Public Comment
Revised Sections of the SED
Deadline: 4/8/13 by 12 noon

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April 8, 2013

Via Email

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814
commentletters@waterboards.ca.gov

Re: **Comment Letter - Revised Sections of the SED**
- Regarding Revised Proposed Policy for Maintaining Instream Flows in Northern California Coastal Streams
- From Living Rivers Council

Dear Ms. Townsend:

This office represents Living Rivers Council ("LRC") with respect to the State Water Resources Control Board's Proposed Policy for Maintaining Instream Flows in Northern California Coastal Streams. Living Rivers Council objects to approval of the Policy on the grounds that the Policy's Revised Substitute Environmental Document ("RSED") fails to comply with the California Environmental Quality Act ("CEQA") and the writ of mandate issued by the Superior Court in *Living Rivers Council v. State Water Resources Control Board*; Alameda Superior Court Case No. RG-10-543923. This letter incorporates by reference Exhibit 1 through 16 that were delivered to your office under separate cover today, in hard copy. This letter also incorporates by reference Exhibit 17, a letter dated April 7, 2013, from Dr. Robert Curry, attached hereto.

SUMMARY

The 2008 SED for this Policy found that it would cause significant adverse impacts on many environmental values. With respect to stream flow and salmonid habitat, the 2008 SED found that the Policy would have significant adverse impacts because it would cause some water users to pump more groundwater as an alternative to applying for permits to appropriate water from surface streams. Yet, the 2008 SED failed to identify or analyze any mitigation measures for this significant impact. As the Superior Court found, this violates CEQA. The Superior Court required that the Board disclose its identification and analysis of mitigation measures to reduce this impact, including the "facially feasible" mitigation measures proposed by Stetson Engineers based on its delineations of subterranean streams and Potential Stream Depletion Areas ("PSDA").

The Board's proposed response to the writ of mandate is two-fold. First, the Policy and SED revisions backtrack, to an uncertain degree, on the Board's previous finding that the Policy will have significant groundwater related impacts on stream flow. In light of the multitude of logical, legal and factual errors that underpin this effort to backtrack, it is clearly a tactical, litigation-driven post-hoc rationalization. (*Laurel Heights Improvement Assn. v. Regents of the Univ. of Calif.* (1988) 47

Cal.3d 376, 394 (*Laurel Heights I*).) The Board's original finding of "significance" deserves much greater weight than the "litigating position" that staff has proposed in the new Supplement to Appendix D. (*Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 24 (*Yamaha*).)

Second, the Policy and SED revisions disclose an analysis of only one mitigation measure for this significant impact: adopting, as a regulation, Stetson Engineers' subterranean stream delineations as legally enforceable conclusions regarding the existence and location of hundreds of miles of subterranean streams over which the Board would then have Water Code § 1200 permitting authority. The revisions find this mitigation measure infeasible. This finding is also based on clear errors of law, and is also not supported by substantial evidence.

Moreover, the Policy and SED revisions fail to disclose or discuss any other mitigation measures that either use Stetson's delineations as the evidentiary basis for other methods of regulation or that are not based on Stetson's delineations. This renders the RSED informationally deficient.

Finally, the RSED's court-mandated discussion of County groundwater regulations fails to include critical information regarding Napa County's groundwater ordinance.

1. THE REVISED SED FAILS TO LAWFULLY IDENTIFY THE SIGNIFICANT ENVIRONMENTAL IMPACTS CAUSED BY POLICY INDUCED INCREASES IN GROUNDWATER USE.

CEQA's first core requirement is to identify and disclose to the public the significant environmental effects of government action. (*Laurel Heights I, supra,* 47 Cal.3d at p. 400; Public Resources Code §§ 21002.1; 21061; 21081.) The determination of "significance" then drives the remainder of the CEQA process. For example, if an initial study finds that impacts will not be significant, further environmental review under CEQA is not required. CEQA Guidelines, §15143 [effects dismissed in an Initial Study as clearly insignificant and unlikely to occur need not be discussed further in an EIR].) Conversely, where there is a "reasonable possibility" that a significant effect will occur, preparation of an EIR is required. (*Citizens for Responsible Equitable Environmental Development v. City of Chula Vista* (2011) 197 Cal.App.4th 327, 331 [an EIR must be prepared when there is substantial evidence in the record to support a fair argument that the project may have a significant effect on the environment].)

Similarly, where an EIR finds that an impact is not significant, the EIR need not identify or disclose mitigation measures to reduce that impact, and where an EIR finds that an impact is significant, the EIR must identify and disclose mitigation measures to reduce it as much as is feasible. (*Mountain Lion Foundation v. Fish & Game Commission* (1997) 16 Cal.4th 105, 127, citing CEQA, § 21080.5, subd. (d)(3)(A); § 21002 [To effectuate its environmental protection mandate, CEQA requires agencies to identify and analyze "alternatives to [a] proposed project and mitigation measures to minimize <u>significant</u> adverse environmental effects."]; see also, Public Resources Code § 21081.)

a. The 2008 SED clearly disclosed that Policy-induced increases in groundwater use will cause significant impacts.

The 2008 SED clearly disclosed that the Policy's impacts on streamflow and other resources would be significant due to ther Policy's effect of increasing the use of groundwater. (See AR 1882-1887.) The 2008 SED found:

(1) Adoption of the Policy threatens over 100 distinct, potentially significant adverse impacts resulting from six types of actions that people are likely to take in response to the Policy. (AR 1917-1978.)[1]

(2) These actions are (1) increased groundwater pumping, (2) increased diversions under riparian rights, (3) increased reliance on alternative water sources, (4) modification of existing onstream dams, (5) removal of existing onstream dams, and (6) construction of offstream storage facilities. (AR 3.)

(3) Each of these actions result in numerous distinct significant environmental impacts. (AR 1885-1904.)

(4) Implementation of the Policy may give rise to increased groundwater extraction and use because the proposed Policy's requirements for appropriations of surface water could lead some affected persons to obtain water supplies under other bases of right, including from sources other than surface water bodies. Additionally, diverters may choose to obtain water supply from other sources if the application of the Policy requirements to a particular water right application reveals that there is insufficient surface water to supply the applicant. (AR 1882, 11760.)

(5) Increased groundwater extraction and use in response to the Policy threatens numerous distinct significant environmental impacts in thirteen different resource areas: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, recreation, transportation and traffic, and utilities and service systems. (AR 1885-1887.)

(6) Of particular importance, increased groundwater extraction can reduce surface water flows when groundwater is hydrologically connected to surface water. Increased pumping of interconnected groundwater could reduce stream flows in the spring and summer, which are critical periods for fish habitat. (AR 2609.)

(7) Reduced surface water flows, particularly summer flows, significantly impact (1) biological resources, by harming riparian vegetation or degrading habitat for sensitive

[1] The administrative record for the Policy lodged in *Living Rivers Council v. State Water Resources Control Board*; Alameda Superior Court Case No. RG-10-543923 is cited as "AR [bates page]."

species; (2) water quality, by adversely altering water temperature and increasing pollutant concentrations due to reduced dilution; and (3) recreational opportunities. (AR 1886-1887.)

(8) Increased groundwater use can lower the groundwater table. (AR 1885.)

(9) In addition to harming anadromous salmonids and their habitat, lowering the water table adversely impacts (1) agricultural resources, by reducing water available to non-irrigated crops that rely on groundwater for soil moisture and resulting in reduced crop yield (*ibid.*); and (2) hydrology, by reducing the production rates of nearby wells (AR 1886).

(10) Reliance on groundwater may significantly impact utilities and service systems through expansion of existing water and energy delivery systems. (*Ibid*.)

b. The RSED Presents Confusing "Conflcting Signals" Regarding Whether Policy-induced Increases in Groundwater Use Will Cause Significant Impacts.

In response to the writ of mandate, the Revised Policy and Revised SED appear to partially retract some of the clear disclosures made in the 2008 SED. As a result, the SED no longer contains a clear disclosure of the significance of environmental impacts attributable to Policy-induced increases in groundwater use. Therefore, the new documents is not informationally sufficient under CEQA.

For example, both the 2008 SED and the Revised SED state that increased groundwater use by water diverters in response to the Policy will result in significant environmental impacts with respect to Air Quality, Biological Resources, Cultural Resources, Geology/Soils, Hazards/Hazardous Materials, Hydrology/Water Quality, Land Use/Planning, Noise, Recreation, Transportation/Traffic, and Utilities/Service Systems. (RSED at pp. 56-58, 86-87.) However, in the Revised SED, the description of impacts to Biological Resources, Hydrology/Water Quality, and Recreation is changed to include the word "unlikely" and the phrase "switching to groundwater pumping" (new language is underscored):

(1) Biological Resources: "Although unlikely, under certain circumstances switching to groundwater pumping ~~Extraction of groundwater~~ could result in reduced surface water flows, ~~particularly summer flows,~~ which could harm riparian vegetation or degrade habitat for sensitive species, particularly if the reduction in surface water flows occurs during the summer." (Revised SED at p. 56.)

(2) Hydrology/Water Quality: "Construction activities could result in short-term increases in sedimentation and degradation of water quality. Although unlikely, under certain circumstances switching to groundwater pumping ~~Extraction of groundwater~~ could result in reduced surface water flows, ~~particularly summer flows,~~ which could adversely affect water temperature and increase constituent concentrations due to reduced dilution, particularly if the reduction in surface water flows occurs during the summer. The production rates of nearby wells could drop." (Revised SED at p. 57.)

> (3) Recreation: "Although unlikely, under certain circumstances switching to groundwater pumping ~~Extraction of groundwater~~ could result in reduced surface water flows, ~~particularly summer flows,~~ which could adversely affect recreational opportunities, particularly if the reduction in surface water flows occurs during the summer. The production rates of nearby wells could drop." (RSED at pp. 57-58.)

The revised language regarding the likelihood that these impacts will occur is confusing, particularly in light of the fact that the Revised SED still concludes the impacts are significant. (RSED at pp. 56-58, 86-87.) Additionally, as discussed in detail below, the RSED's assertion that these impacts could occur only "under certain circumstances [where a diverter] switch[es]" to groundwater pumping further confuses matters because it suggests that increased groundwater use would occur when a surface water user voluntarily replaces existing surface water use with groundwater. Yet, at the same time the RSED retains the 2008 SED's disclosure that the Policy's impact of increasing groundwater use results when water users either forego applying for a surface water permit or have such an application denied due to the Policy's restrictions and then use groundwater to meet their water supply demand.

In effect, the RSED describes the Policy as both increasing groundwater use (because the conclusion that the impacts thereof are significant requires some increase in groundwater use attributable to the Policy) and not increasing groundwater use (due to statements that the impacts thereof are "unlikely" and would only occur in "certain circumstances" that are not clearly articulated in the RSED). This sends a "conflicting signal" to the public and the decisionmakers regarding the nature of the Policy's impacts. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 439 ["The FEIR does not explain the divergence between its estimates and those in the Water Forum Proposal, or even the FEIR's own use of divergent new surface water supply figures in different portions of its discussion"]; *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 655–656 ["By giving such conflicting signals to decisionmakers and the public about the nature and scope of the activity being proposed, the Project description was fundamentally inadequate and misleading."].)

Moreover, ambiguously downplaying the likelihood of occurrence of the significant impacts of Policy induced increases in groundwater use does not alter or reduce the Board's obligation to mitigate these impacts.[2] "[A]n agency is forbidden to approve a project unless it finds there are no significant impacts; or imposes mitigation measures for all significant impacts; or finds mitigation measures infeasible or within the jurisdiction of another agency." (*Woodward Park Homeowners Ass'n, Inc. v. City of Fresno* (2007) 150 Cal.App.4th 683, citing § 21081, subd. (a); Guidelines, § 15091, subd. (a).) "If the EIR finds that there are significant impacts for which no mitigation measures are feasible, it must adopt a statement of overriding considerations before approving the project." (*Id.*, citing § 21081, subd. (b); Guidelines, § 15093.) In short, "[t]here are two things an agency cannot do: It cannot acknowledge a significant impact, refuse to do or find anything else

[2] Such impacts include Biological Resources, Hydrology/Water Quality, Recreation, Air Quality, Cultural Resources, Geology/Soils, Hazards/Hazardous Materials, Land Use/Planning, Noise, Transportation/Traffic, and Utilities/Service Systems). (See RSED at pp. 56-58.)

about it, and approve the project anyway. And it cannot acknowledge a significant impact and approve the project after imposing a mitigation measure not shown to be adequate by substantial evidence."[3] (*Id.*) In this case, the RSED acknowledges that groundwater-related impacts to these three resource areas are potentially significant, just as disclosed in the 2008 SED.

c. The RSED's Reasons for Equivocating on Whether Policy-Induced Increases in Groundwater Use Will Cause Significant Impacts Are Legally Erroneous.

The reasons given in the Revised Policy and the Supplement to Appendix D of the SED for equivocating on whether Policy-induced increases in groundwater use will cause significant impacts are erroneous as a matter of law.

(1) The RSED employs an improper baseline for assessing the impacts of Policy-induced groundwater diversion.

In assessing the Policy's impacts, the Board must consider "the reasonably foreseeable indirect physical changes in the environment that might be caused by implementing the [Policy]." (*Madera Oversight Coalition, Inc. v. County of Madera* (2011) 199 Cal.App.4th 48, 90-91, citing § 21065 [definition of "project" references a "physical change in the environment"]; *Wal–Mart Stores, Inc. v. City of Turlock* (2006) 138 Cal.App.4th 273, 288.)

"In evaluating these potential physical changes, [it is crucial to] properly identify[] the relevant change, which 'is identified by comparing existing physical conditions with the physical conditions that are predicted to exist at a later point in time, after the proposed activity has been implemented. [Citation.] The difference between these two sets of physical conditions is the relevant physical change." (*Id.*, citing *Wal–Mart Stores*, at p. 289.) In *Wal-Mart Stores*, for example, the agency compared (1) a prediction of development that would occur if an ordinance banning discount superstores remained in effect with (2) a prediction of development that would occur without such an ordinance. (*Id.,* citing *Wal–Mart Stores*, at p. 290.) The court rejected this analysis as legally erroneous: because it compared predicted conditions with predicted conditions, rather than comparing existing conditions to predicted conditions, the agency failed to use existing conditions to determine the change resulting from the Project. (*Id.* See also *Sunnyvale West Neighborhood Assn. v. City of Sunnyvale City Council* (2010) 190 Cal.App.4th 1351, 1381, quoting CEQA Guidelines, § 15126.2, subd. (a)[In "assessing the impact of a proposed project on the environment, the lead agency should normally limit its examination to changes in the existing physical conditions in the affected area...."].)

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[3] The Board's regulations echo these requirements. (23 Cal. Code Reg. § 3777, subd. (b)(3) ["The Draft SED shall include, at a minimum, ... An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts"]; § 3779.5, subd. (b) ["if the project as adopted will result in the occurrence of significant effects that are not avoided or substantially lessened, the board shall adopt a statement described in [] Guidelines section 15093 ..."]; 23 Cal. Code Reg. § 3777, subd. (d) ["[a]s to each impact ..., the SED shall contain ... a statement described in section 15093."].)

For purposes of assessing reductions in stream flow reductions due to Policy-induced increases in groundwater use, the RSED uses a baseline that is purely hypothetical in some cases and demonstrably false in other cases. Specifically, the RSED discusses the impact assessment solely in terms of the possibility that the Policy will induce water users to "switch" from surface water to groundwater. In fact, the new documents use the word "switch" a total of 60 new times.[4] For example, the Revised SED states:

> As indicated in the 2008 SED, a switch from surface water diversions to groundwater pumping also could result in reduced surface flows. The 2008 SED did not explain, however, that the potential reduction in surface flows is unlikely. In fact, a switch to groundwater pumping is likely to result in less depletion of surface water flows because groundwater pumping will not ordinarily deplete hydraulically connected surface water flows on a one-to-one basis, and in some cases the groundwater and surface water may lack hydraulic connection entirely, or the hydraulic connection may be indiscernible.

(Supplement to Appendix D, p. 2.)

The implications of the Board's use of the term "switch" (i.e., that Policy-induced increases in the use of groundwater will replace existing surface water diversions that would then be abandoned) are not factually true with respect to the unknown number of water users and quantity of water demand that will be met by new groundwater use due to either (1) users avoiding applying for a surface water permit subject to the Policy; or (2) users withdrawing applications for surface water or having them denied as a result of the Policy. In both cases, there is no "switch" from the actual use of surface water to the use of groundwater, because the new groundwater use does not "replace" a use of surface water. Obviously, a water users' frustrated desire to use surface water cannot establish a valid baseline condition that assumes the would-be or actual applicant is actually using surface water. The Board's contrary assumption is a error of law.[5]

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[4] The term "switch" was used only once – by a commentor – in the 2008 SED. (Response to Comments Vol. 2 at p. 6, Comment 23.4.39].)

[5] There are many more examples of the Board's reliance on the flawed concept of "switching" in a way that obscures its assumption of a legally erroneous baseline. Several examples follow:

- "Surface water diversions have one-to-one impacts on surface water flows. Switching from surface water diversions to groundwater pumping in response to Policy adoption will result in an equal or lesser volume and rate of depletion in streams hydraulically connected to the pumped groundwater aquifer. The foregoing assumes an impact ratio less than or equal to 1:1. In streams affected by groundwater pumping, the volume and rate of surface water flow depletion resulting from groundwater pumping depends on the location of the well and may be further offset by associated determining factors...." (Supplement to Appendix D, p. 4.)
- "Depending on the circumstances, such a delay could cause a significant reduction in surface water flows, which could in turn have a significant adverse impact on biological resources, water quality, or recreation. As discussed below, however, the possible effects of a user switching from

There are, however, a certain number of limited situations where the Policy might induce an actual "switch" from the existing use of surface water to the use of groundwater. This would be the unknown number of pending surface water applications for projects that are currently illegally using surface water. These are discussed in more detail in section 1.c.(2) below. For now, it is enough to note that even here, the Board cannot use these project's current illegal use of surface water as the environmental baseline, because if the application is withdrawn or denied, the Board will presumably shut down the existing illegal use of water. (See Evidence Code § 664.) Moreover, it would be against public policy to allow the Board to create a "higher" baseline by condoning illegal diversions of surface water.

Also, the 2008 SED's analysis of impacts to stream flow caused by Policy induce increases in groundwater use was premised on actual knowledge, as documented by Stetson Engineer's in its subterranean stream delineation work, that groundwater is often hydraulically connected to surface streams across the five county area. Since, groundwater use cannot impact stream flow at all in the absence of such a connection, it is misleading to discount the 2008 SED's conclusions by suggesting that it rested on an erroneous assumption that all increased groundwater pumping may affect stream flow.

(2) The Board's factual assertions are illogical and irrelevant.

In its attempt to paper over the these baseline problems, the Board makes several illogical and irrelevant assertions. For example, the RSED states:

> It merits note that the majority of pending and future water right filings that would be affected by the Policy already exist. Currently, project facilities associated with roughly 90 percent* of pending applications in the Policy area are either completely or partially constructed, and water diversions associated with these facilities are likely already occurring. A similar ratio may exist for future applications as well. Approval of existing projects in accordance with the principles and guidelines established by the Policy would serve to lessen any ongoing impacts of those

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a surface water diversion to a ground water diversion are dependent on a wide range of variables, and therefore it is highly uncertain whether any particular user who may switch to groundwater will cause a delay in surface water flow depletion, whether any such delay will cause a significant reduction in surface water flows, or whether any delayed reduction in flows will have a significant adverse impact on the environment." (Supplement to Appendix D, p. 5.)

- "The foregoing discussion and example demonstrate that the level of significance for a potential impact to surface water flows attributable to a delay in surface water flow depletion as a result of diverters switching to groundwater pumping is dependent on site specific circumstances. In light of the fact that the switch to groundwater as an alternative source of supply is likely to be limited to lower capacity wells in the Policy area and the current lack of known diverters switching to groundwater as a result of the 2010 Policy adoption, a significant impact to surface water flows, while possible, is highly unlikely." (Supplement to Appendix D, p. 6.)

> projects on instream flows and fishery resources and will result in an overall benefit to the environment.
>
> *The estimate of existing diversions associated with pending applications in the Policy area (i.e., unauthorized diversions) is based on billing data from the Division of Water Rights' electronic Water Rights Information Management System for the year 2012. The Division charges annual application fees pursuant to California Code of Regulations, title 23, section 1063 under specific circumstances, including cases where the diversion of water has been initiated before a permit is issued. Out of 255 pending applications in the Policy area, 230 were billed an annual fee in 2012 because the diversion of water, the construction of diversion works, or the clearing of land where the diverted water will be used or stored was initiated before permit issuance.

(Supplement to Appendix D, p. 2.)

This "note" is deeply misleading for many reasons. As a general matter, the fact that some portion of pending (or future) applications for surface water rights ask (or will ask) the Board to "legalize" an existing unauthorized diversion is irrelevant. All applications must be reviewed under the Policy's standards and guidelines. If any appropriation, existing or not, would adversely impact stream flow necessary to protect salmonids and their habitat it may not be authorized. (See 2008 SED Section 6.5.2 ["Dam owners may have to modify existing unauthorized dams to comply with the elements of the Policy pertaining to permitting requirements for onstream dams. Existing unauthorized dams may have to be removed. For these reasons, implementation of the proposed Policy could result in some affected persons modifying or removing onstream storage and regulatory dams and their appurtenant reservoirs." (emphasis added)].)

The first sentence quoted above ("It merits note that the majority of pending and future water right filings that would be affected by the Policy already exist") is unsupported speculation and most likely false, as well as legally irrelevant. The Policy has no sunset provision, so the Board has no idea how many applications will be submitted in the future. Nor can the Board ascertain how many and to what extent future applications will include existing diversions. Further, water users who abandon existing illegal surface water to use groundwater instead account for only a portion of Policy-induced increases in groundwater use. Policy-induced increases in groundwater use also occurs when water users never submit an application for surface water and opt to use groundwater instead, and where a permit application is withdrawn or denied under the Policy's standards and guidelines and the water user uses groundwater instead. Thus, the remainder of the passage quoted above is irrelevant.

The remainder of the paragraph is also misleading. The second sentence states that "[c]urrently, project facilities associated with roughly 90 percent* of pending applications in the Policy area are either completely or partially constructed, and water diversions associated with these facilities are likely already occurring." As the footnote thereto explains, however, the identification of these 90 percent of applications is based on billing records indicating one of three conditions, i.e., the diversion of water, the construction of diversion works, or the clearing of land where the diverted

water will be used or stored was initiated before permit issuance. The Board concluded that 230 out of 255 applications exhibit one of these three conditions. Yet, the percentage of these 230 applications that actually include an ongoing illegal diversion of surface water is unknown and unknowable from the billing records.[6]

This sentence also incorrectly suggests that 90% of the water for which applications are pending is currently being diverted and/or stored. First, although some applicants possess an existing illegal diversion and have applied for a permit to "legalize" that diversion and/or storage, the same applications also seek significant expansions of the amount of water to be diverted. Several examples of these include:

- Exhibit 2, Application A31549. The applicant has an existing unauthorized (i.e., illegal) 30 acre-foot offstream reservoir currently filled with water collected in a draintile system, and the application seeks to allow diversion from a stream into the existing reservoir and the construction of a proposed 70 acre-foot off-stream reservoir. This applicant paid a section 1063 fee. (Exhibit 2, footnote 5].)

- Exhibit 3, Application A31745. The applicant has four unauthorized existing reservoirs with a total capacity of 173 acre-feet. This application seeks a permit to divert water from a stream into two of the existing reservoirs, as well as the construction and diversion of water into a new 120 acre-foot reservoir. The applicant paid a section 1063 fee. (Exhibit 3, footnote 5].)

- Exhibit 4, Application A31813. This applicant seeks to enlarge an existing onstream reservoir from 2 acre-feet to 12 acre-feet and to divert water from a nearby stream to the enlarged reservoir. The reservoir was constructed in 1971 and the applicant does not currently divert water from the nearby stream. This applicant paid a section 1063 fee.[7]

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[6] In response to a Living Rivers' PRA request, the Board produced a billing record spreadsheet containing the information used to determine whether an application (or some portion thereof) sought to "legalize" an existing illegal diversion. (Exhibit 1.) Column E of the spreadsheet indicates (with a simple "Y" or "N") whether certain actions had been "Initiated bef[ore] permit issued." (*Id.*) As explained in the Board's letter, these actions include: (1) the clearing of land for a diversion or use of water, (2) the construction or partial construction of a dam or other diversion structure, or (3) the direct diversion of water. (*Id.* at p. 2.) For each application, the spreadsheet indicates with a "Y" that one of these actions had been initiated (without specifying which) and with an "N" that none of these actions has been initiated. The spreadsheet does not indicate whether any diversion of water is actually occurring.

[7] It is also worth noting that in a 2004 declaration submitted in protest to a water right application, Stan Griffin of Trout Unlimited explained that of 112 application notices that he protested from 1990-2004, 64 applications sought a permit for an already constructed dam or reservoir (several in fact involve multiple existing on-stream dams on the same waterway). (Exhibit 5, Exhibit 2 thereto, ¶ 32.) "In other words, 57% of these applications request retroactive permission." (*Id*. (emphasis

(Exhibit 4, footnote 5.)

Second, some applicants have been charged a fee where there is no existing diversion from a stream, but the other conditions of section 1063 are met (i.e., partial construction of the proposed storage/diversion or clearing of land for use of water). For instance, Application No. A31617 seeks a permit to divert 35 acre-feet of water from a stream to an existing off-stream reservoir. (Exhibit 6.) The off-stream reservoir was built in 2002 and currently stores water from groundwater wells. (*Id.*) This applicant also paid a section 1063 fee. (Exhibit 6, footnote 5.)

The third sentence of the above-quoted passage states: "A similar ratio may exist for future applications as well." This is pure speculation. Speculation is not "substantial evidence."

Moreover, it makes little sense to use pending applications as a gauge for assessing how diverters will respond to the Policy because most applications were filed years, even decades, before the Policy was approved. Indeed, fewer water right application notices have been filed within the Policy area since the Policy's adoption than in any single year over the past decade. Only four application notices (seeking a permit within the Policy counties) were filed in 2012, and only three in 2011. In contrast, 16 were filed in 2010 (all prior to the Policy's adoption on September 28, 2010), 13 in 2009, 11 in 2008, 18 in 2007, 23 in 2006, 8 in 2005, 9 in 2004, 15 in 2003, 23 in 2002, 26 in 2001, and 84 in 2000. The dramatic drop in the number of application notices provides strong evidentiary support for the 2008 SED's prediction that the Policy would cause water users to forgo applying for a surface water permit and opt to use groundwater instead.

In the fourth sentence of the above-quoted passage, the Board suggests that the Policy will not result in any adverse impacts because approving existing projects pursuant to the Policy will lessen the impacts of existing projects. It states: "[a]pproval of existing projects in accordance with the principles and guidelines established by the Policy would serve to lessen any ongoing impacts of those projects on instream flows and fishery resources and will result in an overall benefit to the environment." (Supplement to Appendix D, p. 2 (emphasis added).)

This assertion is based on several illogical assumptions. First, it presumes, prior to evaluation of the pending applications under the Policy, that the Board will approve the applicant's existing illegal diversions. It should go without saying that until the Board makes a decision on these applications, it has no information on whether it will issue a permit or not. Second, this presumption ignores the basis for the 2008 SED's identification of the Policy's significant impact on streamflow as a result of Policy induced increases in groundwater use, namely, that some water users will use groundwater rather than apply for surface water or because their surface water application is denied or withdrawn. Therefore, even if some application are approved, these applications are not and were never considered by the 2008 SED to be contributing to this impact.

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added).) Mr. Griffin made the "reasonable assumption that for applications for which [he had] not protested a similar pattern or percentage exists." (*Id.*) Mr. Griffin made this declaration in support of a petition urging the Board to comply with A.B. 2121 and complaining to the Board for condoning illegal diversions.

As the 2008 SED and RSED explain, "diverters may choose to obtain water supply from other sources if the application of the Policy requirements to a particular water right application reveals that there is insufficient surface water to supply the applicant." (Supplement to Appendix D at p. 1; AR 1882 (emphasis added).) So the Board's observation is irrelevant.

Further, when the Board denies a surface water application on the ground that there is an insufficient amount of water to both protect salmonids and supply the diversion based on the Policy's standards and guidelines, the Board, in essence, appropriates the remaining surface water to the salmonids that the Policy was enacted to protect. If the applicant "switches" to a diversion of interconnected groundwater, the diversion will reduce the amount of water in the stream, notwithstanding the Policy's imposition of "restrictions" on surface water projects. The impacts flowing from the groundwater diversion are not "exchanged" or somehow offset by the reservation of stream flow for salmonids. Rather, the new groundwater diversion reduces stream flow, contrary to the Policy's purpose, even after it has been determined that all remaining water is necessary to prevent harm to imperiled salmonid species.[8]

(3) Increased groundwater use in response to the Policy is likely to adversely impact surface flows.

The Policy restricts surface water diversions to the extent necessary to protect salmonids and their habitat (i.e., when no further diversions can be authorized without causing harm to salmonids). As the RSED states, the "proposed Policy will impose [] restrictions on surface water diversion

[8] The only instance in which a "switch" from surface water to interconnected groundwater is not likely to result in reduced stream flow occurs where a water user chooses to use groundwater in lieu of exercising a permitted appropriative right. Under Water Code section 1011.5, subdivision (b), the appropriative right is not thereby lost due to abandonment:

> When any holder of an appropriative right fails to use all or any part of the water as a result of conjunctive use of surface water and groundwater involving the substitution of an alternate supply for the unused portion of the surface water, any cessation of, or reduction in, the use of the appropriated water shall be deemed equivalent to a reasonable and beneficial use of water to the extent of the cessation of, or reduction in, use, and to the same extent as the appropriated water was put to reasonable and beneficial use by that person. No forfeiture of the appropriative right to the water for which an alternate supply is substituted shall occur upon the lapse of the forfeiture period applicable to water appropriated pursuant to the Water Commission Act or this code or the forfeiture period applicable to water appropriated prior to December 19, 1914.

(Water Code, § 1011.5, subd. (b).) Because the right is not forfeited, the surface water will not become available to another water user for appropriation or claim under another basis of right and, thus, there is some indication that the surface water forgone in the "switch" may remain in the stream to offset impacts of the new groundwater diversion. Of course, however, the Policy is not concerned with existing surface water appropriative rights. Thus, an legal appropriator's conjunctive use of groundwater is irrelevant to the Policy's impacts.

projects." (RSED at pp. 54 (emphasis added).) In these circumstances, increased groundwater use is likely: "diverters may choose to obtain water supply from other sources [including groundwater] if the application of the Policy requirements to a particular water right application reveals that there is insufficient surface water to supply the applicant." (Supp. to Appendix D at p. 1; AR 1882 (emphasis added).)

Almost a third of the 60 most recently noticed applications identify groundwater as an alternate source of water.[9] Policy-induced increases in groundwater use adversely impact stream flow because applications will be denied due to the unavailability of surface water under the Policy, groundwater is a probable alternative source of water; and pumping interconnected groundwater depletes stream flow.

Similarly, groundwater diversions initiated in effort to avoid the Policy's permitting requirements (including circumstances in which the user simply decides not to seek a permit, voluntarily ceases an illegal existing surface water diversion, and/or abandons a pending surface water right application) are likely to reduce stream flow. As the Board staff explained:

> If pumping continues uncontrolled, then surface water levels would become depleted, therefore making it extremely difficult to maintain instream flows. [...] For instance, if the policy gets adopted, the people with water right applications may decide they don't want a water right for surface water, that they instead will pump groundwater. But if they pump groundwater that is connected to surface water, surface water would become depleted anyway. So the importance of regulating these areas is to fundamentally comply with the directives of the AB 2121 legislation. To provide for maintenance of instream flows.
>
> If we chose not to put this into the policy, then we run into the likelihood that stream flows would become depleted because we have only approached the solution part way. We have half a solution, because we choose not to address the possibility of diverters choosing to pump groundwater instead of complying with the policy. In order to get rid of that loophole, []staff recommends that the policy contain [] subterranean stream delineations, and [] delineations of [] groundwater administrative pumping zones.

(AR 7834-7835 [Staff Notes and Memo re Effect of Groundwater Pumping on Instream Flows and Subterranean Stream Issue Summary].)

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[9] The application numbers and amount of water sought (in acre-feet) are: A031840 (8 AF); A031838 (14 AF); A031836 (8.55 AF); A031813 (12 AF); A031804 (17.3 AF); A031791 (1694 AF); A031655 (72 AF); A031629 (12.95 AF); A031632 (40 AF); A031612 (156 AF); A031620 (35 AF); A031618 (15 AF); A031617 (35 AF); A031567 (10 AF); A031549 (100 AF); A031521 (60 AF); A031501 (10 AF); A031465 (60 AF); A031464 (146 AF). Almost another third of the applicants either did not answer the question regarding alternative water sources or answered "N/A."

The Board now asserts that stream flow depletion caused by water users "switching" to groundwater pumping is unlikely because "[c]urrently, the Division is aware of only one prospective surface water diverter switching to groundwater pumping either as a result of the 2010 Policy adoption or to avoid water right permitting requirements in general." (Supplement to Appendix D, at p. 6.) However, in light of the Board's decision not to require groundwater diverters within the Policy area to supply information about new or increased groundwater diversions, there is no reason that the Board would "be aware" of a prospective surface water diverter switching to groundwater pumping unless either (1) the diverter affirmatively withdrew its application or (2) it was so probable that the groundwater diversion could be from a subterranean stream that the diverter sought the Board's counsel.[10] Yet, given the absence of any significant consequences for allowing an application to sit before the Board, there is absolutely no incentive for an applicant to take either action. Thus, the Board's awareness of only one "switching" diverter indicates nothing about the actual number of existing or potential surface water applicants who are now or will be looking to groundwater as a water supply in response to the Policy.

(4) The RSED improperly concludes that groundwater impacts are unlikely on the ground that it is not an adequate alternative source for large water agencies.

The RSED contends that Policy-induced groundwater impacts are unlikely because groundwater would not likely supply all future water needs of large water agencies:

> As described in Appendix D, however, groundwater is not likely to be an adequate alternative supply source for future large agency demands in the Policy area. Only small water agencies and self-supplied individuals are likely to rely on groundwater as an alternative future source of supply. Therefore, delayed surface water flow depletion caused by larger diverters switching to groundwater pumping is unlikely in the Policy area.

(Supplement to Appendix D, at p. 6.)

This logic is flawed in two ways. First, the implied conclusion that "large agency" diverters are not "likely to rely on groundwater as an alternative future source of supply" is based on the proposition that "groundwater is not likely to be an adequate alternative supply source for future large agency demands." The key is the word "adequate." By "adequate," the document means that such agencies cannot meet all of their water demand from groundwater. Assuming this is true, it does not follow that they will not use groundwater to meet as much of their demand as they can, i.e., they are likely to use as much groundwater as it is feasible to obtain.

Second, the final sentence sounds like a conclusion for the entire issue of whether Policy-induced groundwater diversions are likely to impact stream flow. It is not. The "conclusion" says

[10] In this case, it appears to be the latter, as the groundwater well was located approximately 20 feet from the surface water source. (Supplement to Appendix D, at p. 6.)

nothing about whether the "small water agencies and self-supplied individuals" who "are likely to rely on groundwater as an alternative future source of supply" are likely to cause "delayed surface water flow depletion." (Supplement to Appendix D, at p. 6.) It also says nothing about whether the large or small water users are likely to cause "immediate" rather than "delayed" surface water flow depletion. (See *id.*)

(5) The hydrological and geological bases for the RSED's reasons for equivocating are not supported.

On this point, see Dr. Curry's report at Exhibit 17.

2. THE RSED FAILS TO LAWFULLY IDENTIFY AND DISCUSS POTENTIALLY FEASIBLE MITIGATION MEASURES TO REDUCE SIGNIFICANT ENVIRONMENTAL IMPACTS CAUSED BY POLICY-INDUCED INCREASES IN GROUNDWATER USE.

CEQA's second core requirement is to identify and discuss potentially feasible mitigation measures to reduce the significant environmental impacts caused by government action. (*Laurel Heights I, supra*, 47 Cal.3d 376, 400; Public Resources Code §§ 21002.1; 21061; 21081.)

As noted above, the Policy and SED revisions analyze only one mitigation measure for this significant impact, namely, adopting, as new a regulation, Stetson Engineers' subterranean stream delineations as definitive, legally enforceable conclusions regarding the existence and location of hundreds of miles of subterranean streams over which the Board would then have permitting authority under Water Code section 1200 in the five counties covered by the Policy. The revisions find this mitigation measure to be infeasible.

As discussed below, this finding of infeasibility is based on clear errors of law and is not supported by substantial evidence. In sections 2.b(1)-(4), this letter describes several additional mitigation measures that the Board could and should analyze, or adopt, in order to comply with its legal obligations under CEQA.

a. The Board's conclusion that "adopting subterranean stream delineations" as a mitigation measure is not feasible is erroneous as matter of law.

The revisions to the Policy purport to analyze the feasibility of "adopting subterranean stream delineations" as a mitigation measure. (See RSED at pp. 93-101.) As a threshold matter, the Board does not define what such a mitigation measure would consist of. Absent a clear description of the proposed regulation that would "adopt[ ] the delineation amps"(Policy Revisions, p.93), it is impossible to evaluate its feasibility or understand the Board's reasons for determining that such adoption is not feasible.

Nevertheless, the Board advances six reasons in support of its determination that "adopting subterranean stream delineations" (RSED at p.93) is infeasible as a mitigation measure. All are deeply flawed.

(1) The first reason stated is:

> Preliminarily, the likelihood of affected persons switching to groundwater pumping is uncertain. Groundwater occurrence in the Policy area is limited by hydrogeologic factors, including seawater intrusion, thin alluvial deposits, aquifer materials of low permeability, and degraded water quality. Overdraft, resulting from excessive pumping associated with development, could possibly occur in the future, reducing available supplies in late summer and dry years. In some site-specific cases, groundwater may be an adequate alternative supply source for low capacity wells, such as those typically associated with small water agencies or self-supplied individuals for domestic, industrial, or agricultural use. Groundwater is not a likely adequate alternative supply source for large agencies because of the above-described limiting hydrogeologic factors.

(RSED, p. 94, ¶ 1.)

This discussion has nothing to do with whether "adopting subterranean stream delineations" is a feasible mitigation measure. Instead, it represents another attempt by the Board to downplay the significance of the impact.

But the 2008 SED (at AR 2020) summarizes the instances in which available groundwater is not likely to meet the (highest possible) increased demand for groundwater water created by the Policy's restrictions. The RSED wrests this discussion out of context to present it as evidence of "uncertainty" regarding the circumstances under which existing or prospective appropriators are likely to pump groundwater.

This is unavailing in light of the fact that both the 2008 SED and the RSED conclude that the impacts of increased groundwater use are potentially significant, notwithstanding these limited barriers to groundwater use in some locations, for some water users. Indeed, where groundwater <u>is</u> available, both documents indicate that demand will outstrip supply: in Napa, Sonoma, Mendocino, and Marin, groundwater is "not likely adequate to meet lower demand due to limiting hydrogeologic factors. [It] may be adequate for small agencies and self-supplied individuals provided suitable site-specific hydrogeologic conditions." (AR 2019–20; RSED [does not revise these pages].) This demonstrates that groundwater diversions <u>are likely</u> to increase to the greatest extent possible – not that increased groundwater use is <u>unlikely</u>.[11]

Further, any evidence that Policy-induced increases in groundwater use is "unlikely" is irrelevant, as a matter of law, to the Board's obligation to mitigate potentially significant impacts resulting from Policy-induced groundwater use. The likelihood that an impact would occur is a factor considered in (1) the threshold determination of whether an indirect impact is "reasonably foreseeable" and thus must be analyzed in an EIR/SED (see CEQA Guidelines, § 15064, subd. (d))

[11] Further, as noted above, almost a third of the 60 most recently-noticed applications in the Policy area identify groundwater as an alternate source of water.

and (2) the discussion of cumulative impacts (see CEQA Guidelines, § 15030, subd. (b) [cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence].) However, once an agency determines that a reasonably foreseeable impact is potentially significant, it cannot discharge its obligations to mitigate the impact by drawing attention to instances in which the impact is not likely to occur.

In short, the mitigation obligation attaches when an agency acknowledges a potentially significant impact. Although the RSED includes a confusing discussion of the circumstances in which an existing and/or prospective appropriators would be less likely to voluntarily choose to use groundwater in lieu of seeking a permit under the Policy, the RSED does not alter the 2008 SED's ultimate conclusion that the impacts of increased groundwater pumping in response to the Policy are "potentially significant." (See RSED at pp. 55-58, 86-87.) As a result, the Board has an obligation to analyze and disclose potentially feasible ways to mitigate the impacts. This is not accomplished by the Board's attempt to undermine confidence in its own significance findings.

(2) The second reason stated is:

> The potential shift from surface water diversions to groundwater pumping that could be caused by the proposed Policy is unlikely to cause a significant reduction in surface water flows. To the contrary, the potential switch from surface water diversions to groundwater pumping is likely to reduce the impacts of surface water diversions on surface water flows because in many cases groundwater pumping will not deplete surface water flows on a one-to-one basis, and in some cases the groundwater and surface water may not be hydraulically connected at all.

(RSED, p. 94, ¶ 2.)

This discussion also has nothing to do with whether "adopting subterranean stream delineations" is a feasible mitigation measure. It also represents an attempt by the Board to downplay the significance of the impact, by using, as discussed above in section 1.c(1) above, a false baseline semantically disguised by the word "switch."

(3) The third reason stated is:

> Adopting the subterranean stream delineations would not assist the State Water Board in regulating any increase in groundwater pumping outside the areas identified as subterranean streams in the delineation maps, which represent just a small portion of the watersheds in the Policy area. Significant portions of Policy area watersheds are not within the identified subterranean stream areas, yet in many cases these areas contain known existing or planned points of diversion. In addition, prospective groundwater pumpers could be expected to divert outside any delineated subterranean streams whenever possible in order to avoid the State Water Board's permitting authority, further undermining the effectiveness of the subterranean stream delineations as an enforcement tool. The delineation map prepared for the Hopland USGS 7.5 minute quadrangle is a good example of the limited utility of

> adopting the subterranean stream delineations. On this map, the subterranean stream delineated area covers approximately 10% of the watershed area, approximately 14% is designated as a potential stream depletion area, and the remaining 76% is not designated. The majority of the known existing and planned points of diversion are outside the subterranean stream delineated area. The approximate distribution of the known diversion points are provided in table 7-2 below.

(RSED, p. 94, ¶ 3.)

This discussion also has nothing to do with whether "adopting subterranean stream delineations" is a feasible mitigation measure. Instead, it relates to the "effectiveness' of using the mitigation measure; i.e., whether it substantially reduce the impact.

This reason includes many false statements of fact and flawed inferences. First, it is a tautology that the delineation of subterranean streams will not be useful where subterranean streams do not exist. The important question is whether they will facilitate water rights administration and implementation of the Policy where subterranean streams *do* exist. They will. At a minimum, if they are properly proposed and adopted, then the delineations and maps would be quasi-legislative in nature and therefore subject to some deference as the Board enforced the Policy through permits and enforcement actions. (See Exhibit 13 [*Living Rivers Council v. State Water Board*, Final Statement of Decision at p. 6, citing AR 7834-7835 and *North Gualala Water Co. v. State Water Resources Control Bd.* (2006) 139 Cal.App.4th 1577, 1607.) The Board's sleight of hand: focusing attention on impacts that the delineations could not mitigate and ignoring those impacts that it could mitigate is misleading to the public and decision makers regarding the value and potential applications of the delineations.

This observation also applies to the Board's statement that the effectiveness of the delineations of an enforcement tool would be undermined by groundwater users who would pump groundwater water outside of delineated subterranean stream areas. As an initial matter, to the extent that the mere existence of the delineations compels users to pump groundwater from areas less likely to adversely impact stream flow, the delineations would be a resounding success because they would achieve their purpose without any further action by the Board at all. Further, the fact that groundwater users would tend to select points of extraction outside the areas delineated as subterranean streams does not mean that the delineations would not be an effective enforcement tool where a well is within a delineated subterranean stream or other area that could adversely impact stream flows.

Stated differently, the value of the delineations is not coextensive with the amount of land delineated as a subterranean stream or potential stream depletion area in any particular map. It is just as valuable for purposes of siting new wells (in that it provides guidance as to where a new well would have the fewest impacts) as it is to stopping poorly-sited groundwater wells (i.e., those that would adversely impact surface flows due to their location within a subterranean stream or PSDA). In this regard, the Hopland USGS 7.5 minute quadrangle is an excellent example of the broad utility of adopting the subterranean stream delineations. Indeed, it depicts the 24% of the watershed in which impacts are likely to be greatest and regulation is more likely. (See AR 11842.)

(4) The fourth reason stated is:

> Stetson Engineers Inc. prepared the delineation maps based on available geologic information at the time of delineation. Field inspections were not conducted as part of development of the delineation maps and Stetson Engineers Inc. stated that further refinement of the delineation maps could be made in the future. Accordingly, each of the delineation maps includes the following disclosure statement:
>
> *Because the delineated areas on this map were based on information readily available at the time of its development, this map does not claim to represent all of the subterranean streams or potential stream depletion areas that exist in the area. Site specific investigations will be needed to verify the existence of subterranean streams or potential stream depletion areas.*
>
> In light of this disclosure statement and due to the large scale of the delineation maps (1:24,000 is not small enough to show all roads that may be present in the undeveloped portions of the watersheds), it would be necessary for the State Water Board to undertake additional review in order to determine the likelihood and potential extent of future diversion of subterranean flow in these remote areas. The refined delineation maps would be used to distinguish between water in subterranean streams subject to the State Water Board's permitting authority and percolating groundwater subject only to the State Water Board's discretionary enforcement authority under the public trust doctrine and the doctrine of waste. The additional review and associated adoption process for the subterranean stream delineations would entail a lengthy and contentious proceeding. The estimated time and cost associated with the adoption process is described in the following section.
>
> If the subterranean stream delineations were adopted as part of the Policy, they would have regulatory effect. (See Gov. Code, § 11353, subds. (a), (b)(2)(A).) As a result, existing users within the delineated areas who do not have a valid water right, and who might have assumed that they were pumping percolating groundwater for which a permit is not required, would have to either cease pumping or obtain a water right permit from the State Water Board in accordance with the Policy. Similarly, prospective users within the subterranean stream delineations would have to obtain water right permits from the State Water Board. Many of these existing and prospective water users would likely oppose adoption of the delineations, and would seek to present site-specific technical information concerning the validity of the delineations.

(Supplement to Appendix D, p. 95, ¶ 4.)

The Board cites Stetson's acknowledgment that the Delineations they are based on available information and that site-specific studies may be necessary to include additional areas not currently mapped as subterranean stream. The Board wrong implies that this disclaimer undermines Stetson's results. As Dr. Curry explains, and as is apparent from Stetson's own words, Stetson's disclaimer

reflects its conservative methodology, in which it interpreted ambiguous or sparse data sources so that its mapping of subterranean streams errs toward under inclusion. An example of this approach is:

> Delineating the mapped active stream deposits from this source was especially difficult because all of the non Tertiary alluvium could technically be included in this designation, and the inclusion would resolve many discrepancies with the small scale sources at the edges, but using the same criteria on the other 1:24k maps from this set would have lead to more ambiguous decisions on other quads. Considering the large scale of this source and the need for consistency, the decision was made to include only the geologic unit mapped as active stream (ac) from these sources in the delineation of Mapped Active Stream Deposits", rather than try to define "associated alluvial deposits" for these sources.

(AR 11651.)

To avoid having this conservative approach exclude areas from the Board's jurisdiction if the Board does adopt the delineation maps, Stetson included the disclaimer to allow the Board to later add areas to the mapped subterranean streams based on more site-specific investigations, stating:

> "The subterranean stream and PSDA delineations prepared in conjunction with this project will be based on the available geologic information at the time of delineation. Further refinement of the delineations could be made in the future if new information becomes available. Field inspection will not be conducted as part of the delineations. Therefore, the following statement will be included on all maps resulting from this project to insure that no alluvial deposits associated with a "natural channel" are excluded from the jurisdiction of the State Water Board.
>
> > *Because the delineated areas on this map were based on information readily available at the time of its development, this map does not claim to represent all of the subterranean streams or potential stream depletion areas that exist in the area. Site specific investigations will be needed to verify the existence of subterranean streams or potential stream depletion areas.*"

(AR 11763.)

Instead of accepting this disclaimer as further evidence of the reliability of Stetson's delineation maps, the Board turns the disclaimer on its head and construes it as evidence of the unreliability of Steson's results. In fact, however, Stetson's methods were reliable and its results are scientifically valid. (See Exhibit 17.)

With respect to site-specific projects, if the Delineations motivate groundwater users to present the Board with evidence indicating whether a particular well draws diversion from a subterranean stream, a PSDA, or from "unconnected" groundwater, the Delineations will (1) tremendously reduce the Board's regulatory burden of discovering and investigating diversions on

its own and (2) thereby greatly increase the likelihood that a subterranean stream diverter will seek a permit under the Policy and that the Board will engage in an enforcement action to stop diversions from PSDAs that harm salmonids. This demonstrates the effectiveness of the Delineations, not the infeasibility of their use.

The Board apparently concedes that this process can be undertaken, because it provides estimates of the amount of time the process might take and its financial costs (i.e., 3.6 to 12.8 years and $1.3 million to $5 million.) But the Board presents no evidence that these estimates render the process infeasible. The Board apparently expects the time and cost numbers presented to speak for themselves in this regard. They do not.

Presumably, the Board believes these numbers make it infeasible to adopt the delineations as a final, conclusive statement of the location of subterranean streams as a mitigation measure to be included as part of the Policy *immediately*. That is an unrealistic test for feasibility.

Moreover, the Board never considers adopting as a mitigation measure a commitment to engage in the process it describes with the goal of adopting subterranean stream delineations over time as resources permit. When viewed in this more programmatic light, the Board presents no evidence that the time or costs of adopting the delineations, as refined by more site-specific investigation where warranted, render this approach infeasible.

After all, regulating water supply and water quality to protect fish is this Board's legal mandate. The Board is essentially arguing that it is infeasible to do its job!

Indeed, the new documents present no evidence regarding the time or cost of adopting the delineations as compared to the time invested and cost of enforcement of the Board's other regulatory efforts, including the development of this Policy for the last nine years since the Legislature adopted AB 2121. Without this information, there is no context for determining whether the estimated time and cost of adopting the Delineations is too high to be feasible.

> [Economic feasibility] must be evaluated within the context of the proposed project. "The fact that an alternative [or mitigation measure] may be more expensive or less profitable is not sufficient to show that the alternative is financially infeasible. What is required is evidence that the *additional* costs or lost profitability are sufficiently severe as to render it impractical to proceed with the project." (*Citizens of Goleta Valley v. Board of Supervisors, supra,* 197 Cal.App.3d at p. 1181, italics added.) While an EIR need not analyze "every imaginable alternative or mitigation measure," "it should evince good faith and a reasoned analysis." (*Los Angeles Unified School Dist. v. City of Los Angeles, supra,* 58 Cal.App.4th at p. 1029; *San Francisco Ecology Center v. City and County of San Francisco* (1975) 48 Cal.App.3d 584, 596; CEQA Guidelines, § 15088, subd. (c).)

(*Uphold Our Heritage v. Town of Woodside* (2007) 147 Cal.App.4th 587, 599.)

Furthermore, if full mitigation is too costly within the Board's current budget, the Board

must request funding from the Legislature. (See *City of Marina v. Board of Trustees of California State University* (2006) 39 Cal.4th 341, 367 ["for the Trustees to disclaim responsibility for making such payments before they have complied with their statutory obligation to ask the Legislature for the necessary funds is premature, at the very least."].)

(5) The fifth and sixth reasons stated are:

> The State Water Board can consider the delineation maps and supporting information on a case-by-case basis to assist in determining whether a particular groundwater well is subject to the State Water Board's permitting authority even if the delineation maps are not adopted.

(Supplement to Appendix D, p. 96, ¶ 5.)

> As discussed above, the State Water Board has the legal authority to regulate any unacceptable impacts associated with the potential increase in groundwater pumping pursuant to the State Water Board's authority to prohibit the unreasonable use of water.

(Supplement to Appendix D, p. 96, ¶ 6.)

These reasons also have nothing to do with whether "adopting subterranean stream delineations" is a feasible mitigation measure. Instead, they relate to different mitigation measures that the Board could adopt, but has not.

The Board's ad hoc enforcement authority, whether based on the ad hoc use of the delineations or otherwise, does not meet the CEQA requirements that an agency must "commit" to mitigation, that mitigation measures must be legally enforceable, and where a plan or policy is the subject of environmental review, incorporated into the plan or policy at issue.

At any rate, the fact that the Board can use the delineations on a case-by-case basis does not provide any indication that it would be infeasible to adopt the delineations into the Policy as legally enforceable provisions (to the extent that it is reasonable to make them enforceable, based on the level of existing detail and confidence in their accuracy).

Similarly, the fact that the Board possesses the authority to regulate groundwater diversions with adverse impacts on streams does not indicate that the delineations are not feasible mitigation measures. Far to the contrary, the fact that the Board possesses the legal authority necessary to adopt and implement the delineations indicates that the delineations <u>are legally feasible</u> mitigation measures.

Indeed, the delineations could be a highly effective tool that the Board could employ in efforts to prevent unreasonable uses of water. For instance, if the delineations are properly adopted and accorded legal effect, the Board could use the delineations to shift the burden of proving the source of groundwater to the user (i.e. to prove that the diversion is *not* from a subterranean stream

or stream depletion zone), rather than bearing the burden, in each enforcement action, of proving that a diversion *is* within a subterranean stream or stream depletion zone.

b. The Board's RSED Fails to Identify and Discuss Other Mitigation Measures to Reduce this Significant Impact.

The mitigation measure the Board evaluated and that is discussed in section 2.a above is somewhat of a straw man because it represents the most costly, most time-consuming and most difficult to defend way of using Stetson's subterranean stream and PSDA delineations. There are other less time-consuming or costly ways to use these delineations as evidence supporting other methods of regulation to reduce the Policy's significant environmental impacts.

The following are a few examples of other mitigation measures that a good faith disclosure effort would include in the RSED. In discussing these measures for their feasibility, the Board should bear in mind the deference that California courts give to agency decision-making in the adoption of quasi-legislative rules.

> In the case of quasi-legislative regulations, the court has essentially two tasks. The first duty is "to determine whether the [agency] exercised [its] quasi-legislative authority within the bounds of the statutory mandate." [citation] ..."While the construction of a statute by officials charged with its administration, including their interpretation of the authority invested in them to implement and carry out its provisions, is entitled to *great weight*, nevertheless 'Whatever the force of administrative construction ... *final responsibility for the interpretation of the law rests with the courts*.' * * *
>
> The court's second task arises once it has completed the first. "If we conclude that the [agency] was empowered to adopt the regulations, we must also determine whether the regulations are 'reasonably necessary to effectuate the purpose of the statute.' [(§ 11342.2).] In making such a determination, the court will not 'superimpose its own policy judgment upon the agency in the absence of an arbitrary and capricious decision.' [Citations.]"

Yamaha Corp. of America v. State Bd. of Equalization (1998) 19 Cal.4th 1, 16-17]

(1) Pumping from Subterranean streams: Adopting the Subterranean streams delineations for the limited purpose of triggering site-specific review of groundwater use within the delineated areas.

The Board could propose a rule establishing a rebuttable presumption that groundwater extraction in areas mapped and delineated as subterranean stream is, in fact, from a subterranean stream and therefore requires an appropriation permit under Water Code § 1200.

(2) Pumping from percolating groundwater: Adopting the PSDA delineations for the limited purpose of triggering site-specific review of groundwater use within the delineated areas.

The Board's takes an unduly narrow view of its authority to regulate groundwater use. The Board says it can exercise permitting authority under Water Code § 1200 solely over water in subterranean streams, and that it can regulate the use of percolating groundwater only under its authority to prevent waste and unreasonable use of water under California Constitution, article X, section 2 and Water Code § 100. The prohibition on waste and unreasonable use of water in California Constitution, article X, section 2 and Water Code § 100 applies to all water users, regardless of basis of water right, and all water rights and methods of diversion. (*Peabody v. Vallejo* (1935) 2 Cal.2d 351, 367, 372.) Water Code section 275 directs the Board to take all appropriate proceedings or actions to prevent waste or violations of the reasonable use standard. Section 275 grants the Board authority to regulate water uses in addition to, or beyond, its permitting authority under Water Code section 1200. (*Imperial Irrigation Dist. v. State Water Resources Control Bd.* (1990) 225 Cal.App.3d 548, 559-60 [regulatory jurisdiction extends to pre-1914 rights, which are not subject to § 1200]; Second RJN, Exh 1 [Sax, SWQCB Final Report No. 0-076-300-0] pp. 84-85.)

The Board's authority over percolating groundwater is not limited to filing discretionary enforcement lawsuits based on the doctrine of waste. The Board may regulate percolating groundwater as part of a state water quality control policy. Under AB 2121 and Water Code section 1259.4, the Policy is not just a water rights policy; it is also a water quality control policy pursuant to chapter 3, article 3 (commencing with section 13140) of the Porter-Cologne Water Quality Control Act (Wat. Code, 13000 *et seq*.). The Porter-Cologne Act provides the Board with authority to regulate any activity that may affect water quality. (See AR 13853.) Water Code section 13142(a) provides that state water quality policy may include "principles and guidelines for long-range resource planning, including ground water and surface water management programs ...." (*Id*., quoting Wat. Code, 13142, subd. (a).) The Act "defines 'water quality control' broadly as 'the regulation of any activity or factor which may affect the quality of the waters of the state ....'" (See AR 13853, quoting Wat. Code, 13050(I); see also *U.S. v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 227 [nothing in the federal Clean Water Act or California's Porter-Cologne Act "allows the Board to limit the scope of its basin planning function to such water quality standards as are enforceable under the Board's water rights authority"].) This statute grants "wide authority to the Board <u>in its planning role</u> to identify activities of the projects and other water users requiring correction." (*U.S. v. State Water Bd., supra*, 182 Cal.App.3d at p.124 (emphasis added).) "[W]ater quantity is a component of water quality because the quantity of water in a stream is a property or characteristic of the water that affects its use." (See *id.*.) Under Water Code § 13142(a), the Policy may include "principles and guidelines" for managing percolating groundwater extractions to maintain instream flows necessary to protect salmonids.

The Board also has an affirmative duty to take the public trust into account in the <u>planning</u> of water resources. Therefore, the Board's jurisdiction to protect trust resources is not limited to individual enforcement actions. The public trust doctrine protects navigation, fishing, recreation, environmental values, and fish and wildlife habitat. (*National Audubon Soc'y v. Superior Court* (1983) 33 Cal.3d 419, 434-435].)

Finally, "[w]here another law grants an agency discretionary powers, CEQA supplements those discretionary powers by authorizing the agency to use the discretionary powers to mitigate or avoid significant effects on the environment when it is feasible to do so with respect to projects subject to the powers of the agency." (Guidelines, § 15140, subd. (c).) Thus, the Board may and must use its authority to prevent waste and unreasonable uses of water, and to protect the public trust, to mitigate the impacts of its projects.

Under these authorities, the Policy could include the use of Stetson's PSDA delineations to establish a reporting requirement for all groundwater users in the PSDA to provide information to the Board that it could use to investigate whether groundwater pumping in the area is depleting stream flows, including (1) identify any well(s) on the parcel to be served by the diversion; (2) specify any intended season and rate of pumping from the well(s); (3) provide well test data sufficient to calculate whether the stream under review is within the likely "radius of influence" of the well(s) and whether the intended groundwater extraction has the potential to harm salmonids by reducing flows in the stream.[12]

(3) Pumping by applicants for appropriation permits from subterranean stream ands percolating groundwater: Adopting the subterranean stream and PSDA delineations for the purpose of triggering site-specific review of groundwater use on parcels where newly appropriated water will be used.

The Board could revise the Policy to include the following provisions:

- Require that any appropriation permit applicant (1) identify any well(s) on the parcel to be served by the diversion; (2) specify any intended season and rate of pumping from the well(s); (3) provide well test data sufficient to calculate whether the stream under review is within the likely "radius of influence" of the well(s) and whether the intended groundwater extraction has the potential to harm salmonids by reducing flows in the stream.

- For any well that has the potential to harm salmonids by reducing flows in the stream, the Board must prepare an "initial study" under CEQA to be followed by either a negative declaration, a mitigated negative declaration or an EIR. If the Board finds that use of the well will cause or contribute to significant adverse impacts on salmonids by reducing flows in the stream, the Board must impose a condition of approval that prohibits any extraction of groundwater that will cause or

[12] The Board's regulation of groundwater in the Russian River (at 23 Cal. Code Regs. § 862) is an example of this type of regulation. The recent decision by the Mendocino County Superior Court invalidating these rules (attached as Exhibit 14), while not necessarily correct and while clearly not binding on this Policy, provides useful guidance to the Board in crafting quasi-legislative rules like those suggested here that do not run afoul of the requirement of Code of Civil Procedure § 1094.5 that adjudication of specific existing water rights must be supported by proper findings and substantial evidence supporting the findings or the requirement of Government Code 11350 to demonstrate the necessity for the regulation.

contribute to significant adverse impacts on salmonids by reducing flows in the stream, consistent with all legal requirements for the imposition of mitigation measures, including the "nexus,""rough proportionality" and other requirements of CEQA Guideline 15126.4.

This measure would impose this reporting requirement on permit applicants only for the limited purpose and only to the limited extent necessary to determine whether the applicant's use of groundwater will affect the water that is "available" for appropriation by the applicant by reference to the effect of such groundwater use on stream flow. A basic principle of virtually all environmental law is that environmental resources like clean water, water supply and fish and wildlife are part of the public "commons" and that anyone who uses or degrades the resource for private gain must apply for permit to do so. The permit process allows public servants employed by government agencies to require that permit applicants provide sufficient information to demonstrate that their activity will either not harm the environment or that any harm is "acceptable" in light of the project's public benefits. This measure allows for the reasonable exercise of discretion by the Board and Board staff as to what measures are necessary and appropriate to make the assessment.

(4) Ask legislature for the authority needed to protect salmonids.

To the extent the Board believes that its existing authority to regulate groundwater use is insufficient to do anything to reduce this significant impact, it can ask the Legislture to grant it the authority to do so. "The lack of legal powers of an agency to use in imposing an alternative or mitigation measure may be as great a limitation as any economic, environmental, social, or technological factor." (*Id.* [discussion foll.].) Although an agency need not analyze *infeasible* mitigation measures, it must nonetheless explain the reasons underlying a determination that a particular measure is not feasible. (Guidelines, § 15126.4, subd. (a)(5).) Thus, in *City of Marina, supra*, the Supreme Court held that an agency's incorrect determination under CEQA that it was legally infeasible to mitigate a significant impact because it did not have the legal authority to so do was an abuse of discretion. (39 Cal.4th 341, 355-56, 360-361.). The Supreme Court also held in that case that the agency abused its discretion is determining that mitigation was infeasible due to lack of funds where it could have but did not ask the Legislature for funds to mitigate the project's impacts.

Indeed, California is virtually the only western states that does not regulate groundwater use. See Sax, Joseph L., Review of the Laws Establishing the SWRCB's Permitting Authority over Appropriations of Groundwater Classified as Subterranean Streams and the SWRCB's Implementation of Those Laws. SWRCB No. 0-076-300-0, Final Report (attached hereto as Exhibit 15). There are a number of regulatory approaches that the Board could ask the legislature to adopt. Oregon's approach, perhaps as modified in ways discussed by Professor Sax, is particularly suitable for Northern California and for use of Steson's delineations. (See Exhibit 15, pp. 77-78.)

3. Napa County's "fair use" thresholds are not appropriate criteria of significance for groundwater impacts.

The RSED's discussion of the Napa County groundwater ordinance leaves out a crucial part of the analysis.

Napa County's "fair use" thresholds are set forth in the County Planning Department's *Water Availability Analysis: Policy Report* dated August 2003 (Exhibit 7 to IS/MND Comment Letter). This document describes the procedure for obtaining a groundwater permit and establishes "thresholds" for use of groundwater in each basin. If a new water use is below this threshold, the County assumes that the use will not have a significant adverse effect on the aquifer.

For example in the area west of the City of Napa, the "threshold" is deemed to be 1 acre-foot per acre per year for each acre of land overlying the aquifer and 0.5 acre-feet per acre per year for each acre of land overlying the gradient up-slope of the aquifer (i.e., hillside area). In the County's view, as long as these groundwater sue does not exceed these "fair share" thresholds, the project will not have a significant adverse impact on groundwater resources.

These thresholds are not appropriate criteria for determining whether the project's impacts on groundwater are significant for several reasons.

First, the thresholds are not based on any actual data relating to the availability or use of groundwater in the area. The County's 2003 Policy report explains that the "threshold" number for the Valley Floor Area was "determined in 1991 in the form of a staff report to the Board of Supervisors" and "was established as the expected demand an average vineyard would have." (Exhibit 7.)

The 1991 staff report to the Board of Supervisors notes that no "extensive groundwater studies" have been conducted in many areas of the County. (Exhibit 11, p. 2.) The 1991 staff report summarizes the findings in the January 1991 Water Resources Study for the Napa County Region (Napa County Flood Control and Water Conservation District) (Exhibit 12).

Second, the County's threshold does not take into account the fact that many previous owners may be using more than their "threshold" amount of water. As a result, later owners may not be able to use their "threshold" amount, or as in this case, any amount of groundwater, without causing or exacerbating existing significant effects. The IS/MND presents no information on the use of groundwater by other property owners in the area.

Third, existing groundwater supplies in the Napa Valley area are already being depleted, yet the County's thresholds assume, without any empirical foundation, that groundwater extraction and recharge are in balance. The April 7, 1999, Memorandum from Napa County Planning Department to the Planning Commission regarding a General Plan Amendment relating to groundwater use and the proposed Napa County groundwater ordinance states:

> The 1991 study also develops short and long-term projections of water needs among users and regions in Napa County using these figures to balance water needs and supplies for the period 1990 through 2020. The results of this balance reveal substantial long-term inadequacies in supply throughout the county's subareas, although admittedly at present some areas have a short-term surplus. From this study it is reasonable to conclude that as the county's water needs increase in the future, increases in agricultural and rural uses are likely to eliminate any existing

> groundwater surplus. This change from surplus to deficit is likely to be far more pronounced and occur sooner rather than later if increased municipal and industrial demands are also satisfied by using groundwater.... The 1993 Report confirmed the 1991 Study's results and projected a growing deficiency in the overall county water supply. The Report identified shortfalls of 10,900 acre feet by the year 2000 which would increase to 18,600 acre feet by 2020 and 23,000 acre feet by 2030.

(Exhibit 9, p. 2.) Similarly, the January 19, 1993, Memorandum from the Napa County Water Advisory Committee to the Napa County Board of Supervisors re: Report of the Water Advisory Committee, referenced in the 1999 staff report above and attached to the IS/MND Comment Letter as Exhibit 10, notes that "Increased utilization of groundwater as a source of supply can have severe detrimental effects on the rural residential community."

In sum, the "thresholds" are not based on any empirical analysis of actual groundwater supply or availability, and cannot be substituted for the reasoned, fact-based analysis required by CEQA. While the County claims that the "fair share" test of groundwater use protects the environment, the County has never subjected it to a CEQA analysis.

Thank you for your attention to this matter.

Very Truly Yours,

Tom Lippe

Thomas N. Lippe

List of Exhibits

1. March 28, 2013 letter from State Water Resources Control Board, Division of Water Rights in response to Living Rivers Council's March 22, 2013 Public Records Act and attachment thereto.

2. Application to Appropriate Water No. 31549.

3. Application to Appropriate Water No. 31745.

4. Application to Appropriate Water No. 31813.

5. Trout Unlimited and the Peregrine Chapter of the National Audubon Society's Petition to the State Water Resources Control Board for Timely and Effective Regulation Of New Water Diversions in Central Coast Streams (October 27, 2004) and Exhibits 1-17 thereto.

6. Application to Appropriate Water No. 31617.

7. Water Availability Analysis: Policy Report: Napa County Department of Public Works,

August 2003.

8. Department of Public Works, Water Availability Analysis.

9. April 7, 1999 Memorandum from Napa County Planning Department and other County agencies to Planning Commission regarding General Plan Amendment relating to groundwater use and proposed Napa County groundwater ordinance.

10. January 19, 1993 Memorandum from Napa County Water Advisory Committee to Napa County Board of Supervisors re Report of the Water Advisory Committee.

11. February 27, 1991 Memorandum to Planning Commission from Jeffrey Redding, Director, re Public Works Department Report on Water Availability Analysis

12. January 1991 Water Resources Study for the Napa County Region (Napa County Flood Control and Water Conservation District).

13. August 9, 2012 Final Statement of Decision in *Living Rivers Council v. State Water Resources Control Board*, Alameda Superior Court Case No. RG-10-543923.

14. September 26, 2012 Order in *Light, et al. v. State Water Resources Control Board*, Mendocino Superior Court Case No. SCUK CVG-11-59127.

15. Sax, Joseph. Review of the Laws Establishing the State Water Resources Control Board's Permitting Authority Over Appropriations of Groundwater Classified as Subterranean Streams and the State Water Resources Control Board's Implementation of Those Laws, SWRCB No. 0-076-300-0 (January 19, 2002).

16. Russian River Frost Protection Regulation, 23 Cal. Code Regs. § 862.

17. Letter dated April 7, 2013 From Dr. Robert Curry (with CV).

State Water Resources Control Board

MAR 28 2013

Mr. Thomas N. Lippe
Lippe Gaffney Wagner LLP
329 Bryant St., Ste. 3D
San Francisco, CA 94107

Dear Mr. Lippe:

PUBLIC RECORDS ACT REQUEST – SUPPLEMENT TO APPENDIX D OF THE SUBSTITUTE ENVIRONMENTAL DOCUMENT PREPARED FOR THE FOR THE POLICY FOR MAINTAINING INSTREAM FLOWS IN NORTHERN CALIFORNIA COASTAL STREAMS

The State Water Resources Control Board (State Water Board), Division of Water Rights (Division) is in receipt of your Public Records Act request letter dated March 22, 2013. Your letter requests the opportunity to review all records upon which Board staff relied in making the assertion in the Supplement to Appendix D of the Substitute Environmental Document for the Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams that "Currently, project facilities associated with roughly 90 percent [footnote omitted] of pending applications in the Policy area are either completely or partially constructed, and water diversions associated with these facilities are likely already occurring." You stated that the requested files should include, at a minimum, the 255 pending applications referenced in the footnote to this statement.

As stated in the Supplement to Appendix D, and as noted in your letter, staff relied on billing data from the Division's electronic Water Rights Information Management System (eWRIMS) for the year 2012 to make this determination. Section 1063, subsection (a), of the State Water Board's regulations requires that a water right applicant pay an annual fee *if the diversion of water, the construction of diversion works, or the clearing of land where the diverted water will be used or stored, has been initiated before a permit is issued authorizing the diversion*. The billing module within eWRIMS contains a data field that can be toggled to 'yes' or 'no' to indicate whether this criterion is met. If 'yes' is selected for a project, then that applicant is charged an annual fee for that application. Division staff uses this feature to determine which applicants should receive an annual fee. Division staff has a high degree of confidence in the accuracy of these data because the application form requires applicants to provide this information to the Division, applicants have no reason to falsely report that they have initiated construction or diversion without authorization, and applicants are likely to notify Division staff if they were

incorrectly charged an annual fee. For this reason, Division staff did not review the individual application files to make the determination referred to in your letter, although the files are likely to contain information substantiating the data in eWRIMS. Instead, Division staff relied solely on the information in the eWRIMS database.

Some of the eWRIMS information is available on the State Water Board's website through the public version of eWRIMS, but the billing data are not. I am enclosing the spreadsheet created in January 2013 that contains the eWRIMS data that Division staff relied on to determine how many of the pending applications in the Policy area are for facilities that are either completely or partially constructed. Although one of the columns contains data for Fiscal Year 2007-2008, the remaining columns contain information that was current when the spreadsheet was created. Please advise me if you would like to inspect the eWRIMS database itself, or if you would still like to inspect and copy the 255 individual application files, even though Division staff did not rely on an independent review of those files in making the determination referenced in your letter. The application files are public records and are available for review in the Division's records room during normal business hours.

To make arrangements to inspect and copy the records described above, please contact me at (916) 341-5438 or by email at pcrader@waterboards.ca.gov. Written correspondence can be directed to: State Water Resources Control Board, Division of Water Rights, Attn: Phillip Crader, P.O. Box 2000, Sacramento, CA 95812-2000.

Sincerely,

ORIGINAL SIGNED BY:

Phillip Crader, Manager
Permitting and Licensing Section
Division of Water Rights

Enclosure

A	B	C	D	E	F	G	H	I	J	K
APPLICATION_ NUMBER	COUNTY	Annual fee for 2007/ 2008	Public notice issued	Initiated bef. permit issued	Appli-cation on hold	CEQA lead agency	Not submitted supp. info	Not paid the fees	Include hydro-power	Final Billing Determin-ation
A031057	Mendocino	N	Y	N	N	N	N	N	N	N
A031554	Mendocino	Y	Y	N	N	N	N	N	N	Y
A031661	Mendocino		Y	N	N	Y	N	N	N	Y
A031662	Mendocino		Y	N	N	Y	N	N	N	Y
A031870	Mendocino	Y	Y	N	N	N	N	N	N	N
A031932	Mendocino	N	N	N	N	N	N	N	N	N
A029686	Napa	N	Y	N	N	N	Y	N	N	Y
A029687	Napa	N	Y	N	N	N	Y	N	N	Y
A029800	Napa	N	Y	N	N	N	N	N	N	N
A029801	Napa	N	Y	N	N	N	N	N	N	N
A029951	Napa	N	Y	N	N	N	Y	N	N	Y
A030384	Napa		Y	N	N	N	Y	N	N	Y
A030594	Napa	N	Y	N	N	N	N	N	N	N
A030674	Napa	N	Y	N	N	N		N	N	N
A030725	Napa	N	Y	N	N	N	N	N	N	N
A030756	Napa	N	Y	N	N	N	N	N	N	N
A030965	Napa	N	Y	N	N	N	N	N	N	N
A031548	Napa	Y	Y	N	N	N	N	N	N	N
A031550	Napa	N	Y	N	Y	N	N	N	N	Y
A031556	Napa	N	Y	N	Y	N	N	N	N	Y
A030579	Sonoma	Y	Y	N	Y	N	N	N	N	Y
A030592	Sonoma	Y	Y	N	N	N	N	N	N	Y
A030663	Sonoma	N	Y	N	N	N	N	N	N	N
A031021	Sonoma	N	Y	N	N	N	N	N	N	N
A031501	Sonoma	N	Y	N	N	N	N	N	N	N
A031521	Sonoma	N	Y	N	N	N	N	N	N	N
A031655	Marin	Y	Y	Y	N	N	N	N	N	Y
A031656	Marin	Y	Y	Y	N	N	N	N	N	Y
A031911	Marin	N	N	Y	N	N	N	N	N	Y
A029511	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A029512	Mendocino	Y	Y	Y	N	N		N	N	Y
A029525	Mendocino	Y	Y	Y	Y					Y
A029526	Mendocino	Y	Y	Y	Y					Y
A029760	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A029763	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A029783	Mendocino	Y	Y	Y	N	N	N		N	Y
A029810	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030015	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030290	Mendocino	Y	Y	Y	N	N	Y	N	N	Y
A030448	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030449	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030479	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030492	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030533	Mendocino	N	Y	Y	N	N	N	N	N	Y
A030553	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030554	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030615	Mendocino	Y	Y	Y	N	N	N	N	N	Y

A030656	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030683	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030718	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030722	Mendocino	Y	Y	Y	N	N	N	N		Y
A030761	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030779	Mendocino			Y						Y
A030780	Mendocino			Y						Y
A030792	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030794	Mendocino		Y	Y	N	N	N	N	N	Y
A030828	Mendocino		Y	Y						Y
A030859	Mendocino	N	Y	Y	N	N	N	N	N	Y
A030860	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030861	Mendocino	N	Y	Y	N	N	N	N	N	Y
A030870	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030877	Mendocino			Y						Y
A030878	Mendocino		Y	Y						Y
A030892	Mendocino	N	Y	Y	N	N	N	N	N	Y
A030912	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030966	Mendocino			Y						Y
A030982	Mendocino	Y	Y	Y	N	N	N		N	Y
A030986	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A030987	Mendocino	Y	Y	Y	N	N	N		N	Y
A030988	Mendocino	Y	Y	Y	N	N	N		N	Y
A030994	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031003	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031004	Mendocino	N	Y	Y	N	N	N	N	N	Y
A031040	Mendocino	Y		Y	N	N	N	N	N	Y
A031059	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031060	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031080	Mendocino	N	Y	Y	N	N	N	N	N	Y
A031085	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031086	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031087	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031091	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031092	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031093	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031105	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031135	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031138	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031140	Mendocino	Y		Y	N	N	N	N	N	Y
A031141	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031159	Mendocino			Y						Y
A031179	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031184	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031250	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031253	Mendocino			Y						Y
A031255	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031258	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031259	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031260	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031261	Mendocino	Y	Y	Y		N	N	N	N	Y
A031282	Mendocino			Y						Y

A031296	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031305	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031311	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031315	Mendocino	Y	Y	Y	N	N	Y	N	N	Y
A031336	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031339	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031383	Mendocino	Y	Y	Y	N		N	N	N	Y
A031386	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031387	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031398	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031399	Mendocino	Y	Y	Y	N	N	Y	N	N	Y
A031418	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031426	Mendocino		Y	Y	N	N	N	N	N	Y
A031434	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031435	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031437	Mendocino		Y	Y	N	N	Y	N	N	Y
A031445	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031446	Mendocino	Y	Y	Y	N		N	N	N	Y
A031447	Mendocino		Y	Y	N					Y
A031464	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031465	Mendocino	Y	Y	Y	N	N	N		N	Y
A031467	Mendocino		Y	Y	N	N	N	N	N	Y
A031504	Mendocino	Y	Y	Y	Y	N	N	N	N	Y
A031513	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031519	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031553	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031739	Mendocino	N		Y	N	N	N	N	N	Y
A031792	Mendocino	N	N	Y	N	N	N	N	N	Y
A031804	Mendocino	N	Y	Y	N	N	N	N	N	Y
A031835	Mendocino			Y						Y
A031838	Mendocino	N	N	Y	N	N	N	N	N	Y
A031843	Mendocino	N	Y	Y						Y
A031877	Mendocino	Y	Y	Y	N	N	N	N	N	Y
A031887	Mendocino			Y	N				N	Y
A031888	Mendocino	N	N	Y	N	N	N	N	N	Y
A031910	Mendocino	N	N	Y	N	N	N	N	N	Y
A031923	Mendocino	N		Y	N	N	N	N	N	Y
A031924	Mendocino	N		Y	N	N		N	N	Y
A031978	Mendocino	N	N	Y	N	N	N	N	N	Y
A031988	Mendocino	N	N	Y	N	N	N	N	N	Y
A029853	Napa	Y	Y	Y	N	N	N	N	N	Y
A029929	Napa	N	Y	Y	N	N	Y	N	N	Y
A030012	Napa	Y	Y	Y	N	N	N	N	N	Y
A030144	Napa			Y						Y
A030322	Napa	Y	Y	Y	N	N	Y	N	N	Y
A030323	Napa	N	Y	Y	N	N	N	N	N	Y
A030545	Napa	N	Y	Y	N	N	N	N	N	Y
A030546	Napa	N	Y	Y	N	N	N	N	N	Y
A030597	Napa	Y	Y	Y	N	N	N	N	N	Y
A030605	Napa	Y	Y	Y	N	N	N	N	N	Y
A030679	Napa	Y	Y	Y	N	N		N	N	Y
A030698	Napa	Y	Y	Y	N	N	N	N	N	Y

A030737	Napa	Y	Y	Y	N	N	N	N	N	Y
A030856	Napa	N	Y	Y		N	N	N	N	Y
A030950	Napa	Y	Y	Y	N	N	N	N	N	Y
A031034	Napa	Y	Y	Y	N	N	N	N	N	Y
A031279	Napa	N	Y	Y	N	N	N	N	N	Y
A031312	Napa	Y	Y	Y	N	N	N	N	N	Y
A031452	Napa	Y	Y	Y	N	N	N	N	N	Y
A031533	Napa	Y	Y	Y	N	N	N	N	N	Y
A031549	Napa	N	N	Y	Y	N	N	N	N	Y
A031560	Napa	N	N	Y	Y	N	N	N	N	Y
A031635	Napa	Y	Y	Y	N	N	N	N	N	Y
A031670	Napa	N	N	Y	N	N	N	N	N	Y
A031715	Napa	N	N	Y	N	N		N	N	Y
A031736	Napa	N	N	Y	N	N	N	N	N	Y
A031817	Napa			Y	Y					Y
A031824	Napa			Y						Y
A031840	Napa			Y						
A031890	Napa	N	N	Y	N	N	N	N	N	Y
A031891	Napa			Y						
A031925	Napa	N	N	Y	N	N	N	N	N	Y
A031929	Napa	N	N	Y	N		N	N	N	Y
A031930	Napa	N	N	Y	N	N	N	N	N	Y
A031939	Napa	N		Y	N	N		N	N	Y
A031951	Napa	N	N	Y	N	N			N	Y
A031994	Napa	N	N	Y	N	N	N	N	N	Y
A029381	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A029737	Sonoma			Y						Y
A029784	Sonoma			Y						Y
A029983	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030126	Sonoma	Y	Y	Y	Y	N	N	N	N	Y
A030181	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030186	Sonoma			Y						Y
A030223	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030259	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030336	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030368	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030369	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030405	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030429	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030558	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030583	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030687	Sonoma			Y						Y
A030688	Sonoma			Y						Y
A030730	Sonoma			Y						Y
A030744	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030745	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030781	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030782	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030787	Sonoma	Y	Y	Y	N	N	N	N		Y
A030796	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030798	Sonoma	N	Y	Y	N	N	N	N	N	Y
A030800	Sonoma	Y	Y	Y	N	N	N	N	N	Y

A030802	Sonoma	Y	Y	Y	Y	N	Y	N	N	Y
A030805	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030806	Sonoma		Y	Y	N	N	N	N	N	Y
A030807	Sonoma		Y	Y	N	N	N	N	N	Y
A030879	Sonoma	Y	Y	Y	N	N	Y	N	N	Y
A030880	Sonoma	Y	Y	Y	N	N	Y	N	N	Y
A030954	Sonoma		Y	Y	N	N	N	N	N	Y
A030955	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A030981	Sonoma			Y						Y
A030991	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031022	Sonoma	Y	Y	Y	Y	N	Y	N	N	Y
A031033	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031049	Sonoma	N	Y	Y	N	N	N	N	N	Y
A031050	Sonoma			Y						Y
A031056	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031095	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031149	Sonoma	N	Y	Y	N	N	N	N	N	Y
A031254	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031256	Sonoma	N	Y	Y	N	N	N	N	N	Y
A031262	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031300	Sonoma	N	Y	Y	N	N	N	N	N	Y
A031323	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031385	Sonoma	N	Y	Y	N	N	N	N	N	Y
A031507	Sonoma	Y	Y	Y	N	N		N	N	Y
A031567	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031616	Sonoma		Y	Y	N	N	N	N	N	Y
A031617	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031618	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031620	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031621	Sonoma	Y	Y	Y	N	N	Y	N	N	Y
A031622	Sonoma	Y	Y	Y	N	N	Y	N	N	Y
A031623	Sonoma	Y	Y	Y	Y	N	N	N	N	Y
A031629	Sonoma	Y	Y	Y	N	N	N	N	N	Y
A031719	Sonoma	N	N	Y	N	N	N	N	N	Y
A031735	Sonoma	N	N	Y	N	N	N	N	N	Y
A031737	Sonoma			Y	N	N		N	N	Y
A031738	Sonoma	N		Y	N	N	N	N	N	Y
A031740	Sonoma	N	N	Y	N	N	N	N	N	Y
A031743	Sonoma	N	N	Y	N	N	N	N	N	Y
A031745	Sonoma	N	N	Y		N	N	N	N	Y
A031746	Sonoma	N	N	Y	N	N	N	N	N	Y
A031811	Sonoma	N	N	Y	N	N	N	N	N	Y
A031813	Sonoma	N	Y	Y	Y	N	N	N	N	Y
A031818	Sonoma		N	Y	N	N	N	N	N	Y
A031834	Sonoma			Y						
A031836	Sonoma	N	N	Y	N	N	N	N	N	Y
A031889	Sonoma	N	N	Y	Y	N	N	N	N	Y
A031909	Sonoma	N	N	Y	N	N	N	N	N	Y
A031914	Sonoma	N	Y	Y	N	N	N	N		Y
A031920	Sonoma	N	N	Y	N	N		N	N	Y
A031955	Sonoma	N	N	Y						Y
A031956	Sonoma	N	N	Y	N	N			N	Y

230 existing facilities

TYPE OR PRINT
IN BLACK INK
(For instructions, see booklet: "How to File an Application to Appropriate Water in California")

APPLICATION NO. 31549

California Environmental Protection Agency

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
www.waterboards.ca.gov/waterrights

APPLICATION TO APPROPRIATE WATER

1. APPLICANT/AGENT

	APPLICANT	ASSIGNED AGENT (if any)
Name	Frank Family Vineyards, LLC	Napa Valley Vineyard Engineering, Inc.
	c/o Todd Graff	Drew L. Aspegren, P.E.
Mailing Address	1091 Larkmead Lane	176 Main St. Suite B
City, State & Zip	Calistoga, CA 94515	St. Helena, CA 94574
Telephone	(707) 942-0859	(707) 963-4927
Fax		(707) 963-1297
E-mail		NapaVVE@aol.com

2. OWNERSHIP INFORMATION (Please check type of ownership.)

☐ Sole Owner ☑ Limited Liability Company (LLC) ☐ General Partnership*
☐ Limited Partnership* ☐ Business Trust ☐ Husband/Wife Co-Ownership
☐ Corporation ☐ Joint Venture ☐ Other _____

*Please identify the names, addresses and phone numbers of all partners.

3. PROJECT DESCRIPTION (Provide a detailed description of your project, including, but not limited to, type of construction activity, area to be graded or excavated, and how the water will be used.) Add additional pages if needed and check box below and label as an attachment.

This project consists of an existing 30 AF offstream reservoir currently filled with water collected in a draintile system, and ±70 acres of existing vineyard. The application seeks to allow diversion from an unnamed stream tributary to Capell Creek to offstream storage in the existing reservoir and a proposed 70 AF offstream reservoir. The water will be used for irrigation and frost protection on the 70 acres of existing vineyard, and 30 acres of proposed vineyard.

☐ *For continuation, see Attachment No. ___*

4. PURPOSE OF USE, DIVERSION/STORAGE AMOUNT AND SEASON

a. PURPOSE OF USE (irrigation, domestic, etc.)	DIRECT DIVERSION				STORAGE		
	AMOUNT		SEASON OF DIVERSION		AMOUNT	SEASON OF COLLECTION	
	Rate (cfs or gpd)*	Acre-feet per annum	Beginning date (month & day)	Ending date (month & day)	Acre-feet per annum	Beginning date (month & day)	Ending date (month & day)
Irrigation					100	Nov. 1	Apr. 15
Frost Protection							
	Total afa			Total afa	100		

☐ *See Attachment No. ___* * If rate is less than 0.025 cubic feet per second (cfs), use gallons per day (gpd).

b. Total combined amount taken by direct diversion and storage during any one year will be 100 acre-feet.

c. Reservoir storage is: ☐ onstream ☒ offstream ☐ underground (If underground storage, attach Underground Storage Form.)

d. County in which diversion is located: Napa County in which water will be used: Napa

5. SOURCES AND POINTS OF DIVERSION/REDIVERSION

a. Sources and Points of Diversion (POD)/Points of Rediversion (PORD):

☒ POD / ☐ PORD # Unnamed Stream tributary to Capell Creek thence Lake Berryessa

☐ POD / ☐ PORD # _____ tributary to _____ thence _____

☐ POD / ☐ PORD # _____ tributary to _____ thence _____

☐ POD / ☐ PORD # _____ tributary to _____ thence _____

If needed, attach additional pages, check box below and label attachment

☐ *See Attachment No. ___*

b. State Planar and Public Land Survey Coordinate Description:

POD/ PORD #	CALIFORNIA COORDINATES (NAD 83)	ZONE	POINT IS WITHIN (40-acre subdivision)	SECTION	TOWN-SHIP	RANGE	BASE AND MERIDIAN
POD	N 1,927,771 E 6,502,971	2	SW¼ of NW¼	16	7N	3W	MD
			¼ of ¼				
			¼ of ¼				
			¼ of ¼				

If needed, attach additional pages, check box below and label attachment

☐ *See Attachment No. ___*

c. Name of the post office most often used by those living near the proposed point(s) of diversion: Napa

6. WATER AVAILABILITY

a. Have you attached a water availability analysis for this project? ☐ YES ☒ NO
If NO, provide sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation: If needed, attach additional pages, check box below and label attachment. The letter by the Upper Putah Creek Watermaster dated June 4, 2009 states that, based on the estimated average annual depletion of active pending applications within Napa County, there is sufficient water for A31549.
☐ *See Attachment No.* ___

b. Is your project located on a stream system declared to be fully appropriated by the State Water Resources Control Board (State Water Board) during your proposed season of diversion?
☐ YES ☒ NO

c. In an average year, does the stream dry up at any point downstream of your project? ☒ YES ☐ NO
If YES, during which months? ☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☒ Jun ☒ Jul ☒ Aug ☒ Sep ☐ Oct ☐ Nov ☐ Dec

d. What alternate sources of water are available if a portion of your requested diversion season must be excluded because water is not available for appropriation? (e.g., percolating groundwater, purchased water, etc.) If needed, attach additional pages, check box below and label attachment
Perched water from a draintile system, wells
☐ *See Attachment No.* ___

7. PLACE OF USE

a.

USE IS WITHIN (40-acre subdivision)	SECTION*	TOWNSHIP	RANGE	BASE & MERIDIAN	IF IRRIGATED	
					Acres	Presently cultivated?
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
				Total Acres:		

*Please indicate if section is projected with a "(P)" following the section number.

☒ *See Attachment No.* 1 Please provide the Assessor's Parcel Number(s) for the place of use:
032-130-008, 032-130-044

8. PROJECT SCHEDULE

Project is: ☐ proposed, ☒ partially complete or ☐ complete (Year completed - _____).

Extent of completion: 30 AF offstream reservoir and 70 acres of vineyard are existing.

Estimated amount of time in years it will take for construction to be completed: 5 years

Estimated amount of time in years it will take for water to be put to full beneficial use: 10 years

9. JUSTIFICATION OF AMOUNTS REQUESTED

a. ☒ IRRIGATION: Maximum area to be irrigated in any one year: 100 acres.

CROP	ACRES	METHOD OF IRRIGATION (sprinklers, flooding, etc.)	WATER USE (Acre-feet/Yr.)	SEASON OF WATER USE	
				Beginning date (month & day)	Ending date (month & day)
wine grapes	100	drip	50	May 15	Sept. 1

☐ *See Attachment No. ___*

b. ☐ DOMESTIC: Number of residences to be served: _____ Separately owned? ☐ YES ☐ NO Number of people to be served: _____ Estimated daily use per person is: _____ gallons per day Area of domestic lawns and gardens: _____ square feet Incidental domestic uses:

_____
(dust control area, number and kind of domestic animals, etc.)

a. ☐ STOCKWATERING: Kind of stock: _____ Maximum number: _____
Describe type of operation: _____
(feedlot, dairy, range, etc.)

d. ☐ RECREATIONAL: Type of recreation: ☐ Fishing ☐ Swimming ☐ Boating ☐ Other _____

e. ☐ MUNICIPAL:

POPULATION List for 5-year periods until use is completed		MAXIMUM MONTH		ANNUAL USE		
Period	Population	Average daily use (gallons per capita)	Rate of diversion (cfs)	Average daily use (gallons per capita)	Acre-foot (per capita)	Total (acre-feet)
Present						

☐ *See Attachment No. ___*

Month of maximum use during year: _____
Month of minimum use during year: _____

f. ☐ HEAT CONTROL: Area to be heat controlled: _____ net acres
Type of crops protected: _____
Rate at which water is applied to use: _____ gpm per acre
Heat protection season will begin _____ (month and day) and end _____ (month and day).

g. ☒ FROST PROTECTION: Area to be frost protected: 100 net acres
Type of crops protected: wine grapes
Rate at which water is applied to use: 55 gpm per acre
The frost protection season will begin Mar. 15 (month & day) and end May 15 (month & day).

h. ☐ INDUSTRIAL: Type of industry: _____

Basis for determination of amount of water needed: _____

i. ☐ MINING: Name of the claim: _____ ☐ Patented ☐ Unpatented
Nature of the mine: _____ Mineral(s) to be mined: _____
Type of milling or processing: _____
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B. & M.

j. ☐ POWER: Total head to be utilized: _____ feet
Maximum flow through the penstock: _____ cfs Maximum theoretical horsepower capable of being generated by the works (cfs x fall ÷ 8.8): _____
Electrical capacity (hp x 0.746 x efficiency): _____ kilowatts at: _____% efficiency
After use, the water will be discharged into _____ (watercourse)
in ____ ¼ of ____ ¼ of Section _____, T _____, R _____, _____B&M. FERC No.: _____

k. ☐ FISH AND WILDLIFE PRESERVATION AND/OR ENHANCEMENT: List specific species and habitat type that will be preserved or enhanced: _____

l. ☐ OTHER: Describe use: _____
Basis for determination of amount of water needed: _____

10. DIVERSION AND DISTRIBUTION METHOD

a. Diversion will be by gravity by means of: _____
(dam, pipe in unobstructed channel, pipe through dam, siphon, weir, gate, etc.)

b. Diversion will be by pumping from: offset diversion box with screened intake in the stream.
(sump, offset well, channel, reservoir, etc)
Pump discharge rate: 3 ☒ cfs or ☐ gpd Horsepower: 10
Pump Efficiency: 70%

c. Conduit from diversion point to first lateral or to offstream storage reservoir:

CONDUIT (pipe or channel)	MATERIAL (type of pipe or channel lining; indicate if pipe is buried or not)	CROSS-SECTION (pipe diameter, or ditch depth and top and bottom width) (inches or feet)	LENGTH (feet)	TOTAL LIFT OR FALL		CAPACITY (cfs, gpd or gpm)
				feet	+ or -	
pipe	pvc	12"	±2060	±20	+	3 cfs

☐ *See Attachment No. ___*

d. Storage reservoirs: (For underground storage, complete and attach underground storage form)

RESERVOIR NAME OR NUMBER	DAM				RESERVOIR		
	Vertical height from downstream toe of slope to spillway level (feet)	Construction material	Length (feet)	Freeboard: dam height above spillway crest (feet)	Surface area when full (acres)	Capacity (acre-feet)	Maximum water depth (feet)
Resv. 1 (E)	N/A (offstream reservoir)				±2	±30	±20
Resv. 2 (P)	N/A (offstream reservoir)				±4	±70	±25

☐ *See Attachment No. ___*

e. Outlet pipe: Complete for storage reservoirs having a capacity of 10 acre-feet or more.

RESERVOIR NAME OR NUMBER	OUTLET PIPE				
	Diameter in inches	Length in feet	Fall: Vertical distance between entrance and exit of outlet pipe in feet	Head: Vertical distance from spillway to entrance of outlet pipe in feet	Dead Storage: Storage below entrance of outlet pipe in acre-feet
Resv. 1 (E)	N/A (offstream reservoir)				
Resv. 2 (P)	N/A (offstream reservoir)				

☐ *See Attachment No. ___*

e. If water will be stored and the reservoir is not at the point of diversion, the maximum rate of diversion to off-stream storage will be 3 cfs. Diversion to offstream storage will be made by:
☒ Pumping ☐ Gravity

11. CONSERVATION AND MONITORING

a. What methods will you use to conserve water? Explain.
Drip Irrigation, soil moisture sensors

b. How will you monitor your diversion to be sure you are within the limits of your water right and you are not wasting water? ☐ Weir ☒ Meter ☐ Periodic sampling ☐ Other (describe)

12. RIGHT OF ACCESS

a. Does the applicant own all the land where the water will be diverted, transported and used?
☒ YES ☐ NO
If NO, I ☐ do ☐ do not have a recorded easement or written authorization allowing me access.

b. List the names and mailing addresses of all affected landowners and state what steps are being taken to obtain access:

☐ *See Attachment No. ___*

13. EXISTING WATER RIGHTS AND RELATED FILINGS

a. Do you claim an existing right for the use of all or part of the water sought by this application?
☐ YES ☒ NO
If YES, please specify: ☐ Riparian ☐ Pre-1914 ☐ Registration ☐ Permit ☐ License
☐ Percolating groundwater ☐ Adjudicated ☐ Other (specify) _____

b. For each existing right claimed, state the source, year of first use, purpose, season and location of the point of diversion (to within quarter-quarter section). Include number of registration, permit, license, or statement of water diversion and use, if applicable.

☐ *See Attachment No. ___*

c. List any related applications, registrations, permits, or licenses located in the proposed place of use or that utilize the same point(s) of diversion.

☐ *See Attachment No. ___*

14. OTHER SOURCES OF WATER

Are you presently using, or do you intend to use, purchased water or water supplied by contract in connection with this project? ☐ Yes ☒ No If yes, please explain:

15. MAP REQUIREMENTS

The Division cannot process your application without accurate information showing the source of water and location of water use. You must include a map with this application form that clearly indicates the quarter/quarter, section, township, range, and meridian of (1) the proposed points of diversion and (2) the place of use. A copy of a U.S.G.S. quadrangle/topographic map of your project area is preferred, and can be obtained from sporting goods stores or through the Internet at http://topomaps.usgs.gov. A certified engineering map is required when (1) appropriating more than three cubic feet per second by direct diversion, (2) constructing a dam which will be under the jurisdiction of the Division of Safety of Dams, (3) creating a reservoir with a surface area in excess of ten acres or (4) appropriating more than 1,000 acre-feet per annum by underground storage. See the instruction booklet for more information.

☒ *See Attachment No. 2*

ENVIRONMENTAL INFORMATION

Note: Before a water right permit may be issued for your project, the State Water Board must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared for your project, a determination must be made of who is responsible for its preparation. If the State Water Board is determined to be responsible for preparing the CEQA document, the applicant will be required to pay all costs associated with the environmental evaluation and preparation of the required documents. Please answer the following questions to the best of your ability and submit with this application any studies that have been conducted regarding the environmental evaluation of your project.

16. COUNTY PERMITS

a. Contact your county planning or public works department and provide the following information:

Person contacted: Terri Abraham Date of contact: July 22, 2009

Department: Napa County Planning Dept. Telephone: (707)299-1331

County Zoning Designation:

Agricultural Watershed

Are any county permits required for your project? ☒ YES ☐ NO If YES, check appropriate box below:

☒ Grading permit ☐ Use permit ☐ Watercourse ☐ Obstruction permit ☐ Change of zoning

☐ General plan change ☒ Other (explain):

Erosion Control Plan for Vineyard Development

b. Have you obtained any of the required permits described above? ☐ YES ☒ NO

If YES, provide a complete copy of each permit obtained.

☐ *See Attachment No. ___*

17. STATE/FEDERAL PERMITS AND REQUIREMENTS

a. Check any additional state or federal permits required for your project:
☐ Federal Energy Regulatory Commission ☐ U.S. Forest Service ☐ U.S. Bureau of Land Management ☐ U.S. Corps of Engineers ☐ U.S. Natural Res. Conservation Service ☒ Calif. Dept. of Fish and Game ☐ State Lands Commission ☐ Calif. Dept. of Water Resources (Div. of Safety of Dams) ☐ Calif. Coastal Commission ☐ State Reclamation Board ☐ Other (specify)

_____

b. For each agency from which a permit is required, provide the following information:

AGENCY	PERMIT TYPE	PERSON(S) CONTACTED	CONTACT DATE	TELEPHONE NO.
DFG	1603	Corinne Gray	6/16/09	(707) 944-5526

☐ *See Attachment No. ___*

c. Does your proposed project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank, or riparian habitat of any stream or lake? ☐ YES ☒ NO
If YES, explain:

_____
_____
_____
_____
_____
_____

☐ *See Attachment No. ___*

b. Have you contacted the California Department of Fish and Game concerning your project?
☒ YES ☐ NO If YES, name, telephone number and date of contact:
See Above

18. ENVIRONMENTAL DOCUMENT

a. Has any California public agency prepared an environmental document for your project?
☐ YES ☒ NO

b. If YES, submit a copy of the latest environmental document(s) prepared, including a copy of the notice of determination adopted by the California public agency. Public agency:

_____

c. If NO, check the appropriate box and explain below, if necessary:
☐ The applicant is a California public agency and will be preparing the environmental document.*
☒ I expect that the State Water Board will be preparing the environmental document.**
☐ I expect that a California public agency other than the State Water Board will be preparing the environmental document.* Public agency: _____
☐ *See Attachment No. ___*

* Note: When completed, submit a copy of the final environmental document (including notice of determination) or notice of exemption to the State Water Board, Division of Water Rights and proof of payment of the State Clearinghouse filing fee. Processing of your application cannot be completed until these documents are submitted.

** Note: CEQA requires that the State Water Board, as Lead Agency, prepare the environmental document. The information contained in the environmental document must be developed by the applicant and at the applicant's expense under the direction of the State Water Board, Division of Water Rights.

19. WASTE/WASTEWATER

a. Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation? ☐ YES ☒ NO
If YES, or you are unsure of your answer, explain below and contact your local Regional Water Quality Control Board for the following information (See instruction booklet for address and telephone no.):

_____
_____
_____

☐ *See Attachment No.* ___

b. Will a waste discharge permit be required for your project? ☐ YES ☒ NO
Person contacted: _____ Date of contact: _____

c. What method of treatment and disposal will be used? _____
_____
_____

☐ *See Attachment No.* ___

20. ARCHEOLOGY

a. Have any archeological reports been prepared on this project? ☒ YES ☐ NO
b. Will you be preparing an archeological report to satisfy another public agency? ☐ YES ☐ NO
c. Do you know of any archeological or historic sites located within the general project area?
☒ YES ☐ NO If YES, explain:
Site near the old farmstead on southeast corner of property.
_____
_____

☐ *See Attachment No.* ___

21. ENVIRONMENTAL SETTING

Attach **two complete sets of color photographs**, clearly dated and labeled, showing the vegetation that exists at the following three locations:

☐ Along the stream channel immediately downstream from the proposed point(s) of diversion.
☐ Along the stream channel immediately upstream from the proposed point(s) of diversion.
☐ At the place(s) where the water is to be used.
☒ *See Attachment No.* 3

SUBMITTAL FEES

Calculate your application filing fee using the "Water Right Fee Schedule Summary" that was enclosed in the application packet. The "Water Right Fee Schedule Summary" can also be viewed at the Division of Water Rights' website (www.waterrights.ca.gov).

A check for the application filing fee, payable to the "Division of Water Rights" and an $850 check for the Streamflow Protection Standards review fee [Pub. Resources Code § 10005(a)], payable to the "California Department of Fish and Game," must accompany this application. All applicable fees are required at the time of filing. If the application fees are not received, your application will not be accepted and will be returned to you. Please check the fee schedule for any fee changes prior to submitting the application.

DECLARATION AND SIGNATURE

I declare under penalty of perjury that all information provided is true and correct to the best of my knowledge and belief. I authorize my agent, if I have designated one above, to act on my behalf regarding this water right application.

[signature] AIF/Winemaker 7-30-09

Signature of Applicant | Title or Relationship | Date

Signature of Co-Applicant (if any) | Title or Relationship | Date

Applications that are not completely filled out and/or do not have the appropriate fees will not be accepted. In the event that the Division has to return the application because it is incomplete, a portion of the application submittal fee will be charged for the initial review.

"APPLICATION TO APPROPRIATE WATER" CHECKLIST

Before you submit your application, be sure to:

- ☐ **Answer each question completely.**
- ☐ **Number, label and include all necessary attachments.**
- ☐ **Include a legible map that meets the requirements discussed in the instruction booklet.**
- ☐ **Include the Water Availability Analysis or sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation.**
- ☐ **Include two complete sets of color photographs of the project site.**
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- ☐ **Sign and date the application.**

Send the original and one copy of the entire application to:

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

ATTACHMENT 1

PLACE OF USE

USE IS WITHIN	SECTION	TOWNSHIP	RANGE	BASE & MERIDIAN	ACRES	IF IRRIGATED PRESENTLY CULTIVATED?
NW 1/4 OF NW 1/4	16	7N	3W	MD	8	☐ YES ☒ NO
NE 1/4 OF NW 1/4	16	7N	3W	MD	10	☐ YES ☒ NO
SE 1/4 OF NW 1/4	16	7N	3W	MD	22	☒ YES ☐ NO
SE 1/4 OF NW 1/4	16	7N	3W	MD	1	☐ YES ☒ NO
SW 1/4 OF NW 1/4	16	7N	3W	MD	27	☒ YES ☐ NO
NW 1/4 OF SW 1/4	16	7N	3W	MD	10	☒ YES ☐ NO
NW 1/4 OF SW 1/4	16	7N	3W	MD	1	☐ YES ☒ NO
NE 1/4 OF SW 1/4	16	7N	3W	MD	11	☒ YES ☐ NO
NE 1/4 OF SW 1/4	16	7N	3W	MD	10	☐ YES ☒ NO

Total Existing	70 acres
Total Proposed	30 acres
	100 acres

Working Copy KDM

A031745

STATE WATER RESOURCES CONTROL BOARD

2009 JAN 28 PM 2:37

DIV. OF WATER RIGHTS SACRAMENTO

TYPE OR PRINT IN BLACK INK (For instructions, see booklet: "How to File an Application to Appropriate Water in California")

California Environmental Protection Agency

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
www.waterrights.ca.gov

APPLICATION NO. _____

APPLICATION TO APPROPRIATE WATER

1. APPLICANT/AGENT

	APPLICANT	ASSIGNED AGENT (if any)
Name	Windsor Oaks Associates	Diane L. Willson
		Napa Valley Vineyard Engineering
Mailing Address	P. O. Box 883	176 Main St. Suite B
City, State & Zip	Windsor, CA 94592	St. Helena, CA 94574
Telephone	(707) 433-3810	(707) 963-4927
Fax		(707) 963-1297
E-mail		nvvedlw@covad.net

2. OWNERSHIP INFORMATION (Please check type of ownership.)

☐ Sole Owner ☐ Limited Liability Company (LLC) ☐ General Partnership*
☐ Limited Partnership* ☐ Business Trust ☐ Husband/Wife Co-Ownership
☐ Corporation ☒ Joint Venture ☐ Other _____

*Please identify the names, addresses and phone numbers of all partners.

3. PROJECT DESCRIPTION (Provide a detailed description of your project, including, but not limited to, type of construction activity, area to be graded or excavated, and how the water will be used.) Add additional pages if needed and check box below and label as an attachment.

☒ *For continuation, see Attachment No.* 1

Additional $1000 Recvd 2/4/09.

Rec'd $4245.00 $850.00 1/28/09 MS

Total Recvd. 5245

850 Feb

6095

4. PURPOSE OF USE, DIVERSION/STORAGE AMOUNT AND SEASON

a. PURPOSE OF USE (irrigation, domestic, etc.)	DIRECT DIVERSION				STORAGE		
	AMOUNT		SEASON OF DIVERSION		AMOUNT	SEASON OF COLLECTION	
	Rate (cfs or gpd)*	Acre-feet per annum	Beginning date (month & day)	Ending date (month & day)	Acre-feet per annum	Beginning date (month & day)	Ending date (month & day)
Irrigation					293	October 1	March 31
Frost Protection						November 1	March 31 (POD #4 only)
Dust Control							
Fire Protection							
Recreation	Total afa			Total afa	293		

☐ *See Attachment No. ___* * If rate is less than 0.025 cubic feet per second (cfs), use gallons per day (gpd).

b. Total combined amount taken by direct diversion and storage during any one year will be 293 acre-feet.

c. Reservoir storage is: ☒ onstream ☒ offstream ☐ underground (If underground storage, attach Underground Storage Form.)

d. County in which diversion is located: Sonoma County in which water will be used: _____

5. SOURCES AND POINTS OF DIVERSION/REDIVERSION

a. Sources and Points of Diversion (POD)/Points of Rediversion (PORD):

☐ POD / ☐ PORD #_____ tributary to _____ thence _____

☐ POD / ☐ PORD #_____ tributary to _____ thence _____

☐ POD / ☐ PORD #_____ tributary to _____ thence _____

☐ POD / ☐ PORD #_____ tributary to _____ thence _____

If needed, attach additional pages, check box below and label attachment

☒ *See Attachment No. 2*

b. State Planar and Public Land Survey Coordinate Description:

POD/ PORD #	CALIFORNIA COORDINATES (NAD 83)	ZONE	POINT IS WITHIN (40-acre subdivision)	SECTION	TOWN-SHIP	RANGE	BASE AND MERIDIAN
			¼ of ¼				
			¼ of ¼				
			¼ of ¼				
			¼ of ¼				

If needed, attach additional pages, check box below and label attachment

☒ *See Attachment No. 2*

c. Name of the post office most often used by those living near the proposed point(s) of diversion: Windsor

6. WATER AVAILABILITY

a. Have you attached a water availability analysis for this project? ☐ YES ☒ NO
If NO, provide sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation: If needed, attach additional pages, check box below and label attachment.

☒ *See Attachment No.* 3

b. Is your project located on a stream system declared to be fully appropriated by the State Water Resources Control Board (State Water Board) during your proposed season of diversion?
☐ YES ☒ NO

c. In an average year, does the stream dry up at any point downstream of your project? ☒ YES ☐ NO
If YES, during which months? ☐ Jan ☐ Feb ☐ Mar ☐ Apr ☒ May ☒ Jun ☒ Jul ☒ Aug ☒ Sep ☐ Oct ☐ Nov ☐ Dec

d. What alternate sources of water are available if a portion of your requested diversion season must be excluded because water is not available for appropriation? (e.g., percolating groundwater, purchased water, etc.) If needed, attach additional pages, check box below and label attachment
none
☐ *See Attachment No.* ___

7. PLACE OF USE

a.

USE IS WITHIN (40-acre subdivision)	SECTION*	TOWNSHIP	RANGE	BASE & MERIDIAN	IF IRRIGATED	
					Acres	Presently cultivated?
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
				Total Acres:		

*Please indicate if section is projected with a "(P)" following the section number.

☒ *See Attachment No.* 4 Please provide the Assessor's Parcel Number(s) for the place of use:
086-100-016, 015, 014, 013; 086-180-013, 012, 011, 010

8. PROJECT SCHEDULE

a. Project is: ☐ proposed. Year construction will begin: ___
☒ partially complete. Extent of completion: 5 existing reservoirs, 238 acres of existing vineyard and landscaping around existing residences and winery.
☐ complete. Year completed: ___

b. Year of first use: ±1950 Year water will be used to the full extent intended: ±10 years after permit is issued

9. JUSTIFICATION OF AMOUNTS REQUESTED

a. ☒ IRRIGATION: Maximum area to be irrigated in any one year: 284 acres.

CROP	ACRES	METHOD OF IRRIGATION (sprinklers, flooding, etc.)	WATER USE (Acre-feet/Yr.)	SEASON OF WATER USE	
				Beginning date (month & day)	Ending date (month & day)
Wine Grapes	278	Wine Grapes	139	May 15	Sept. 1
Landscaping	6	Landscaping	9	May 15	Sept. 1

☐ *See Attachment No.* ___

b. ☐ DOMESTIC: Number of residences to be served: _____ Separately owned? ☐ YES ☐ NO Number of people to be served: _____ Estimated daily use per person is: _____ gallons per day Area of domestic lawns and gardens: _____ square feet Incidental domestic uses:

_____
(dust control area, number and kind of domestic animals, etc.)

c. ☐ STOCKWATERING: Kind of stock: _____ Maximum number: _____
Describe type of operation: _____
(feedlot, dairy, range, etc.)

d. ☒ RECREATIONAL: Type of recreation: ☒ Fishing ☒ Swimming ☒ Boating ☐ Other _____

e. ☐ MUNICIPAL:

POPULATION List for 5-year periods until use is completed		MAXIMUM MONTH		ANNUAL USE		
Period	Population	Average daily use (gallons per capita)	Rate of diversion (cfs)	Average daily use (gallons per capita)	Acre-foot (per capita)	Total (acre-feet)
Present						

☐ *See Attachment No.* ___

Month of maximum use during year: _____
Month of minimum use during year: _____

f. ☐ HEAT CONTROL: Area to be heat controlled: _____ net acres
Type of crops protected: _____
Rate at which water is applied to use: _____ gpm per acre
Heat protection season will begin _____ (month and day) and end _____ (month and day).

g. ☒ FROST PROTECTION: Area to be frost protected: 278 net acres
Type of crops protected: Wine Grapes
Rate at which water is applied to use: 55 gpm per acre (approx. 50 hrs per annum)
The frost protection season will begin March 31 (month & day) and end May 15 (month & day).

h. ☐ INDUSTRIAL: Type of industry: _____
Basis for determination of amount of water needed: _____

i. ☐ MINING: Name of the claim: _____ ☐ Patented ☐ Unpatented

Nature of the mine: _____ Mineral(s) to be mined: _____
Type of milling or processing: _____
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B. & M.

j. ☐ POWER: Total head to be utilized: _____ feet
Maximum flow through the penstock: _____ cfs Maximum theoretical horsepower capable of being generated by the works (cfs x fall ÷ 8.8): _____
Electrical capacity (hp x 0.746 x efficiency): _____ kilowatts at: _____% efficiency
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B&M. FERC No.: _____

k. ☐ FISH AND WILDLIFE PRESERVATION AND/OR ENHANCEMENT: List specific species and habitat type that will be preserved or enhanced: _____

l. ☒ OTHER: Describe use: Dust Control on roads during summer months. Approximately 1 AFA.
Basis for determination of amount of water needed: _____

10. DIVERSION AND DISTRIBUTION METHOD

a. Diversion will be by gravity by means of: Dam (POD 2 thru 5)
(dam, pipe in unobstructed channel, pipe through dam, siphon, weir, gate, etc.)

b. Diversion will be by pumping from: Unnamed stream (POD 6)
(sump, offset well, channel, reservoir, etc)
Pump discharge rate: 3 ☒ cfs or ☐ gpd Horsepower: 30
Pump Efficiency: 70%

c. Conduit from diversion point to first lateral or to offstream storage reservoir:

CONDUIT (pipe or channel)	MATERIAL (type of pipe or channel lining; indicate if pipe is buried or not)	CROSS-SECTION (pipe diameter, or ditch depth and top and bottom width) (inches or feet)	LENGTH (feet)	TOTAL LIFT OR FALL		CAPACITY (cfs, gpd or gpm)
				feet	+ or -	
Pipe	PVC	10"	100'	10'	+	3 cfs
Pipe	PVC	10"	1,450'	80'	+	3 cfs
Pipe	PVC	10"	2,460'	40'	+	3 cfs

☐ *See Attachment No. ___*

d. Storage reservoirs: (For underground storage, complete and attach underground storage form)

RESERVOIR NAME OR NUMBER	DAM				RESERVOIR		
	Vertical height from downstream toe of slope to spillway level (feet)	Construction material	Length (feet)	Freeboard: dam height above spillway crest (feet)	Surface area when full (acres)	Capacity (acre-feet)	Maximum water depth (feet)

☒ *See Attachment No. 5*

e. Outlet pipe: Complete for storage reservoirs having a capacity of 10 acre-feet or more.

RESERVOIR NAME OR NUMBER	OUTLET PIPE				
	Diameter in inches	Length in feet	Fall: Vertical distance between entrance and exit of outlet pipe in feet	Head: Vertical distance from spillway to entrance of outlet pipe in feet	Dead Storage: Storage below entrance of outlet pipe in acre-feet

☒ *See Attachment No.* 5

e. If water will be stored and the reservoir is not at the point of diversion, the maximum rate of diversion to off-stream storage will be 3 cfs. Diversion to offstream storage will be made by:
☒ Pumping ☐ Gravity

11. CONSERVATION AND MONITORING

a. What methods will you use to conserve water? Explain.
Drip Irrigation

b. How will you monitor your diversion to be sure you are within the limits of your water right and you are not wasting water? ☐ Weir ☒ Meter ☐ Periodic sampling ☒ Other (describe)
Staff Gages

12. RIGHT OF ACCESS

a. Does the applicant own all the land where the water will be diverted, transported and used?
☒ YES ☐ NO
If NO, I ☐ do ☐ do not have a recorded easement or written authorization allowing me access.

b. List the names and mailing addresses of all affected landowners and state what steps are being taken to obtain access:

☐ *See Attachment No.* ___

13. EXISTING WATER RIGHTS AND RELATED FILINGS

a. Do you claim an existing right for the use of all or part of the water sought by this application?
☐ YES ☒ NO
If YES, please specify: ☐ Riparian ☐ Pre-1914 ☐ Registration ☐ Permit ☐ License
☐ Percolating groundwater ☐ Adjudicated ☐ Other (specify) ___

b. For each existing right claimed, state the source, year of first use, purpose, season and location of the point of diversion (to within quarter-quarter section). Include number of registration, permit, license, or statement of water diversion and use, if applicable.

☐ *See Attachment No.* ___

c. List any related applications, registrations, permits, or licenses located in the proposed place of use or that utilize the same point(s) of diversion.

☐ *See Attachment No. ___*

14. OTHER SOURCES OF WATER

Are you presently using, or do you intend to use, purchased water or water supplied by contract in connection with this project? ☐ Yes ☒ No If yes, please explain:

15. MAP REQUIREMENTS

The Division cannot process your application without accurate information showing the source of water and location of water use. You must include a map with this application form that clearly indicates the quarter/quarter, section, township, range, and meridian of (1) the proposed points of diversion and (2) the place of use. A copy of a U.S.G.S. quadrangle/topographic map of your project area is preferred, and can be obtained from sporting goods stores or through the Internet at http://topomaps.usgs.gov. A certified engineering map is required when (1) appropriating more than three cubic feet per second by direct diversion, (2) constructing a dam which will be under the jurisdiction of the Division of Safety of Dams, (3) creating a reservoir with a surface area in excess of ten acres or (4) appropriating more than 1,000 acre-feet per annum by underground storage. See the instruction booklet for more information.

☐ *See Attachment No. ___*

ENVIRONMENTAL INFORMATION

Note: Before a water right permit may be issued for your project, the State Water Board must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared for your project, a determination must be made of who is responsible for its preparation. If the State Water Board is determined to be responsible for preparing the CEQA document, the applicant will be required to pay all costs associated with the environmental evaluation and preparation of the required documents. Please answer the following questions to the best of your ability and submit with this application any studies that have been conducted regarding the environmental evaluation of your project.

16. COUNTY PERMITS

a. Contact your county planning or public works department and provide the following information:

Person contacted: Bob Gaiser Date of contact: Jan. 8, 2009
Department: Sonoma County Planning Telephone: (707) 565-1900
County Zoning Designation:
LIA (Land Intensive Agriculture)
Are any county permits required for your project? ☐ YES ☐ NO If YES, check appropriate box below:
☒ Grading permit ☐ Use permit ☐ Watercourse ☐ Obstruction permit ☐ Change of zoning
☐ General plan change ☐ Other (explain):

b. Have you obtained any of the required permits described above? ☐ YES ☒ NO
If YES, provide a complete copy of each permit obtained.
☐ *See Attachment No. ___*

17. STATE/FEDERAL PERMITS AND REQUIREMENTS

a. Check any additional state or federal permits required for your project:
☐ Federal Energy Regulatory Commission ☐ U.S. Forest Service ☐ U.S. Bureau of Land Management ☐ U.S. Corps of Engineers ☐ U.S. Natural Res. Conservation Service ☒ Calif. Dept. of Fish and Game ☐ State Lands Commission ☒ Calif. Dept. of Water Resources (Div. of Safety of Dams) ☐ Calif. Coastal Commission ☐ State Reclamation Board ☐ Other (specify)

b. For each agency from which a permit is required, provide the following information:

AGENCY	PERMIT TYPE	PERSON(S) CONTACTED	CONTACT DATE	TELEPHONE NO.
DFG	1603	DFG will be contacted during env. review		
DSOD will be contacted upon filing				

☐ *See Attachment No. ___*

c. Does your proposed project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank, or riparian habitat of any stream or lake? ☐ YES ☒ NO
If YES, explain:
Construction of a diversion facility in the unnamed stream will not significantly alter the bed or banks.

☐ *See Attachment No. ___*

d. Have you contacted the California Department of Fish and Game concerning your project?
☐ YES ☒ NO If YES, name, telephone number and date of contact:

18. ENVIRONMENTAL DOCUMENT

a. Has any California public agency prepared an environmental document for your project?
☐ YES ☒ NO

b. If YES, submit a copy of the latest environmental document(s) prepared, including a copy of the notice of determination adopted by the California public agency. Public agency:

c. If NO, check the appropriate box and explain below, if necessary:
☐ The applicant is a California public agency and will be preparing the environmental document.*
☒ I expect that the State Water Board will be preparing the environmental document.**
☐ I expect that a California public agency other than the State Water Board will be preparing the environmental document.* Public agency:
☐ *See Attachment No. ___*

* Note: When completed, submit a copy of the final environmental document (including notice of determination) or notice of exemption to the State Water Board, Division of Water Rights and proof of payment of the State Clearinghouse filing fee. Processing of your application cannot be completed until these documents are submitted.

** Note: CEQA requires that the State Water Board, as Lead Agency, prepare the environmental document. The information contained in the environmental document must be developed by the applicant and at the applicant's expense under the direction of the State Water Board, Division of Water Rights.

19. WASTE/WASTEWATER

a. Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation? ☐ YES ☒ NO
If YES, or you are unsure of your answer, explain below and contact your local Regional Water Quality Control Board for the following information (See instruction booklet for address and telephone no.):

_____

_____

_____

☐ *See Attachment No. ___*

b. Will a waste discharge permit be required for your project? ☐ YES ☒ NO
Person contacted: _____ Date of contact: _____

c. What method of treatment and disposal will be used? _____

_____

_____

☐ *See Attachment No. ___*

20. ARCHEOLOGY

a. Have any archeological reports been prepared on this project? ☐ YES ☒ NO

b. Will you be preparing an archeological report to satisfy another public agency? ☐ YES ☒ NO

c. Do you know of any archeological or historic sites located within the general project area?
☐ YES ☒ NO If YES, explain:

_____

_____

_____

☐ *See Attachment No. ___*

21. ENVIRONMENTAL SETTING

Attach **two complete sets of color photographs**, clearly dated and labeled, showing the vegetation that exists at the following three locations:

☒ Along the stream channel immediately downstream from the proposed point(s) of diversion.
☒ Along the stream channel immediately upstream from the proposed point(s) of diversion.
☒ At the place(s) where the water is to be used.
☐ *See Attachment No. ___*

SUBMITTAL FEES

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DECLARATION AND SIGNATURE

I declare under penalty of perjury that all information provided is true and correct to the best of my knowledge and belief. I authorize my agent, if I have designated one above, to act on my behalf regarding this water right application.

Signature of Applicant	Title or Relationship	Date
	Legal Counsel	1-27-09

Signature of Co-Applicant (if any)	Title or Relationship	Date

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- ☐ **Number, label and include all necessary attachments.**
- ☐ **Include a legible map that meets the requirements discussed in the instruction booklet.**
- ☐ **Include the Water Availability Analysis or sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation.**
- ☐ **Include two complete sets of color photographs of the project site.**
- ☐ **Enclose a check for the required fee, payable to the Division of Water Rights.**
- ☐ **Enclose an $850 check for the Streamflow Protection Standards review fee, payable to the Department of Fish and Game.**
- ☐ **Sign and date the application.**

Send the original and one copy of the entire application to:

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

ATTACHMENT 1
Project Description

This application is to authorize 4 existing onstream reservoirs and a proposed offstream reservoir to support existing vineyard and other uses. The project includes a proposed diversion facility in an unnamed stream tributary to Russian River and development of +/-40 acres of new vineyard. The 4 existing reservoirs have a total capacity of 173 AF. The reservoirs are currently used for irrigation of 238 acres of existing vineyard, fire protection, dust control and landscape irrigation at the existing residences and winery. Future water use will also include frost protection of the existing and proposed vineyard; a water feature at the winery entrance; and irrigation of +/-2 acres of formal gardens and landscaping along the entry road. The proposed offstream reservoir will be located in an area currently planted to vineyard and will have a capacity of approximately 120 AF. A pump will be installed in the adjacent unnamed stream to divert water into the proposed reservoir and into 2 of the existing reservoirs as needed to supplement initial filling. The proposed vineyard will be planted in previously farmed areas.

Two of the existing reservoirs (BR40-01 and BT40-02) have irrigation pumps. Frost protection pumps will be installed in the future. Water is gravity fed from BQ40-02 to BR40-01, and water from BS40-01 is gravity fed directly into the irrigation system.

ATTACHMENT 2

Points of Diversion/Rediversion

a. POD/PORD #2 Unnamed Stream tributary to Russian River
POD #3 Unnamed Stream tributary to Russian River
POD #4 Unnamed Stream tributary to Windsor Creek thence Mark West Creek thence Russian River
POD/PORD #5 Unnamed Stream tributary to Russian River
POD #6 Unnamed Stream tributary to Russian River

b.

POD PORD	NAD 83	ZONE	POINT IS WITHIN	SECTION	TOWNSHIP	RANGE	BASE AND MERIDIAN
POD/ PORD 2 BR40-01	N1,976,234 E6,329,184	2	SW 1/4 of NW 1/4	36	9N	9 8W	MD
POD 3 BQ40-02	N1,977,982 E6,330,482	2	NE 1/4 of NW 1/4	36	9N	9 8W	MD
POD 4 BS40-01	N1,973,930 E6,330,754	2	SE 1/4 of SW 1/4	36	9N	9 8W	MD
POD/ PORD #5 BT40-02	N1,972,622 E6,329,351	2	NW 1/4 of NW 1/4	1	8N	9 8W	MD
POD 6	N1,974,967 E6,328,348	2	NW 1/4 of SW 1/4	36	9N	9 8W	MD
POOS Proposed Resv			SW 1/4 of NW 1/4 NW 1/4 of SE 1/4	36	9N	9 8W	MD

Per email dated 3/2/09 - MSW.

ATTACHMENT 3
Water Availability

To demonstrate the reasonable likelihood that unappropriated water is available for diversion, streamflow during the requested diversion season (November 1 to March 31) is estimated at each POD by prorating USGS streamflow data at the gage on Russian River near Healdsburg (USGS 11464000). For purposes of this preliminary analysis it is assumed that precipitation above the PODs and gage are equal. The following formula is used:

$Q_2 = Q_1 \times (A_2/A_1)$

Where Q_2 = Seasonal Flow (AF) @ POD

Q_1 = Seasonal Flow (AF) @ gage

A_2 = Watershed area (sq. mi..) above POD

A_1 = Watershed area (sq. mi.) above gage

Seasonal Unimpaired Flow @ POD #2:

Q_1 = 870,780 AF

A_2 = 0.48 sq. mi.

A_1 = 793 sq. mi.

Q_2 = 870,780 (.48/793)

= 527 AF

Seasonal Unimpaired Flow @ POD #3:

Q_1 = 870,780 AF

A_2 = 0.12 sq. mi.

A_1 = 793 sq. mi.

Q_2 = 870,780 (.12/793)

= 132 AF

Seasonal Unimpaired Flow @ POD #4:

Q_1 = 854,645 AF

A_2 = 0.03 sq. mi.

A_1 = 793 sq. mi.

Q_2 = 854,645 (.03/793)

= 32 AF

Seasonal Unimpaired Flow @ POD #5:

Q_1 = 870,780 AF
A_2 = 0.13 sq. mi.
A_1 = 793 sq. mi.
Q_2 = 870,780 (.13/793)
= 143 AF

Seasonal Unimpaired Flow @ POD #6:

Q_1 = 870,780 AF
A_2 = 0.81 sq. mi.
A_1 = 793 sq. mi.
Q_2 = 870,780 (.81/793)
= 889 AF

Face value rights of senior diverters above the POD are deducted from the seasonal flow to determine the amount of unappropriated water available:

POD #2 – Reservoir BQ40-02 under this application, which has a capacity of 3 AF, is upstream from the reservoir at POD #2:
527 AF – 3 AF = 524 AF available for diversion

POD #3 – No senior diverters above POD #3:
132 AF available for diversion

POD #4 – No senior diverters above POD #4:
32 AF available for diversion

POD #5 - No senior diverters above POD #5:
143 AF available for diversion

POD #6 – S002378 is the only upstream senior diverter and has a face value of 49 AF:
889 AF – 49 AF = 840 AF available for diversion

Based on the above calculations it is reasonable to conclude that unappropriated water is available for diversion.

ATTACHMENT 4

PLACE OF USE

USE IS WITHIN	SECTION	TOWNSHIP	RANGE	BASE & MERIDIAN	ACRES	IF IRRIGATED PRESENTLY CULTIVATED?
NW 1/4 OF NW 1/4	36	9N	8W	MD	10.5	☒ YES ☐ NO
NW 1/4 OF NW 1/4	36	9N	8W	MD	4.5	☐ YES ☒ NO
NE 1/4 OF NW 1/4	36	9N	8W	MD	14.4	☒ YES ☐ NO
NE 1/4 OF NW 1/4	36	9N	8W	MD	14	☐ YES ☒ NO
SE 1/4 OF NW 1/4	36	9N	8W	MD	6.5	☒ YES ☐ NO
SW 1/4 OF NW 1/4	36	9N	8W	MD	5	☒ YES ☐ NO
NW 1/4 OF NE 1/4	36	9N	8W	MD	17.3	☒ YES ☐ NO
NW 1/4 OF NE 1/4	36	9N	8W	MD	3.3	☐ YES ☒ NO
NE 1/4 OF NE 1/4	36	9N	8W	MD	19.5	☒ YES ☐ NO
SE 1/4 OF NE 1/4	36	9N	8W	MD	18.5	☒ YES ☐ NO
SE 1/4 OF NE 1/4	36	9N	8W	MD	2.5	☐ YES ☒ NO
SW 1/4 OF NE 1/4	36	9N	8W	MD	3	☐ YES ☒ NO
NW 1/4 OF SW 1/4	36	9N	8W	MD	10	☒ YES ☐ NO
SE 1/4 OF SW 1/4	36	9N	8W	MD	22	☒ YES ☐ NO
SW 1/4 OF SW 1/4	36	9N	8W	MD	32.5	☒ YES ☐ NO
NE 1/4 OF SE 1/4	36	9N	8W	MD	3.5	☒ YES ☐ NO
SW 1/4 OF SE 1/4	36	9N	8W	MD	7	☒ YES ☐ NO
NW 1/4 OF NW 1/4	1	8N	8W	MD	7.5	☒ YES ☐ NO
NE 1/4 OF NW 1/4	1	8N	8W	MD	12.5	☒ YES ☐ NO
SE 1/4 OF NW 1/4	1	8N	8W	MD	26.5	☒ YES ☐ NO
SE 1/4 OF NW 1/4	1	8N	8W	MD	5	☐ YES ☒ NO
SW 1/4 OF NW 1/4	1	8N	8W	MD	25	☒ YES ☐ NO
SW 1/4 OF NW 1/4	1	8N	8W	MD	7.5	☐ YES ☒ NO

Total Existing 238 acres
Total Proposed 40 acres

per email dtd 3/24/09. -msm.

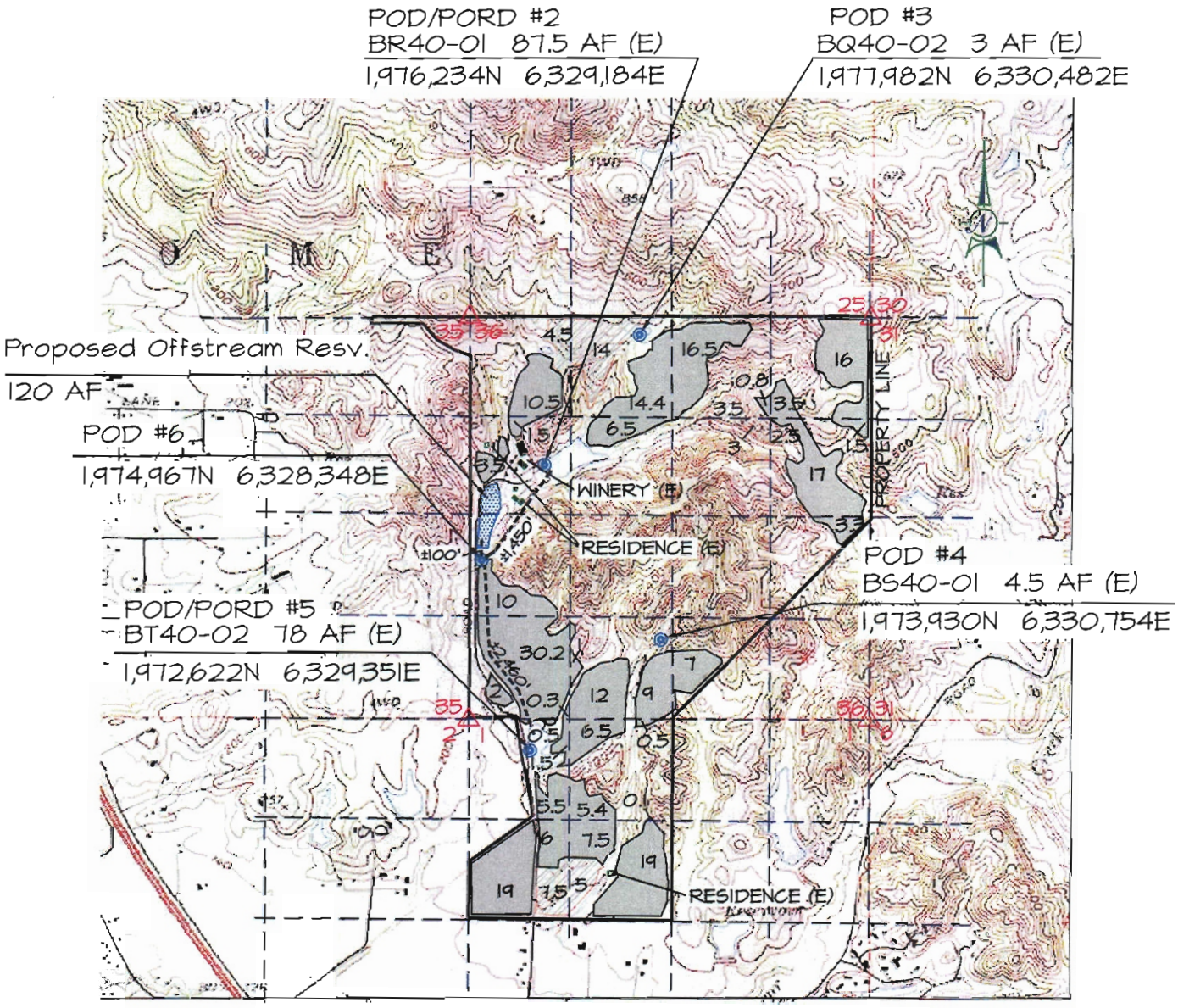
ATTACHMENT 5

STORAGE RESERVOIRS

RESV. NAME	DAM						
	Vertical height from downstream toe of slope to spillway level (ft.)	Construction material	Length (ft.)	Freeboard: dam height above spillway crest ((ft.)	Surface area when full (ac.)	Capacity (A.F.)	Maximum water depth (ft.)
BQ40-02	12	earth	220	5	2.2	3	7
BR40-01	13	earth	415	8	5.6	87.5	30
BS40-01	15	earth	240	3	1.9	4.5	17
BT40-02	24	earth	340	6	4.3	78	51
Proposed offstream resv.	NA	earth	NA	NA	±5	±120	±35

OUTLET PIPE

RESV. NAME	OUTLET PIPE				
	Diameter (in.)	Length (ft.)	Fall: Vertical distance between entrance and exit of outlet pipe (ft.)	Head: Vertical distance from spillway to entrance of outlet pipe (ft.)	Dead Storage: Storage below entrance of outlet pipe (ft.)
BQ40-02	No outlet pipe				
BR40-01	8	260	2	21	±7
BS40-01	No outlet pipe				
BT40-02	10	240	6	21	±17
Proposed offstream resv.	NA				



MAP TO ACCOMPANY
APPROPRIATIVE APPLICATION

19	Acres of Existing Vineyard (1/4, 1/4 Section)
19	Acres of Proposed Vineyard (1/4, 1/4 Section)
(E)	Existing Reservoir
◎	Point of Diversion/Rediversion
-------	Proposed 10" Pipeline
— — —	Quarter/Section Lines
△	Section Corner

OWNER: Windsor Oaks Associates
WATERSHED: Russian River
COUNTY: Sonoma
USGS QUAD MAP: Healdsburg
P.O.D.s within Sec. 1, T8N, R8W, MDBM
Sec. 36, T9N, R8W, MDBM

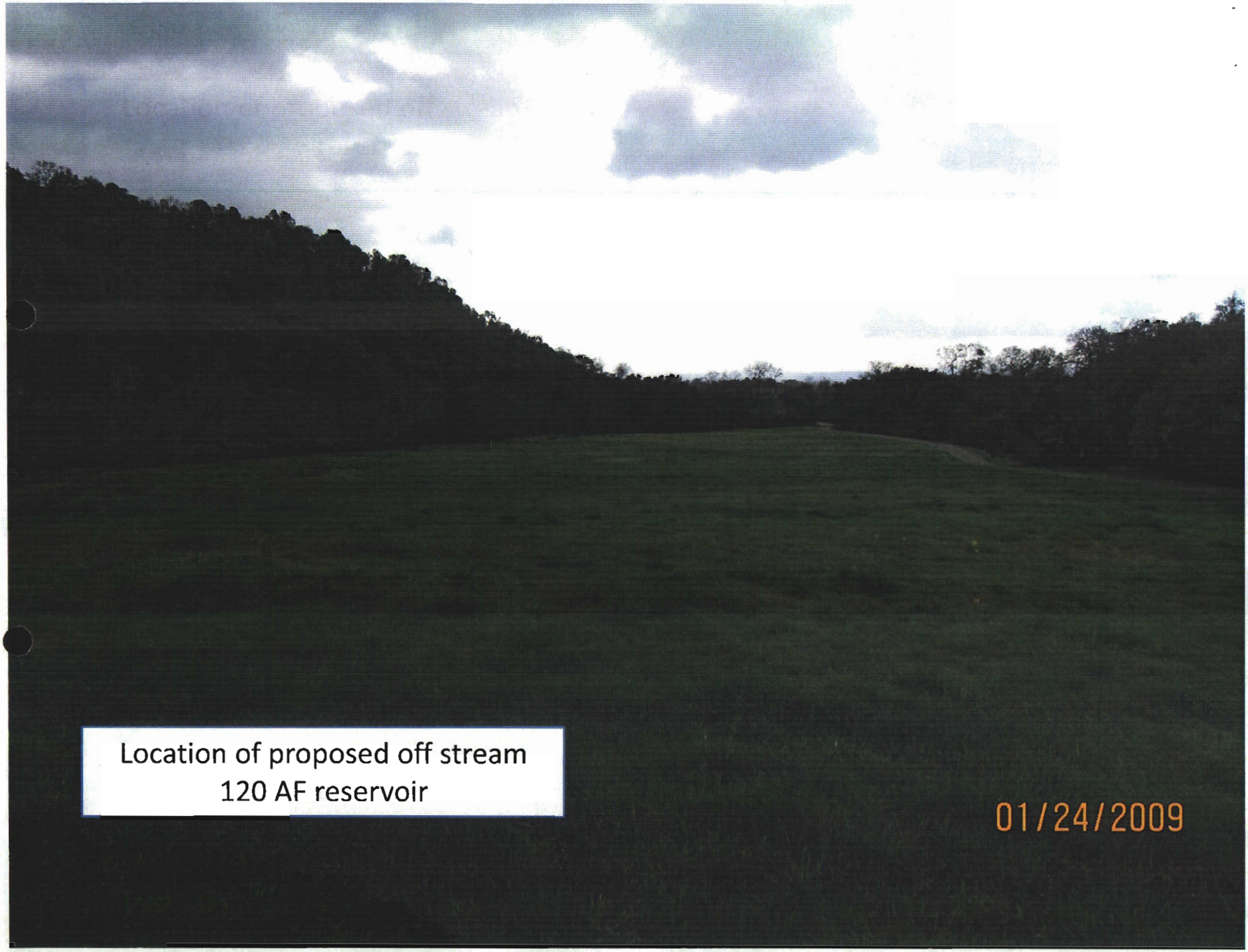
SCALE: 1" = 2000'
NVVE 1-8-09

2 per email
dfd 3/24/2009
-MSM

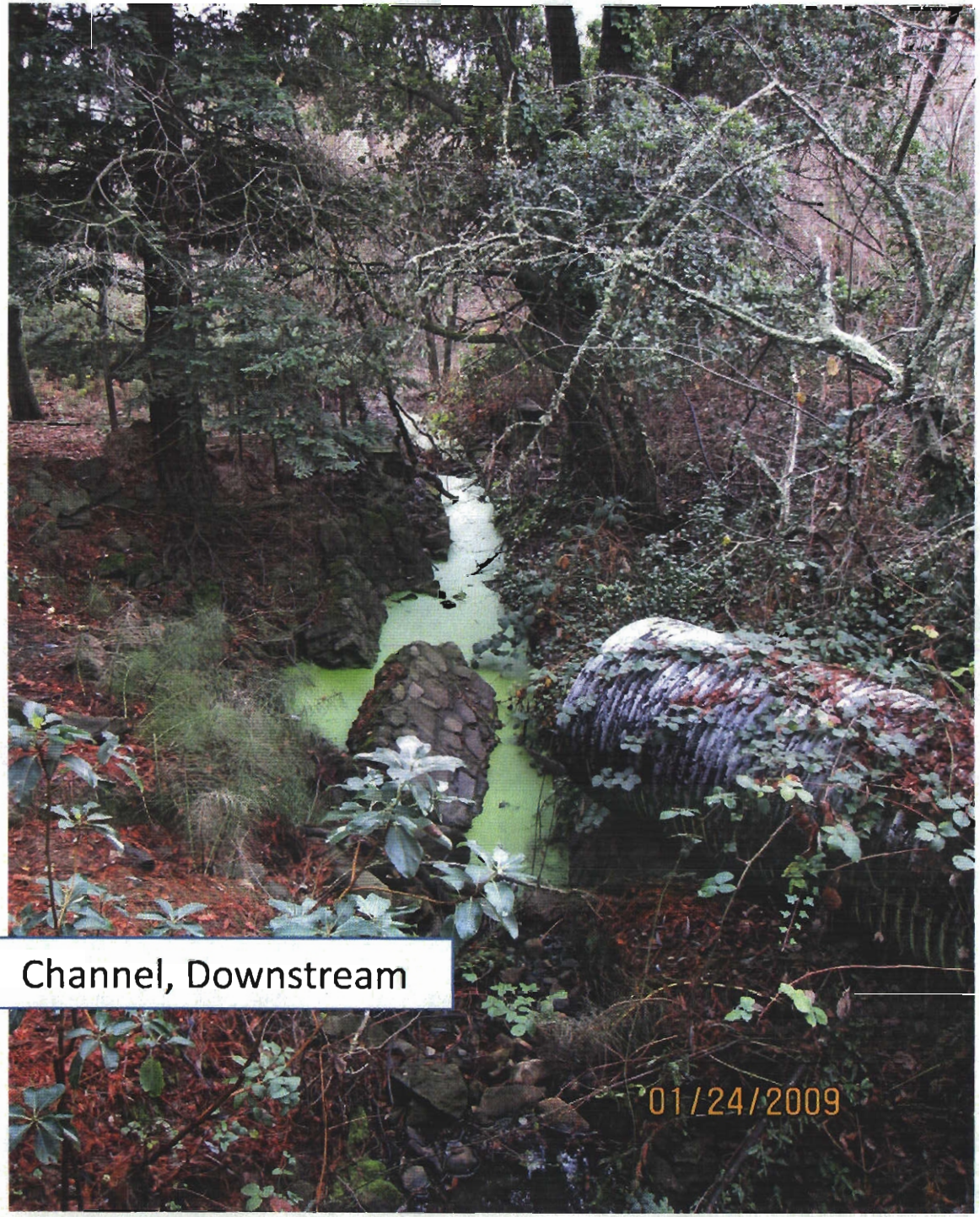

BT40-02 Channel, Downstream
01/24/2009


BT40-02 Channel, Upstream NE
01/24/2009

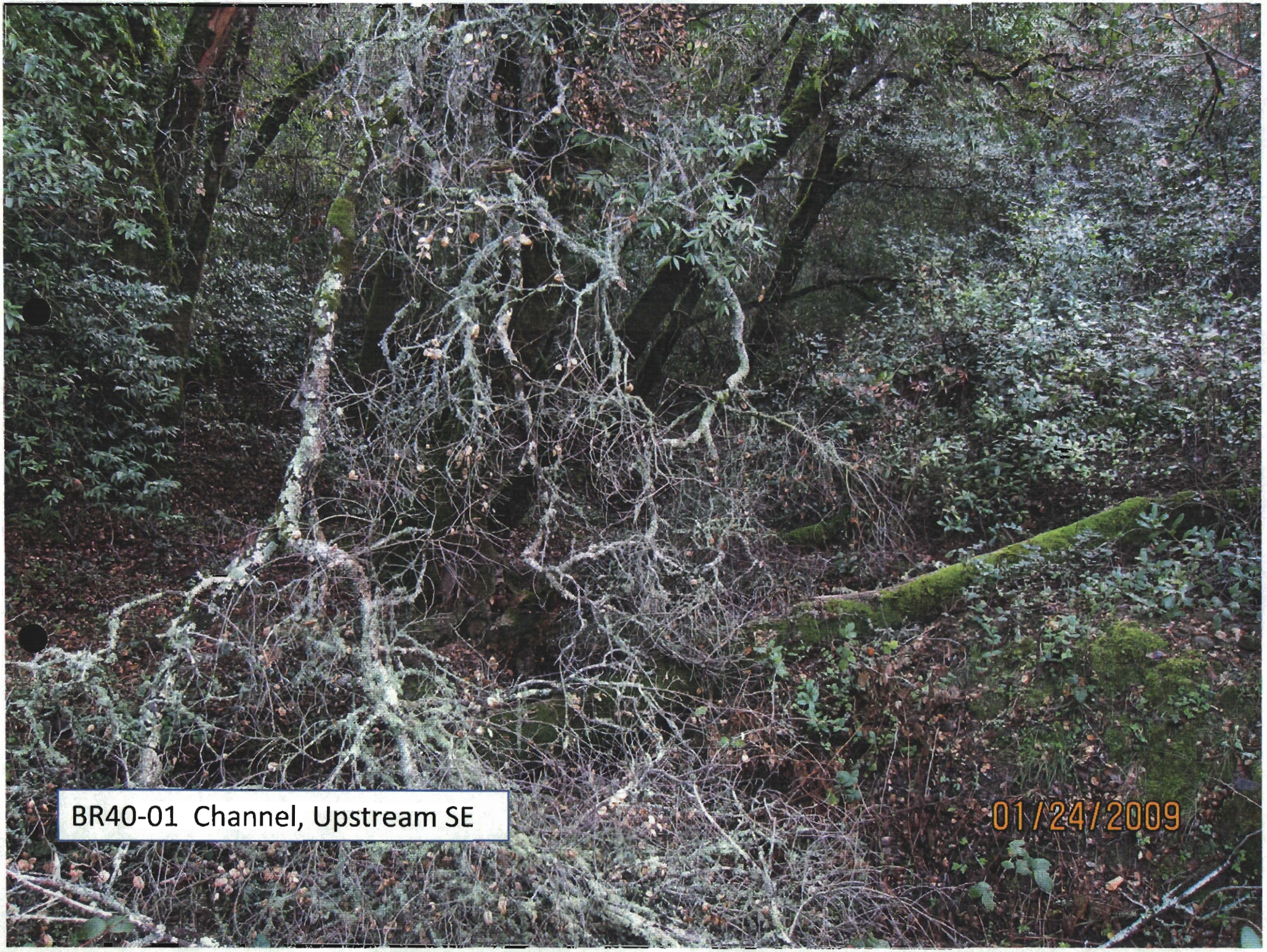

BT40-02 Channel, Upstream NNE
01/24/2009


Location of proposed off stream
120 AF reservoir
01/24/2009

POD 6, Upstream



BR40-01 Channel, Downstream


BR40-01 Channel, Upstream SE
01/24/2009


BR40-01 Channel, Upstream NE
01/24/2009

BR40-01 Channel, Upstream N

BT40-02 Channel, Downstream


01/24/2009
BQ40-02 Channel, Upstream

BS40-01 Channel, Upstream


BS40-01 Channel, Downstream
01/24/2009

TYPE OR PRINT
IN BLACK INK
(For instructions, see booklet: "How to File an Application to Appropriate Water in California")

California Environmental Protection Agency

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
www.waterboards.ca.gov/waterrights

APPLICATION NO. 31813

APPLICATION TO APPROPRIATE WATER

1. APPLICANT/AGENT

	APPLICANT	ASSIGNED AGENT (if any)
Name	William J. McMonigle, Jr. & Constance Kopriva	Wagner & Bonsignore, CCE
Mailing Address	20995 Hyde Road	2151 River Plaza Drive, Ste 100
City, State & Zip	Sonoma, CA 95476	Sacramento, CA 95833
Telephone	(707) 888-4915	(916) 441-6850
Fax	(707) 933-9128	(916) 448-3866
E-mail	BillMcMonigle@gmail.com	

2. OWNERSHIP INFORMATION (Please check type of ownership.)

☒ Sole Owner ☐ Limited Liability Company (LLC) ☐ General Partnership*
☐ Limited Partnership* ☐ Business Trust ☐ Husband/Wife Co-Ownership
☐ Corporation ☐ Joint Venture ☐ Other _____

*Please identify the names, addresses and phone numbers of all partners.

3. PROJECT DESCRIPTION (Provide a detailed description of your project, including, but not limited to, type of construction activity, area to be graded or excavated, and how the water will be used.) Add additional pages if needed and check box below and label as an attachment.

☒ *For continuation, see Attachment No.* 1

Received
12/17/09

4. PURPOSE OF USE, DIVERSION/STORAGE AMOUNT AND SEASON

a. PURPOSE OF USE (irrigation, domestic, etc.)	DIRECT DIVERSION				STORAGE		
	AMOUNT		SEASON OF DIVERSION		AMOUNT	SEASON OF COLLECTION	
	Rate (cfs or gpd)*	Acre-feet per annum	Beginning date (month & day)	Ending date (month & day)	Acre-feet per annum	Beginning date (month & day)	Ending date (month & day)
Irrigation					12	11-1	5-31
Frost Protection							
Heat Control							
	Total afa			Total afa	12		

☐ *See Attachment No.* ___ * If rate is less than 0.025 cubic feet per second (cfs), use gallons per day (gpd).

b. Total combined amount taken by direct diversion and storage during any one year will be 12 acre-feet.

c. Reservoir storage is: ☐ onstream ☒ offstream ☐ underground (If underground storage, attach Underground Storage Form.)

d. County in which diversion is located: Sonoma County in which water will be used: Sonoma

5. SOURCES AND POINTS OF DIVERSION/REDIVERSION

a. Sources and Points of Diversion (POD)/Points of Rediversion (PORD):

☒ POD / ☒ PORD #1 Unnamed Stream tributary to Schell Creek thence Schell Slough thence Steamboat Slough thence Third Napa Slough thence Second Napa Slough thence Sonoma Creek thence San Pablo Bay

☒ POD / ☐ PORD #2 Arroyo Seco tributary to Schell Creek thence Schell Slough thence Steamboat Slough thence Third Napa Slough thence Second Napa Slough thence Sonoma Creek thence San Pablo Bay

☐ POD / ☐ PORD # _____ tributary to _____ thence _____

☐ POD / ☐ PORD # _____ tributary to _____ thence _____

If needed, attach additional pages, check box below and label attachment

☐ *See Attachment No.* ___

b. State Planar and Public Land Survey Coordinate Description:

POD/ PORD #	CALIFORNIA COORDINATES (NAD 83)	ZONE	POINT IS WITHIN (40-acre subdivision)	SECTION	TOWN-SHIP	RANGE	BASE AND MERIDIAN
1	N 1,857,439 E 6,437,415	2	~~NW~~¼ of SE¼	20P	T5N	R5W	M.D.
2	N 1,857,425 E 6,438,148	2	~~NE~~¼ of SE¼	20P	T5N	R5W	M.D.
			¼ of ¼				
			¼ of ¼				

If needed, attach additional pages, check box below and label attachment

☐ *See Attachment No.* ___

c. Name of the post office most often used by those living near the proposed point(s) of diversion: Vineburg

6. WATER AVAILABILITY

a. Have you attached a water availability analysis for this project? ☒ YES ☐ NO
If NO, provide sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation: If needed, attach additional pages, check box below and label attachment.

☒ *See Attachment No.* 2

b. Is your project located on a stream system declared to be fully appropriated by the State Water Resources Control Board (State Water Board) during your proposed season of diversion?
☐ YES ☒ NO

c. In an average year, does the stream dry up at any point downstream of your project? ☒ YES ☐ NO
If YES, during which months? ☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☒ Jun ☒ Jul ☒ Aug ☒ Sep ☐ Oct ☐ Nov ☐ Dec

d. What alternate sources of water are available if a portion of your requested diversion season must be excluded because water is not available for appropriation? (e.g., percolating groundwater, purchased water, etc.) If needed, attach additional pages, check box below and label attachment
Groundwater well

☐ *See Attachment No.* ___

7. PLACE OF USE

a.

USE IS WITHIN (40-acre subdivision)	SECTION*	TOWNSHIP	RANGE	BASE & MERIDIAN	IF IRRIGATED	
					Acres	Presently cultivated?
NE¼ of SE¼	20P	5N	5W	M.D.	1	☒ YES ☐ NO
NW¼ of SE¼	20P	5N	5W	M.D.	1	☒ YES ☐ NO
SE¼ of SE¼	20P	5N	5W	M.D.	2	☒ YES ☐ NO
SW¼ of SE¼	20P	5N	5W	M.D.	9	☒ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
				Total Acres:	13	

*Please indicate if section is projected with a "(P)" following the section number.

☒ *See Attachment No.* 3 Please provide the Assessor's Parcel Number(s) for the place of use:
APN 128-381-021

8. PROJECT SCHEDULE

Project is: ☐ proposed, ☒ partially complete or ☐ complete (Year completed - _____).

Extent of completion: Place of use is planted with 13 acres of vineyard. Existing pond has a capacity of 2 acre-feet.

Estimated amount of time in years it will take for construction to be completed: 3 years after permit is granted

Estimated amount of time in years it will take for water to be put to full beneficial use: 5 years after permit is granted

9. JUSTIFICATION OF AMOUNTS REQUESTED

a. ☒ IRRIGATION: Maximum area to be irrigated in any one year: 13 acres.

CROP	ACRES	METHOD OF IRRIGATION (sprinklers, flooding, etc.)	WATER USE (Acre-feet/Yr.)	SEASON OF WATER USE	
				Beginning date (month & day)	Ending date (month & day)
Vineyard	13	Drip Irrigation	12	4-1	10-31

☐ *See Attachment No.* ___

b. ☐ DOMESTIC: Number of residences to be served: _____ Separately owned? ☐ YES ☐ NO Number of people to be served: _____ Estimated daily use per person is: _____ gallons per day Area of domestic lawns and gardens: _____ square feet
Incidental domestic uses:

_____
(dust control area, number and kind of domestic animals, etc.)

a. ☐ STOCKWATERING: Kind of stock: _____ Maximum number: _____
Describe type of operation: _____
(feedlot, dairy, range, etc.)

d. ☐ RECREATIONAL: Type of recreation: ☐ Fishing ☐ Swimming ☐ Boating ☐ Other _____

e. ☐ MUNICIPAL:

POPULATION List for 5-year periods until use is completed		MAXIMUM MONTH		ANNUAL USE		
Period	Population	Average daily use (gallons per capita)	Rate of diversion (cfs)	Average daily use (gallons per capita)	Acre-foot (per capita)	Total (acre-feet)
Present						

☐ *See Attachment No.* ___

Month of maximum use during year: _____
Month of minimum use during year: _____

f. ☒ HEAT CONTROL: Area to be heat controlled: 13 net acres
Type of crops protected: Vineyard
Rate at which water is applied to use: 35 gpm per acre
Heat protection season will begin 5-1 (month and day) and end 10-15 (month and day).

g. ☒ FROST PROTECTION: Area to be frost protected: 13 net acres
Type of crops protected: Vineyard
Rate at which water is applied to use: 55 gpm per acre
The frost protection season will begin 3-1 (month & day) and end 4-30 (month & day).

h. ☐ INDUSTRIAL: Type of industry: _____

Basis for determination of amount of water needed: _____

i. ☐ MINING: Name of the claim: _____ ☐ Patented ☐ Unpatented
Nature of the mine: _____ Mineral(s) to be mined: _____
Type of milling or processing: _____
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B. & M.

j. ☐ POWER: Total head to be utilized: _____ feet
Maximum flow through the penstock: _____ cfs Maximum theoretical horsepower capable of being generated by the works (cfs x fall ÷ 8.8): _____
Electrical capacity (hp x 0.746 x efficiency): _____ kilowatts at: _____% efficiency
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B&M. FERC No.: _____

k. ☐ FISH AND WILDLIFE PRESERVATION AND/OR ENHANCEMENT: List specific species and habitat type that will be preserved or enhanced: _____

l. ☐ OTHER: Describe use: _____
Basis for determination of amount of water needed: _____

10. DIVERSION AND DISTRIBUTION METHOD

a. Diversion will be by gravity by means of: Dam (P.O.D. #1 collection of runoff from 20 acre watershed)
(dam, pipe in unobstructed channel, pipe through dam, siphon, weir, gate, etc.)

b. Diversion will be by pumping from: Offset well (P.O.D. #2 diversion from Arroyo Seco)
(sump, offset well, channel, reservoir, etc)

Pump discharge rate: 1 ☒ cfs or ☐ gpd Horsepower: 5
Pump Efficiency: 70%

c. Conduit from diversion point to first lateral or to offstream storage reservoir:

CONDUIT (pipe or channel)	MATERIAL (type of pipe or channel lining; indicate if pipe is buried or not)	CROSS-SECTION (pipe diameter, or ditch depth and top and bottom width) (inches or feet)	LENGTH (feet)	TOTAL LIFT OR FALL		CAPACITY (cfs, gpd or gpm)
				feet	+ or -	
Pipe	PVC (buried)	6"	820	6.5	+	1 cfs

☐ *See Attachment No.* ___

d. Storage reservoirs: (For underground storage, complete and attach underground storage form)

RESERVOIR NAME OR NUMBER	DAM				RESERVOIR		
	Vertical height from downstream toe of slope to spillway level (feet)	Construction material	Length (feet)	Freeboard: dam height above spillway crest (feet)	Surface area when full (acres)	Capacity (acre-feet)	Maximum water depth (feet)
Pond #1	2	Earth	920*	2	2	12	8

☐ *See Attachment No.* ___

*This is a pit reservoir; the dam length is equal to the perimeter of the reservoir.

e. Outlet pipe: Complete for storage reservoirs having a capacity of 10 acre-feet or more.

RESERVOIR NAME OR NUMBER	OUTLET PIPE				
	Diameter in inches	Length in feet	Fall: Vertical distance between entrance and exit of outlet pipe in feet	Head: Vertical distance from spillway to entrance of outlet pipe in feet	Dead Storage: Storage below entrance of outlet pipe in acre-feet

☒ *See Attachment No.* 3

e. If water will be stored and the reservoir is not at the point of diversion, the maximum rate of diversion to off-stream storage will be 1 cfs. Diversion to offstream storage will be made by:
☒ Pumping ☐ Gravity

11. CONSERVATION AND MONITORING

a. What methods will you use to conserve water? Explain.
Drip irrigation system will be used.

b. How will you monitor your diversion to be sure you are within the limits of your water right and you are not wasting water? ☐ Weir ☒ Meter ☐ Periodic sampling ☐ Other (describe)

12. RIGHT OF ACCESS

a. Does the applicant own all the land where the water will be diverted, transported and used?
☒ YES ☐ NO
If NO, I ☐ do ☐ do not have a recorded easement or written authorization allowing me access.

b. List the names and mailing addresses of all affected landowners and state what steps are being taken to obtain access:

☐ *See Attachment No.* ___

13. EXISTING WATER RIGHTS AND RELATED FILINGS

a. Do you claim an existing right for the use of all or part of the water sought by this application?
☐ YES ☒ NO
If YES, please specify: ☐ Riparian ☐ Pre-1914 ☐ Registration ☐ Permit ☐ License
☐ Percolating groundwater ☐ Adjudicated ☐ Other (specify) _____

b. For each existing right claimed, state the source, year of first use, purpose, season and location of the point of diversion (to within quarter-quarter section). Include number of registration, permit, license, or statement of water diversion and use, if applicable.

☐ *See Attachment No.* ___

c. List any related applications, registrations, permits, or licenses located in the proposed place of use or that utilize the same point(s) of diversion.

☐ *See Attachment No. ___*

14. OTHER SOURCES OF WATER

Are you presently using, or do you intend to use, purchased water or water supplied by contract in connection with this project? ☐ Yes ☒ No If yes, please explain:

15. MAP REQUIREMENTS

The Division cannot process your application without accurate information showing the source of water and location of water use. You must include a map with this application form that clearly indicates the quarter/quarter, section, township, range, and meridian of (1) the proposed points of diversion and (2) the place of use. A copy of a U.S.G.S. quadrangle/topographic map of your project area is preferred, and can be obtained from sporting goods stores or through the Internet at http://topomaps.usgs.gov. A certified engineering map is required when (1) appropriating more than three cubic feet per second by direct diversion, (2) constructing a dam which will be under the jurisdiction of the Division of Safety of Dams, (3) creating a reservoir with a surface area in excess of ten acres or (4) appropriating more than 1,000 acre-feet per annum by underground storage. See the instruction booklet for more information.

☒ *See Attachment No. 4*

ENVIRONMENTAL INFORMATION

Note: Before a water right permit may be issued for your project, the State Water Board must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared for your project, a determination must be made of who is responsible for its preparation. If the State Water Board is determined to be responsible for preparing the CEQA document, the applicant will be required to pay all costs associated with the environmental evaluation and preparation of the required documents. Please answer the following questions to the best of your ability and submit with this application any studies that have been conducted regarding the environmental evaluation of your project.

16. COUNTY PERMITS

a. Contact your county planning or public works department and provide the following information:

Person contacted: www.sonoma-county.org/prmd/docs/zoning_data Date of contact: ___

Department: ___ Telephone: (___)

County Zoning Designation:

APN: 128-381-021; Zoning Designation: DA B6 10 F1 F2 VOH

Are any county permits required for your project? ☒ YES ☐ NO If YES, check appropriate box below:

☒ Grading permit ☐ Use permit ☐ Watercourse ☐ Obstruction permit ☐ Change of zoning ☐ General plan change ☐ Other (explain):

b. Have you obtained any of the required permits described above? ☐ YES ☒ NO
If YES, provide a complete copy of each permit obtained.

☐ *See Attachment No. ___*

17. STATE/FEDERAL PERMITS AND REQUIREMENTS

a. Check any additional state or federal permits required for your project:
☐ Federal Energy Regulatory Commission ☐ U.S. Forest Service ☐ U.S. Bureau of Land Management ☐ U.S. Corps of Engineers ☐ U.S. Natural Res. Conservation Service ☒ Calif. Dept. of Fish and Game ☐ State Lands Commission ☐ Calif. Dept. of Water Resources (Div. of Safety of Dams) ☐ Calif. Coastal Commission ☐ State Reclamation Board ☐ Other (specify)

b. For each agency from which a permit is required, provide the following information:

AGENCY	PERMIT TYPE	PERSON(S) CONTACTED	CONTACT DATE	TELEPHONE NO.
Dept. of Fish & Game	1600			(916) 445-0411

☐ *See Attachment No. ___*

c. Does your proposed project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank, or riparian habitat of any stream or lake? ☒ YES ☐ NO
If YES, explain:
Installation of underground infiltration gallery

☐ *See Attachment No. ___*

b. Have you contacted the California Department of Fish and Game concerning your project?
☐ YES ☒ NO If YES, name, telephone number and date of contact:

18. ENVIRONMENTAL DOCUMENT

a. Has any California public agency prepared an environmental document for your project?
☐ YES ☒ NO

b. If YES, submit a copy of the latest environmental document(s) prepared, including a copy of the notice of determination adopted by the California public agency. Public agency:

c. If NO, check the appropriate box and explain below, if necessary:
☐ The applicant is a California public agency and will be preparing the environmental document.*
☒ I expect that the State Water Board will be preparing the environmental document.**
☐ I expect that a California public agency other than the State Water Board will be preparing the environmental document.* Public agency: _____
☐ *See Attachment No. ___*

* Note: When completed, submit a copy of the final environmental document (including notice of determination) or notice of exemption to the State Water Board, Division of Water Rights and proof of payment of the State Clearinghouse filing fee. Processing of your application cannot be completed until these documents are submitted.

** Note: CEQA requires that the State Water Board, as Lead Agency, prepare the environmental document. The information contained in the environmental document must be developed by the applicant and at the applicant's expense under the direction of the State Water Board, Division of Water Rights.

19. WASTE/WASTEWATER

a. Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation? ☐ YES ☒ NO
If YES, or you are unsure of your answer, explain below and contact your local Regional Water Quality Control Board for the following information (See instruction booklet for address and telephone no.):

☐ *See Attachment No. ___*

b. Will a waste discharge permit be required for your project? ☐ YES ☒ NO
Person contacted: _____ Date of contact: _____

c. What method of treatment and disposal will be used? _____

☐ *See Attachment No. ___*

20. ARCHEOLOGY

a. Have any archeological reports been prepared on this project? ☒ YES ☐ NO
b. Will you be preparing an archeological report to satisfy another public agency? ☐ YES ☒ NO
c. Do you know of any archeological or historic sites located within the general project area?
☒ YES ☐ NO If YES, explain:
See attached report.

☒ *See Attachment No. 5*

21. ENVIRONMENTAL SETTING

Attach **two complete sets of color photographs**, clearly dated and labeled, showing the vegetation that exists at the following three locations:

☒ Along the stream channel immediately downstream from the proposed point(s) of diversion.
☒ Along the stream channel immediately upstream from the proposed point(s) of diversion.
☒ At the place(s) where the water is to be used.
☒ *See Attachment No. 6*

SUBMITTAL FEES

Calculate your application filing fee using the "Water Right Fee Schedule Summary" that was enclosed in the application packet. The "Water Right Fee Schedule Summary" can also be viewed at the Division of Water Rights' website (www.waterrights.ca.gov).

A check for the application filing fee, payable to the "Division of Water Rights" and an $850 check for the Streamflow Protection Standards review fee [Pub. Resources Code § 10005(a)], payable to the "California Department of Fish and Game," must accompany this application. All applicable fees are required at the time of filing. If the application fees are not received, your application will not be accepted and will be returned to you. Please check the fee schedule for any fee changes prior to submitting the application.

DECLARATION AND SIGNATURE

I declare under penalty of perjury that all information provided is true and correct to the best of my knowledge and belief. I authorize my agent, if I have designated one above, to act on my behalf regarding this water right application.

Signature of Applicant	Title or Relationship	Date
[signature]	OWNER	11/18/09

Signature of Co-Applicant (if any)	Title or Relationship	Date
Constance Koperv	OWNER	11/18/09.

Applications that are not completely filled out and/or do not have the appropriate fees will not be accepted. In the event that the Division has to return the application because it is incomplete, a portion of the application submittal fee will be charged for the initial review.

"APPLICATION TO APPROPRIATE WATER" CHECKLIST

Before you submit your application, be sure to:

- ☐ **Answer each question completely.**
- ☐ **Number, label and include all necessary attachments.**
- ☐ **Include a legible map that meets the requirements discussed in the instruction booklet.**
- ☐ **Include the Water Availability Analysis or sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation.**
- ☐ **Include two complete sets of color photographs of the project site.**
- ☐ **Enclose a check for the required fee, payable to the Division of Water Rights.**
- ☐ **Enclose an $850 check for the Streamflow Protection Standards review fee, payable to the Department of Fish and Game.**
- ☐ **Sign and date the application.**

Send the original and one copy of the entire application to:

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

Attachments to Accompany
Water Right Application
William J. McMonigle, Jr. and Constance Kopriva

Attachment #1
3. Project Description

This project requests the enlargement of an existing 2 acre-feet reservoir to store 12 acre-feet. The reservoir is located on the Applicant's property. The pond is being identified as an on-stream facility as it is shown at the top of a blue line stream on the U.S.G.S. Quadrangle; however the current topography of the lands renders the pond off-stream as there is no longer a stream channel entering or exiting the pond. The reservoir will be enlarged to store the requested 12 acre-feet and will store water from its limited watershed area from a diversion at a proposed offset well at POD #2 located on Arroyo Seco. Water will be used for irrigation, frost protection and heat control of 13 acres of existing vineyard (see location on Attachment 3).

The vineyard was developed in 1976 on lands that were previously developed as orchards since the turn of the century. The reservoir was built by the previous land owner in 1971 for irrigation of orchards. No changes to the project have occurred since the Applicant purchased the property in 2003. The existing vineyard is currently being served from the reservoir, from water diverted from Arroyo Seco and from a groundwater well.

Development will require the enlargement of the existing reservoir to store up to 12 acre-feet, installation of the offset well and under-gravel infiltration gallery at POD #2 and installation of the water transfer pipeline from POD #2 to the reservoir. The proposed reservoir enlargement and offset well are in areas currently developed as vineyard.

Attachment #2
6. Water Availability
See separate attachment.

Attachment #3
10e. Outlet Pipe
P.O.D. #1 is at a pit type pond, and it will be drained with an irrigation pump.

Attachment #4
15. Map
See separate attachment.

Attachment #5
20. Archeology
See separate attachment.

Attachment #6
21. Environmental Setting (Photographs)
See separate attachment.

ATTACHMENT 2

Estimate of Water Availability to Accompany Water Right Application of William J. McMonigle, Jr. and Constance Kopriva

California Water Code Section 1260(k) requires that every application for a permit to appropriate water shall include "sufficient information to demonstrate a reasonable likelihood that unappropriated water is available for the proposed appropriation." This narrative and accompanying calculations provide the required information.

The subject Application includes a point of diversion (POD #1) on an unnamed stream tributary to Schell Creek thence Schell Slough thence Steamboat Slough thence Third Napa Slough thence Second Napa Slough thence Sonoma Creek in Sonoma County, and another point of diversion (POD #2) on Arroyo Seco tributary to Schell Creek (see attached map). Diversion of up to 12 acre-feet is proposed for storage at a reservoir at POD #1. According to State Water Resources Control Board Order WR 98-08, Sonoma Creek is fully appropriated above San Pablo Bay and below the gaging station at Boyes Hot Springs from July 1 to September 30. The Application proposes a diversion season of November 1 to May 31, which conforms to Order WR 98-08. The following describes the methodology used to demonstrate a *reasonable* likelihood that water is physically available for the proposed appropriation.

The attached map shows the proposed points of diversion and the watershed areas tributary thereto. The map also shows lines of equal mean annual runoff as shown on the map included with the document entitled *Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 by S.E. Rantz, 1974.*[1] An excerpt of this map is attached (Rantz map).

The weighted mean annual runoff for the watersheds tributary to POD #1 and POD #2 were computed based on the Rantz map. Mean *seasonal* runoff for the subject watersheds was estimated by adjusting the mean annual runoff assuming that the ratio of seasonal to annual runoff is identical to the ratio of seasonal to annual mean precipitation. The Sonoma precipitation station was used for this purpose (record attached). The resulting seasonal runoff value was adjusted by deducting the *face value* of any senior water rights in the watershed above the proposed points of diversion.

Calculations for the foregoing methodology are attached. These calculations show that in an average water year approximately 5.9 acre-feet would accrue to POD #1 and about 3,172 acre-feet would accrue to POD #2 (after deducting the face value of upstream water rights). The combined total of about 3,178 acre-feet would be ample to fill the 12 acre-foot reservoir at POD #1, leaving about 3,166 acre-feet of runoff remaining. Accordingly, it is reasonable to conclude that water is available for the subject Application.

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[1] USGS Miscellaneous Field Studies Map MF-613, prepared in cooperation with the California Department of Water Resources.

Water Right Application
by William J. McMonigle, Jr. and Constance Kopriva
Estimate of Water Availability

Monthly Precipitation[1]
SONOMA, CALIFORNIA

Month	Mean Precipitation (in)
October	1.62
November	3.92
December	5.17
January	6.17
February	5.29
March	4.08
April	1.77
May	0.79
June	0.23
July	0.03
August	0.09
September	0.34
Annual	**29.50**

Point of Diversion #1

Mean Precipitation for requested diversion season (11/1 - 5/31):	27.19 in
Precipitation during requested diversion season as a percentage of total precipitation:	92.17%
Mean Annual Runoff:[2]	7.8 in
Estimated Mean Seasonal Runoff:[3]	7.2 in
Watershed Area for POD #1:	19.6 ac
Total Estimated Mean Seasonal Runoff at POD #1:	11.8 ac-ft
Senior Diverters of Record within POD #1 watershed (face value):	0.0 ac-ft
Total water available at POD #1:	11.8 ac-ft
Requested diversion amount:	5.9 ac-ft
Total Seasonal Amount Remaining in Stream After Diversion:	5.9 ac-ft

Point of Diversion #2

Mean Precipitation for requested diversion season (11/1 - 5/31):	27.19 in
Precipitation during requested diversion season as a percentage of total precipitation:	92.17%
Mean Annual Runoff:[2]	10.1 in
Estimated Mean Seasonal Runoff:[3]	9.3 in
Watershed Area for POD #2:	4,599.3 ac
Total Estimated Mean Seasonal Runoff at POD #2:	3,564.5 ac-ft
Senior Diverters of Record within POD #2 watershed (face value):[4]	386.7 ac-ft
Total water available at POD #2:	3,177.8 ac-ft
Requested diversion amount:	6.1 ac-ft
Total Seasonal Amount Remaining in Stream After Diversion:	3,171.7 ac-ft

Notes:

[1] Source: Western Regional Climate Center website, http://www.wrcc.dri.edu/summary/climsmnca.html

[2] *Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 (Miscellaneous Field Stud* by S.E. Rantz, 1974.

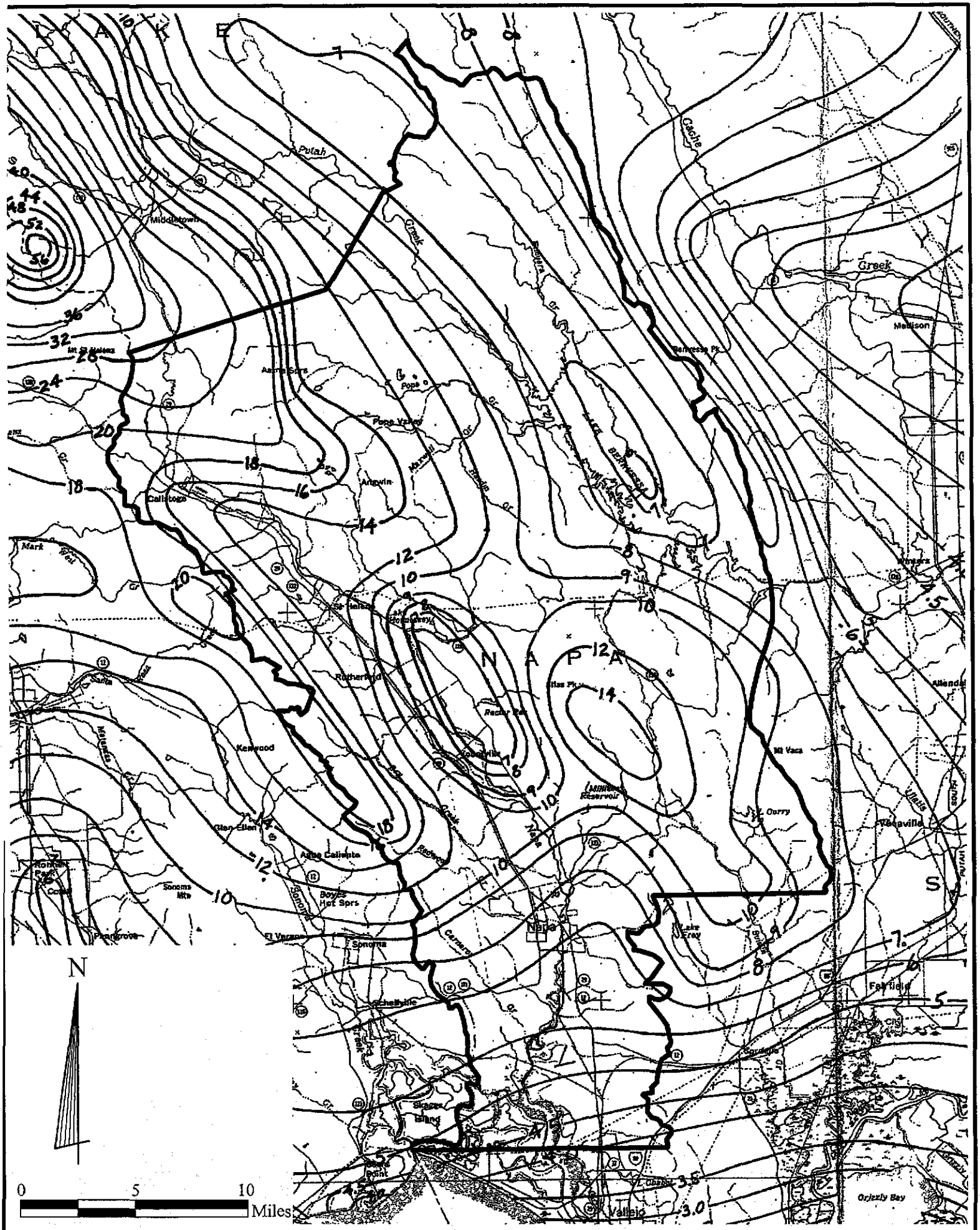
[3] Estimated mean seasonal runoff is computed by multiplying mean annual runoff by percent seasonal precipitation.

[4] Face value of rights above POD #2 based on review of eWRIMS records for watershed upstream of Statement 9641 (eWRIMS summary and map attached) and deducting rights outside of the Arroyo Seco watershed and revoked rights.

William J. McMonigle, Jr. and Constance Kopriva
Calculation of Weighted Mean Annual Runoff in POD Watersheds

Watershed	Area (ac)	Mean Annual Runoff [1] (in)	Volume (ac-in)	Volume (ac-ft)
POD #1				
	20	7.798	153	13
Total	**20**		**153**	**13**
Weighted Average		**7.8**		
POD #2				
	4599	10.137	46,623	3,885
Total	**4599**		**46,623**	**3,885**
Weighted Average		**10.1**		

Notes:
1. Weighted mean annual runoff from automatic calculation using AutoCAD.



Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 (Miscellaneous Field Studies Map MF-613), by S.E. Rantz, 1974.

Q:\Drawings\Kopriva Wine\Preliminary WAA.dwg

June 2008

SONOMA, CALIFORNIA

Monthly Total Precipitation (inches)

http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca8351

-48351

File last updated on Jul 29, 2009
*** Note *** Provisional Data *** After Year/Month 200903
a = 1 day missing, b = 2 days missing, c = 3 days, ..etc..,
z = 26 or more days missing, A = Accumulations present
Long-term means based on columns; thus, the monthly row may not
sum (or average) to the long-term annual value.
MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5
Individual Months not used for annual or monthly statistics if more than 5 days are missing.
Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR(S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1893	4.68	3.53	6.78	1.89	0.6	0 z	0	0	0.5	0.27	5.3	2.93	26.48
1894	10.39	3.96	1.47	0 z	1.4 x	0.75	0 z	0 z	0 z	0 z	0 z	0 z	16.57
1895	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1896	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1897	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1898	0 z	0 z	0 z	0 z	1.68	0.27	0 z	0	0.19 z	0.36 z	0.52 z	0.68 z	1.95
1899	2 z	0.18 z	2.06 z	0.95 z	0.79 z	0.09	0	0.05	0 z	6.27	5.29 p	2.13 z	6.41
1900	4.68	1.21	2.18 z	1.58 v	0.47	0.18	0 z	0 z	0.12	0.89 z	1.57 z	2.52	9.18
1901	5.92	1.83 z	0.58 z	1.23 z	1.02	0	0	0	0.65 z	0.52 z	4.44	1.28 z	11.38
1902	1.66	12.11	3.68 v	2.05	1.16	0	0	0.04	0	5.07	4.37	2.91	29.37
1903	5.46	2.01	5.18 u	0.5	0	0	0	0	0	0.34	6.38	2.97	17.66
1904	1.88	9.08	10.5	1.62	0	0	0.05	0	4.1	4.05	1.91	3.57	36.76
1905	5.21	3.45	5.91	1.06	3.27	0	0	0	0	0	1.74	1.8	22.44
1906	8.18	5.1	0 z	0.63	2.78	0.51	0	0	0.16	0	1.5	8.44	27.3
1907	6.91	7.21	11.46	0.35	0.14	0 z	0	0 z	0 z	0 z	0 z	0 z	26.07
1908	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1909	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0.6 z	1.65	3.6 x	7.45	9.1
1910	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1911	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1912	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1913	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1914	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1915	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1916	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1917	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1918	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1919	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1920	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1921	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1922	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1923	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1924	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1925	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1926	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1927	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1928	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1929	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1930	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1931	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1932	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1933	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1934	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1935	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1936	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1937	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1938	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0

1939	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1940	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1941	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1942	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1943	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1944	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1945	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1946	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1947	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1948	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1949	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1950	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0
1951	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	5.96 a	7.07	13.03
1952	0 z	1.34 k	4.79	0.85	0.04	0.97	0	0	0.07	0.05	2.63	11.8	21.2
1953	6.33	0.08	3.11	4.15	1.04	0.89	0	0.1	0	0.56	4.2	1.22	21.68
1954	5.7	3.03	4.93	2.35	0.1	0.65	0.15	0.72	0	0.39	4.75	6.66	29.43
1955	3.55	1.35	0.59	3.29	0	0	0	0	0.57	0.15	2.81	16.87 a	29.18
1956	10.33	5.41	0.4	1.64	0.55	0.04	0	0	0.07	2.14	0.08	0.39	21.05
1957	4.09	6.35	3.04	1.51	2.61	0.05	0	0	1.95	5.84	1.21	4.02	30.67
1958	7.75	12.87	6.65	6.87	0.7	1.14	0	0	0	0 e	0.38	1.53	37.89
1959	6.5	1.54 j	1.06	0.41	0.12	0	0	0 a	2.7 d	0	0	1.54	12.33
1960	3.72 j	6.46 b	4.02 a	1.41	1.43	0	0	0	0	0.05	5.36	3.61	22.34
1961	5.22	2.42	4.39	1.62	0.84	0.04 d	0	0.14	0.4	0.43	3.64	4.68	23.82
1962	2.4	8.61	4.26	0.47	0	0	0	0	0.46	9.12	0.69	4.57	30.58
1963	5.77	2.94	4.86	5.28	0.71	0	0	0	0.03	2.3	6.99	0.96	29.84
1964	5.62	0.2	2.18	0.21	0.25	0.75	0.04	0.03	0	2.36	5.88	8.96	26.48
1965	5.33	1.23	2.08	3.44	0	0	0	0.66	0	0.2	6.74	3.49	23.17
1966	7.5	3.31	0.54	0.63	0.15	0.23	0.05	0.07	0.1	0	7.5	5.54	25.62
1967	12.64	0.34	4.23	5.69	0.2	2.28	0	0	0.02	0.53	1.21	1.97	29.11
1968	7.34	3.69	3.92	0.27	0.47	0	0	0.27	0	1.98	3.15	7.95	29.04
1969	8.01	9.09	1.66	2.27	0	0.1	0	0	0	1.8	1.08	8.23	32.24
1970	16.31	2.93	2.16	0.24	0	0.48	0	0	0	1.54	10.71	8.47	42.84
1971	2.43	0.44	3.99	0.74	0.28	0	0	0	0.12	0.23	2.64	6.17	17.04
1972	3.16	2.06	0.26	1.27	0.1	0.22	0	0	0.85	4.58	6.92	4.29	23.71
1973	13.79	8.6	3.76	0.03	0.05	0	0	0	0.63	1.73	12.95	5.4	46.94
1974	5.34	2.41	6.04	3.05	0	0	1.11	0.01	0	1.39	0.56	4.14	24.05
1975	3.12	10.93	7.34	1.56	0.05	0.05	0.18	0.05	0	4.73	1.19	0.89	30.09
1976	0.36	2.78	1.23	1.83	0.02	0.03	0	0.98	0.67	0.5	1.92	1.02	11.34
1977	1.74	1.43	2.42	0.22	1.47	0.01	0	0	0.71	0.62	8.04	6.91	23.57
1978	11.02	6.01	6.19	3.39	0.06	0	0	0	0.4	0	2.51	0.77	30.35
1979	12.12	6.81	2.12	1.55	0.56	0	0	0	0	0 z	5.04	6.39	34.59
1980	7.99	10.62	1.55	1.89	0.25	0.14	0.18	0	0	0.26	0.33	2.39	25.6
1981	5.9	2.15	5.82	0.3	0.21	0	0	0	0.2	2.51	7.49	10.4	34.98
1982	11.97	6.1	8.72	3.69	0	0.05	0	0	1.2	3.15	8.78	3.53	47.19
1983	9.28	13.61	13.77	3.82	0.4	0	0	0.83	0.66	0.73	9.07	11.28	63.45
1984	0.49	2.48	2.05	1.92	0 z	0.45	0.01	0.35	0	2.48	10.04	1.8	22.07
1985	1.42	3.04	0 z	0 z	0 z	0 z	0 z	0	0.53	1.36	3.62	2.78	12.75
1986	6.47	14.8	7.62	0.42	0.3	0	0	0	1.28	0.31	0.21	2.35	33.76
1987	5.52	5.22	3.9	0.12	0.21	0	0	0	0	1.59	5.08	8.29	29.93
1988	6.54	0.54	0.12	1.67	0.88	0.24	0	0	0	0.19	5.36 a	3.88	19.42
1989	1.5	1.61	10.08	0.79	0.06	0.06	0	0	1.77	2.23	1.71 a	0.01	19.82
1990	6.92	3.4	1.43	0.35	3.68	0	0	0.02	0.05	0.45	0.51	1.26	18.07
1991	0.69	4.19	10.51	0.74	0.16	0.53	0.03	0.36	0	3.02	1.23	2.54	24
1992	2.21	9.82	7.01	0.9	0	0.92	0	0	0.03	4.47	0.4	9.79	35.55
1993	10.79	7.71	2.67	1.52	2.05 b	0.88	0 a	0	0	1.82	3.32 a	3.13 b	33.89
1994	3.35 a	5.46	0.23	1.32	1.37	0.05	0	0	0	0.59	6.49 a	3.91	22.77
1995	20.29 b	0.82	13.29	1.33	1.89	1.04	0	0	0	0	0.25	9.95	48.86
1996	8.95	8.27	2.61	3.49	3.37	0	0	0	0.17	2.17	3.49	13.11	45.63
1997	10.35 a	0.65	1.02	0.78	0.39	0.27	0	1.02	0.21	1.25	7.48	3.55	26.97
1998	12.01 a	18.89	2.31	2.35	3.9	0.16	0	0	0.05	0.85	5.67	1.44	47.63
1999	4.21	11.33	4.13	2.62	0.05	0.03	0	0	0.12	0.94	3.19	0.88	27.5
2000	5.71	10.8	2.73	2.58	1.72	0.29	0	0.02	0.14	2.64	1.21 a	1.59	29.43
2001	3.37	4.74	1.73	0.89	0	0.05	0	0	0.35 a	0.75	8.58 a	10.99 a	31.45
2002	3.98 a	2.53	2.66	0.48	1.23	0	0	0	0	0	3.95	9.97 a	24.8
2003	2.99 c	2.29	2.38	4.67	1.1	0	0	0	0	0	2.88 a	7.95	24.26
2004	3 a	6.31 a	1.06	0.44	0.07	0	0	0	0.11	5.2	2.31 a	10.43 b	28.93

2005	5.66 a	4.36	4.78	1.73	3.73	0.34	0	0	0	0.51	2.39 a	15.22 a	38.72
2006	5.38 a	4.11	8.01	5.43	0.83	0	0	0	0	0.55	4.2	4.6	33.11
2007	0.47	5.93	0.03	2.05	0.37	0	0.03	0	0.15	2.03	0.65 a	4.24 a	15.95
2008	11.01 a	3.82	0.21	0.15	0.21	0	0	0	0	0.57	2.66 a	1.57 a	20.2
2009	0.52 a	8.76	2.3	0.48	0 z	0 z	0 z	0 z	0 z	0 z	0 z	0 z	12.06
					Period of Record Statistics								
MEAN	6.17	5.29	4.08	1.77	0.79	0.23	0.03	0.09	0.34	1.62	3.92	5.17	29.83
S.D.	4.03	4.05	3.33	1.55	1.05	0.4	0.14	0.23	0.7	1.88	3	3.87	9.66
SKEW	0.96	1.03	1.11	1.29	1.64	2.64	7.12	2.95	3.42	1.71	0.75	0.92	1.06
MAX	20.29	18.89	13.77	6.87	3.9	2.28	1.11	1.02	4.1	9.12	12.95	16.87	63.45
MIN	0.36	0.08	0.03	0.03	0	0	0	0	0	0	0	0.01	11.34
NO YRS	66	65	62	64	65	66	65	66	64	64	65	66	53

THE STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA DEPARTMENT OF FISH AND GAME
STATE LANDS COMMISSION
MARIN, SONOMA, NAPA, MENDOCINO, AND HUMBOLDT COUNTIES

In the Matter of: (1) Applications for Water Rights and Related Regulatory Approvals and (2) Unauthorized Diversions Affecting Steelhead and Coho Salmon Fisheries in Central Coast Streams in Marin, Sonoma, Napa, Mendocino, and Humboldt Counties

TROUT UNLIMITED AND THE PEREGRINE CHAPTER OF THE NATIONAL AUDUBON SOCIETY'S PETITION FOR TIMELY AND EFFECTIVE REGULATION OF NEW WATER DIVERSIONS IN CENTRAL COAST STREAMS

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Dated: October 27, 2004

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I.
INTRODUCTION

1. Trout Unlimited and the Peregrine Audubon Society, a chapter of the National Audubon Society representing interior Mendocino County (Conservation Groups), bring this Petition to propose guidelines and procedures which will assure coordinated, timely, and otherwise effective regulation of water diversions in coastal streams from Marin County northwards to the Mattole River, including the Russian River watershed, as well as those streams in Napa County tributary to San Pablo Bay (Geographic Scope). This Petition seeks reform of the water rights ***system*** – beginning with review of applications for water right permits and ending with compliance – as necessary to protect these steelhead and coho salmon fisheries, riparian habitat, and birds and wildlife dependent on such habitat, in good condition. State laws, including the California Water Code, California Fish and Game Code, and public trust doctrine, require such protection of these public properties.

2. The coho and steelhead fisheries within the Geographic Scope of this Petition are threatened with extinction. NOAA Fisheries, which also listed these fisheries under the federal Endangered Species Act, found that water diversions are a primary cause for that poor condition. The State Water Board does not have written guidelines (namely, policies which guide substantive review of water right permit applications) for the purpose of deciding how much water is divertible for water supply, and how much must remain to protect the coldwater fisheries in good condition. Today, more than 276 water rights applications are pending before the State Water Board for new or modified diversions in Central Coast streams. *See* Ex. 1. Although most have been pending for five years or longer (A.B. 2121, section 1(g)),

the State Water Board has not published or set a schedule for final action. The several State agencies named here do not coordinate their environmental reviews related to such applications. Due partly to resulting uncertainty, delay, and cost, most new diversions since 1990 have been built and are operated today on these streams without permits from the State Water Board or other adequate basis in law.

3. The Mono Lake Cases addressed a similar circumstance where diversions from tributary streams had lowered Mono Lake to the point where public trust values were degraded. "The state h as an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." National Audubon Society v. Superior Court of Alpine County, 33 Cal.3d 419, 446 (1983). The Central Coast streams will be more challenging to restore than Mono Lake. These suffer from the tragedy of the commons, where a multitude of property owners operating separate storage and diversion facilities have cumulatively caused the decline in the flow of numerous streams. By contrast, there was only one defendant, four points of diversion, and one place of use in the Mono Lake Cases.

4. Accordingly, we bring this Petition before the State Water Board, which is the lead agency regulating water rights; California Department of Fish and Game (DFG) and State Land Commission; and before Sonoma, Mendocino, Napa, Marin, and Humboldt Counties, which are the counties within Petition' s Geographic Scope (collectively, Counties). Each of these State agencies has concurrent jurisdiction to regulate facilities or activities used for water storage or diversion.

5. We bring this Petition for administrative relief. We have chosen not to seek relief in Superior Court. If we had done so, and after we had proved the respective duties of these State agencies to adopt guidelines and procedures adequate to preserve and restore the public trust in these streams, the Court would remand to these agencies for such adoption. Instead, this Petition directly asks the State Water Board and other State agencies to restore effective regulation of water diversions within the Geographic Scope of this Petition.

6. We request reforms within the existing authorities of the State agencies before which this Petition is brought. Among other things, this Petition will assist in the implementation of A.B. 2121, as signed by Governor Schwarzenegger on September 30, 2004. This law requires the State Water Board to adopt instream flow guidelines for the waters within the Geographic Scope by January 1, 2007 for the purpose of water right administration. It also requires the Board to publish its schedule for action on pending water right applications. We request adoption of that and other procedures (relating to compliance, as well as coordination of the several State agencies), as specified in Section VI, to assure effective regulation of water diversions in Central Coast Streams. Such regulation is consistent with the objectives of the California Performance Review, which seeks to improve efficiency, responsiveness and accountability in State Government. *See* The California Performance Review Report (Aug.3, 2004).

II.
INTERESTS OF PETITIONERS

A. Trout Unlimited

7. Petitioner Trout Unlimited (TU) is a national conservation organization with its principal office in Arlington, Virginia, and its California offices in Albany and Santa Rosa. TU is a nonprofit corporation organized under the laws of the State of Michigan. TU has approximately 125,000 members nationwide, and is dedicated to protecting, conserving, and restoring North America's native trout and salmon resources.

8. TU is involved in numerous natural resource conservation and advocacy projects throughout California, including but not limited to state water rights matters and on-going hydropower licensing and relicensing proceedings. TU members and staff use and enjoy salmon and steelhead waters throughout Marin, Napa, Sonoma, Mendocino, and Humboldt counties for recreational, educational, and aesthetic purposes. In California alone, TU has approximately 10,000 members.

9. TU has two grassroots chapters in the Petition' s Geographic Scope: North Bay and Redwood. The North Bay Chapter, which meets on a monthly basis, has been actively involved in resolving water disputes in Marin and Sonoma Counties since its formation. It has been instrumental in key salmon and steelhead restoration efforts in the area. For example, the North Bay Chapter has directly contributed to the protection of coho and steelhead fisheries in Lagunitas Creek, most recently entering into a comprehensive settlement with the North Marin Water District to resolve a water rights dispute. The North Bay Chapter has approximately 1,500 members.

10. TU's Redwood Chapter is based in Santa Rosa. Along with the North Bay Chapter, it was instrumental in securing permanent fishway ladders at Healdsburg Dam to improve salmon and steelhead migration up and down the Russian River. In recent years, Redwood Chapter members have been active in gravel mining and water quality issues in the vicinity of Santa Rosa.

11. Both chapters regularly undertake physical restoration projects within the Petition' s Geographic Scope. For example, since 2000, our members have conducted yearly restoration projects on Devil's Gulch, a major tributary to Laguni tas Creek. TU is also implementing an extensive non-regulatory program under which almost two million dollars of private and public funds have been invested in restoration projects in the Garcia River, Navarro River, Ten-Mile River, Hollow Tree Creek, Noyo River, Pudding Creek, Elk Creek, and Big River. *See www.tucalifornia.org/nccoho-proj.htm.*

12. The State's water rights system directly affects TU's missio n to protect, conserve, and restore the remarkable salmon and steelhead fisheries. Since at least 1991, TU members have monitored the State Water Board's performance in the face of a small flood of permit applications within the Geographic Scope. TU has participated in the review of applications for new and modified water right permits within the Geographic Scope. *See* Griffin Declaration (Ex. 2). TU has filed approximately 82 protests of 112 such applications for tributaries to the Russian River. The protests are based on public trust grounds, and specifically address the risk of cumulative impacts that may prevent restoration of salmon and steelhead fisheries to good condition. *See id.* During this period, TU has also participated in 6 State Water Board workshops and 12 site visits related to protests. Through our consultant

Dr. Bill Trush, we have analyzed the regional risk of cumulative impacts related to new diversions and have submitted flow, monitoring, and other recommendations which, if adopted as guidelines, would permit development of water supply consistent with the restoration of the coho and steelhead fisheries in good condition. *See id.* TU contributed to DFG and NOAA Fisheries' adopt ion of their "Guidelines for Maintaini ng Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams" (May 22, 2000, updated June 17, 2002) (2002 Joint Guidelines) (Ex. 3).

B. Peregrine Audubon Society

13. Founded in 1982, the Peregrine Audubon Society (Peregrine) has more than 200 individual and family memberships in inland Mendocino County. It is centrally located within the Geographic Scope of the Petition. Peregrine is a non-profit organization incorporated in California.

14. Peregrine is a chapter of the National Audubon Society (NAS), a nation-wide conservation organization supporting a membership of approximately 550,000 through more than 500 local chapters. NAS has over a 100-year legacy of action, advocacy, and research. It has been instrumental in conservation and protection actions throughout its entire history. NAS was the lead plaintiff in the Mono Lake Cases, which established the first precedent that the public trust doctrine applies to the State's decisions in the allocati on of water resources.

15. Peregrine's mission is t o actively promote the preservation of birds, wildlife, and their natural habitats. As a result of their concern for declines in such resources, many Peregrine members have contributed to public trust efforts through participation in policy, conservation, and educational activities.

16. Peregrine has been represented on the Russian River Watershed Council since its inception in 1998. The Watershed Council seeks to solve problems through collaboration of citizens, municipalities, and agencies. In the Council, Peregrine has maintained that habitat conservation and restoration are important priorities, and that decisions must be based on sound science. Through its members, Peregrine sits on the Executive Committee and Steering Committee of the Council and functions as Coordinator of the Watershed Information Assessment and Management Workgroup that is developing a Russian River Interactive Information System website.

17. Peregrine members have been actively involved in a 20-year effort to adopt a grading ordinance for Mendocino County. Working collaboratively with agencies and other conservation organizations, Peregrine has petitioned the Mendocino County Planning Commission to adopt standards for grading permits adequate to protect riparian corridors and associated wildlife and fisheries resources.

18. Peregrine has been a strong supporter of education through its school activities. We sponsor "Audubon Adventures" program for local elementary schools. Peregrine's field trips and monthly meetings also strive to educate members and guests about local conservation and policy issues. Peregrine regularly hosts symposiums involving state and federal resource agencies, including DFG, NOAA Fisheries, and Army Corps of Engineers, and other stakeholders.

III.
JURISDICTION OF NAMED PUBLIC AGENCIES

A. State Water Resources Control Board

19. The people own the state's waters. *See* Water Code § 102. Use of that water is of public concern. *See id.* § 104. All waters shall be managed for the greatest public benefit. *See id.* § 105.

20. The State Water Board has exclusive jurisdiction to issue, condition, or rescind post-1914 appropriative water rights. *See* Water Code § 1250 *et seq.* It also regulates other rights, including pre-1914 and riparian, to prevent waste or unreasonable use. *See id.* §§ 100, 275; California Constitution, Article X, section 2.

21. More generally, the State Water Board is responsible to "prov ide for the orderly and efficient administration of the water resources of the state." Water Code § 174. The State Water Board "shall exercise the adjudicatory and regulatory functions of the state in the field of water resources." *Id.* It shall take " all appropriate proceedings or actions before executive, legislative, or judicial agencies to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water" in California. *Id.* § 275. To perform these functions, the State Water Board may: "(A) Investigate all streams, stream systems, portions of stream systems, lakes, or other bodies of water; (B) Take testimony in regard to the rights to water or the use of water thereon or therein; and (C) Ascertain whether or not water heretofore filed upon or attempted to be appropriated is appropriated under the laws of this state." *Id.*, § 1051. Its function "has steadily evolved from the narrow role of

deciding priorities between competing appropriators to the charge of comprehensive planning and allocations of waters." National Audubon, 33 Cal.3d at 444.

22. As required by the public trust doctrine, the State protects the trust uses of navigable waters - fishing, navigation, commerce, and environmental quality - to the extent feasible in water rights and other regulatory decisions. *See* National Audubon, 33 Cal. 3d at 437, 441. The State Water Board may reexamine prior diversions to determine whether they should be changed to protect the public trust uses of the affected waters. *See id.* at 446.

23. The State Water Board is a public agency subject to CEQA. *See* Pub. Resources Code § 21063. It is the lead agency in a water rights proceeding, even though other public agencies have concurrent jurisdictions.

24. CEQA's environmental review requirements apply to any State Water Board discretionary project. *See* Pub. Res. Code § 21080(a). CEQA generally applies to "discretio nary projects proposed to be carried out or approved by public agencies...." *Id.* The statutory definition of "project" includes an activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that involves the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies. *See id.* § 21065.

25. The State Water Board may adopt guidelines and procedures to implement applicable laws and rules. *See* Water Code § 275. It may formulate and adopt state policy for water quality control. *See id.* § 13140.

B. California Department of Fish and Game

26. DFG has jurisdiction to regulate taking of fish and wildlife and modifications of their respective habitats. *See* 14 CCR § 783.1.

> "The protection and conservation of the fish and wildlife resources of this state are hereby declared to be of utmost public importance. Fish and wildlife are the property of the people and provide a major contribution to the economy of the state as well as providing a significant part of the people's food supply and therefore their conservation is a proper responsibility of the state."

Fish and Game Code § 1600. To fulfill this purpose, DFG regulates: (A) any diversion or obstruction of natural flow or other modification of a streambed (*id.*, § 1603); (B) any obstruction of fish passage in specified Districts (*id.*, § 5901); fishways (*id.*, § 5931); release of flow from, through, or around any dam or other artificial obstruction (*id.*, § 5937); and screening of any diversion (*id.*, § 6100). DFG may seek civil damages (*id.*, § 2014) or criminal penalties (*id.*, § 12000 *et seq.*) for any unlawful taking or other form of destruction of fish and wildlife.

27. DFG is a public agency subject to CEQA. *See* Pub. Resources Code § 21063; *see also* CCR § 750 *et seq*. It is a responsible agency in a water rights proceeding. *See id.* § 21069; *see also* 14 CCR §§ 778, 779.5. CEQA applies to any DFG discretionary approval of a streambed alteration agreement, fishway, or screen. *See id.* § 21080(a).

28. Through the Fish and Game Commission, DFG may formulate general guidelines for the administration of its duties. Fish and Game Code § 703.

C. **State Lands Commission**

29. The State Lands Commission has exclusive jurisdiction to regulate the use and occupancy of ungranted tidelands or "submerged lands" associated with navigable rivers and creeks. Pub. Resources Code §§ 6301, 6331(a), 6216. Specifically, it surveys all such ungranted lands (*id.*, § 6331.5); and requires permits, leases, or other regulatory approvals for dredging or depositing materials, extraction of oil and gas, or other forms of occupancy. *See id.* §§ 6303, 6801. 6501.1. It may seek civil damages or civil penalties for trespass on these lands. *See id.* §§ 6224.1, 6302, 6303.1, 7992.

30. The State Lands Commission is a public agency subject to CEQA. *See* Pub. Resources Code § 21063. It is a responsible or trustee agency in a water rights proceeding. *See id.* § 21069. CEQA applies to any State Lands Commission discretionary approval of a lease, permit, or other use of submerged lands. *See id.* § 21080(a).

31. The State Lands Commission may adopt guidelines and procedures to implement these authorities. *See id.* § 6108; *see, e.g.*, State Lands Commission, Public Trust Policy (Sept. 17, 2001), available at *http://www.slc.ca.gov/Policy%20Statements/Policy_Statements_Home.htm.*

D. **Counties**

32. Each County within the Petition' s Geographic Scope has jurisdiction to regulate land use outside of a streambed associated with water diversion, such as the construction of an off-stream storage pond. *See* Government Code § 65300.

33. A County is a subdivision of the State. *See* Government Code §§ 23000-02. As such, it has authority to administer the public trust doctrine, which applies to the State as a whole.

34. The County is a public agency subject to CEQA. *See* Pub. Resources Code § 21063. It is a responsible agency in a water rights proceeding. CEQA applies to any County discretionary approval related to a diversion, including a land use permit. *See id.* § 21080(a).

35. A County may adopt rules, guidelines, or procedures to implement these authorities. *See* Government Code § 23003.

IV.
RELEVANT FACTS AND LAWS

36. This section states the facts and laws that are the basis of our claims for relief. It is organized as follows: (A) Geographic Scope; (B) Designated Beneficial Uses of the Central Coast Streams; (C) Threatened Status of Steelhead and Coho Fisheries in Central Coast Streams; (D) Water Right Permits; (E) Registration of Small Domestic Use and Livestock Stockponds; (F) Approvals by DFG; (G) County Permits; (H) Enforcement Proceedings to Correct Unauthorized New Diversions.

37. For the purpose of this Petition, "di version" means any act or facility to divert flow to storage or to actual use. "New" include s new as well as modified. "Unauthorized" means: without a water right granted by the State Water Board or other adequate basis of water right; or without other regulatory approvals required by the Government Code, Fish and Game Code, and Public Resources Code.

A. Geographic Scope of Petition

38. The geographic scope of the Petition is the Central Coast from the southern boundary of Marin County north to the Mattole River in Humboldt County, including the Russian River watershed. It also includes tributaries to northern San Pablo Bay. It includes Marin, Sonoma, Mendocino, and Napa Counties, and Humboldt County south of the Eel River. This roughly coincides with boundaries of the Evolutionary Significant Units of Central Coast steelhead and coho salmon, as discussed in paragraphs 40-50.

B. Designated Beneficial Uses of the Central Coast Streams

39. Pursuant to the Porter-Cologne Act, Water Code sections 13170-13170.1, 13240-13241, the North Coast and San Francisco Bay Regional Water Quality Control Boards (NCRWQCB and SFRWQCB, respectively) have designated beneficial uses for these waters. *See* NCRWQCB, Water Quality Control Plan for the North Coast Region (June 28, 2001), p. 2-6.00; and SFRWQCB, Water Quality Control Plan for the San Francisco Bay Region (June 21, 1995) (hereafter, Basin Plans). These designated uses include water supply, preservation of fish and wildlife, and recreation. *See id.* These Basin Plans also include a mandatory policy prohibiting degradation of such beneficial uses or other water quality standards. *See* Resolution No. 68.16 (Oct. 28, 1968) (Ex. 4); *see also* NCRWQCB, North Coast Basin Plan, p. 5-1.00.

C. Threatened Status of Steelhead and Coho Fisheries In Central Coast Streams

40. The coho and steelhead fisheries in the Petition's Geographic Scope are threatened with extinction. NOAA Fisheries has made this determination in a series of listings and related decisions under the federal Endangered Species Act.

Southern Oregon/Northern California Coho

41. In 1997 NOAA Fisheries listed the Southern Oregon/Northern California Coast Evolutionary Significant Unit (ESU) of coho salmon (*Oncorhynchus kisutch*) as threatened. *See* 62 Fed. Reg. 24,588 (May 6, 1997). This ESU includes all naturally spawned populations of coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California. *See id.* Members of this ESU are known historically to inhabit coastal watersheds in Mendocino Humboldt counties. *See id.* NOAA Fisheries stated that some of the "major activities responsible for the decline of coho salmon in Oregon and California are ... stream channelization, dams, wetland loss, ... water withdrawals and unscreened diversions for irrigation." *Id.* at 24,592. Specifically, "[d]epl etion and storage of natural flows have drastically altered natural hydrological cycles, ... increase[ing] juvenile salmonid mortality[,]" which is attributable to migration impediments, increased water temperatures, and a "loss of useable habitat due to dewatering and blockage." *Id.* at 24,593.

42. On May 5, 1999, NOAA Fisheries designated critical habitat for this ESU. *See* 64 Fed. Reg. 24,049 (May 5, 1999). Such habitat includes all accessible river reaches between Cape Blanco and Punta Gorda. *See id.* Humboldt and Mendocino Counties include watersheds containing such habitat. *See id.*

Central Coast Coho

43. In 1997, NOAA Fisheries listed the Central California Coast ESU of coho salmon as threatened under the ESA. *See* 62 Fed. Reg. 1,296 (Jan. 9, 1997) (technical amendment to 61 Fed. Reg. 56,138 (Oct. 31, 1996)). This ESU includes all naturally spawned populations of coho salmon from Punta Gorda in northern California south to and including the

San Lorenzo River in central California, as well as populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system. *See id.* For Central California Coast coho salmon, NOAA Fisheries found that "... stream channelization, dams, wetland loss, and water withdrawals and unscreened diversions for irrigation have contributed to the decline of ..." the species. *Id.* at 56,141. The sum of these water activities is "drastically altered natural hydrological cycles" which in turn "has increased juvenile salmonid mortality for a variety of reasons" such as increased water temperature, stranding, entrainment, migration delay, and loss of habitat. *Id.* NOAA Fisheries concluded that "[s]ufficient quantities of good quality water are essential for coho survival, growth, reproduction, and migration." *Id.*

44. On May 5, 1999, NOAA Fisheries designated critical habitat for this ESU. *See* 64 Fed. Reg. 24,029 (May 5, 1999). Such habitat includes all accessible river reaches from Punta Gorda in northern California south to the San Lorenzo River in central California, including Mill Valley (Arroyo Corte Madera Del Presidio) and Corte Madera Creeks, tributaries to San Francisco Bay. Marin, Mendocino, and Sonoma counties (and Napa county as a tributary watershed to San Pablo Bay) include watersheds containing habitat for this ESU.

45. In April 2002, DFG recommended that the California Fish and Game Commission list coho salmon from San Francisco north to Punta Gorda as endangered under the California Endangered Species Act (CESA), and coho salmon from Punta Gorda north to the Oregon border, as threatened. *See* DFG, Coho Salmon Recovery Strategy (Nov. 2003), p. ES-1. This geographic division tracks the federal ESUs. In August 2002, the Commission found that listing to be warranted, directed DFG to prepare a recovery strategy for coho, and

deferred final listing decision until such preparation. On February 5, 2004, the Commission approved DFG's recovery strategy, and the fish are now listed under CESA.

Central California Coast Steelhead

46. In 1997, NOAA Fisheries listed the Central California Coast steelhead ESU as threatened under the ESA. *See* 62 Fed. Reg. 43,937 (Aug. 18, 1997). This ESU includes all naturally spawned populations of steelhead (and their progeny) in California streams from the Russian River to Aptos Creek, and the drainages of San Francisco and San Pablo Bays eastward to the Napa River (inclusive), excluding the Sacramento-San Joaquin River Basin. Marin, Mendocino, Napa, and Sonoma counties include watersheds that host this ESU. At the time of listing, NOAA Fisheries found that "[w]ater diversions ... have greatly reduced or eliminated historically accessible habitat." *Id.* at 43,942. Subsequently, NOAA Fisheries has expressed its concern regarding the individual and cumulative effects of the County authorizing new on-stream water storage and diversion facilities, as well as off-stream pond storage, on Central Coast steelhead. *See* letter from James R. Bybee, NOAA Fisheries, to Raymond Hall, Planning and Building Services Department (Building Department), Mendocino County (April 12, 2001) (Ex. 5), p. 2.

47. ESA section 9, 16 U.S.C. § 1538, prohibits take of any species listed as endangered. In July 2000, NOAA Fisheries adopted the Final 4(d) Rule, which extends this prohibition of take to 14 groups of salmon and steelhead listed as threatened. *See* 65 Fed. Reg. 42,422 (July 10, 2000). "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. *See* 16 U.S.C. § 1532(19). Habitat modification or degradation is considered take if the modification kills or

injures a protected species. *See* Ex. 5, p. 1. The Final 4(d) Rule describes activities associated with on-stream water impoundments that are likely to cause harm resulting in take, including:

> "Construct ing or maintaining barriers that eliminate or impede a listed species' access to habitat or ability to migrate ... Constructing or operating dams or water diversion structures with inadequate fish screens or fish passage facilities in a listed species' habita t....Conducting land-use activities in riparian areas and areas susceptible to mass wasting and surface erosion, which may disturb soil and increase sediment delivered to streams...."

See 65 Fed. Reg. 42,472.

48. NOAA Fisheries has not yet adopted a Recovery Plan for these threatened fisheries pursuant to ESA section 4(f), 16 U.S.C. § 1533(f). Plainly, the State Water Board, NOAA Fisheries, and DFG will address water diversions as a limiting factor on such recovery. These agencies will address the cumulative impacts as diversions, both permitted and unpermitted, increase rapidly as a result of significant agricultural and other developments in Sonoma and Mendocino Counties and elsewhere in the Petition's Geogra phic Scope. Sonoma is the fastest growing county in the San Francisco Bay Area. Vineyard conversions often result in a net increase in agricultural water diversions. Given the projected increases in irrigation and population, additional water demands are foreseeable. *See* North Coast Basin Plan, p. 2-9.00.

49. Water diversions are a significant cause for the threatened status of the coho and steelhead fisheries within the Geographic Scope. According to NOAA Fisheries, "[m]ultiple diversi ons can collectively adversely affect listed salmonids by (1) reducing available habitat for these species and related forage species, (2) reducing flows necessary for

upstream and downstream passage of listed salmonids, and (3) interfering with natural stream channel process." Letter from James R. Bybee, NOAA Fisheries, to Laura Vasquez, SWRCB (Aug. 8, 2000) (Ex. 6), p. 4. Even when diversions or impoundments are located in waterways above historical salmonid habitat, adverse effects reach the downstream fisheries because "[h]e adwater tributaries may be important areas for the production or transport of invertebrate foods that subsequently drift downstream to rearing juveniles." NOAA Fisheries, "Comments On The C alifornia State Water Resources Control Board (SWRCB) Report On Proposed Actions On Pending Water Rights Applications In The Russian River Watershed And NMFS Draft Guidelines For Maintaining Instream Flows To Protect Fisheries In Tributaries Of The Russian River" (Jan. 11, 2000) (Ex. 8), p. 2. Plainly, "[h]eadw ater tributaries also contribute flow to downstream reaches that may support salmonids." *Id.* On-stream reservoirs "have the capa city to completely alter stream hydrographs – reducing stream flows to minimum bypass requirements and eliminating intermediate and high flows necessary for successful spawning, fish migrations, and channel maintenance." Letter from James R. Bybee, NOAA Fisheries, to Laura Vasquez, SWRCB (Nov. 22, 2000) (Ex. 7), p. 1. DFG has stated, "[t]he issue of water div ersions is one of the most problematic facing the 1600 program." *See* letter from Robert C. Hight, Director DFG, to Marc J. Del Piero, Russian River Flood Control and Water Conservation Improvement District (unknown date) (Ex. 9).

50. Two State reports illustrate that the ESA listings result from inadequate regulation of water rights within the Petition's Geographic Scope. In 1988, the California Advisory Committee on Salmon and Steelhead Trout, created by law in 1983 to develop a

conservation and restoration strategy for salmon and steelhead fisheries (*see* Fish and Game Code § 6900 *et seq.*) found:

> "The effort to maintain adequate streamflow for fish is also seriously hampered by the existing system for considering, granting, and enforcing the conditions placed on diversion permits. These activities are the responsibility of the State Water Resources Control Board (SWRCB). *More than 13,500* [in 1988] *permits have been granted, but only 500 (less than 4%) have bypass flow requirements for the protection of fish life*. A recent survey conducted by the SWRCB indicated that more than 35% of the permittees were diverting more water than their rights authorize, indicating poor enforcement. Furthermore, there is the equivalent of only one staff person to handle all of the field inspections."

California Advisory Committee on Salmon and Steelhead Trout, Restoring the Balance (1988 Annual Report), p. 25 (emphasis in original). Second, in 2003, DFG found that:

> "A substant ial amount of coho salmon habitat has been lost or degraded as a result of water diversions and groundwater extraction....In some streams the cumulative effect of multiple small legal diversions may be severe. Illegal diversions are also believed to be a problem in some streams within the range of coho salmon....Many of the watersheds where coho salmon are present have been developed and flows have been regulated and significantly reduced compared to natural flows."

DFG, Coho Salmon Recovery Strategy, pp.3-11, 3-13.

D. Water Right Permits

51. Today, there are at least 276 water right permit applications pending for streams in this Petition' s Geographic Scope. *See* Ex. 1.[1]

52. A person may apply to the State Water Board for a permit to appropriate unappropriated water. *See* Water Code § 1252. Such an application is necessary if the applicant does not have an existing permit or license granted by the State Water Board, a pre-

[1] Of this list, many applications are for "min or diversion," 3 cubic feet per second (cfs) direct diversion or 200 acre feet storage.

1914 right, or a riparian right adequate to cover the purpose, place, period, and amount of diversion and use.

53. There are five statutory steps in a permit proceeding. First, the owner of the land where the water will be used files an application with the State Water Board on standard form. Second, the State Water Board publishes a notice of application. Third, any interested person may file a protest, which is forwarded to the applicant. A hearing will be held if the protest is unresolved. Fourth, the Division of Water Rights (Division) reviews the application and determines whether to publish a Negative Declaration or order the preparation of an Environmental Impact Report (EIR) under CEQA, Pub. Resources Code §§ 21082.1, 2100. EIRs are rarely prepared for water right applications. Lastly, after such publication and any comment, the Division determines whether to approve an application and, if so, on what conditions; and it issues a final order subject to reconsideration or judicial review. *See id.*

54. This Petition seeks reform of the water rights system as applied to the Central California Coast. This region may be uniquely situated insofar as new diversions primarily occur on tributary streams up to the headwater springs or swales. We state those facts that are the basis for our claims that new diversions are not regulated in the timely, coordinated, or otherwise effective manner necessary to preserve and restore the steelhead and coho fisheries in good condition, and to provide needed protection of riparian habitat essential to those fish species and to many other bird and wildlife species.

Notice of Permit Application

55. The permit application requires a representation that the applicant has contacted other agencies with permitting authority. *See* Form APP (March 2001), *available at*

http://www.waterrights.ca.gov/forms/appform.pdf. It does not expressly require that the applicant copy the application, when filed, to each affected County, State Lands Commission, NOAA Fisheries, or DFG, regardless of whether the applicant believes that such agency has permitting authority. NOAA Fisheries has protested many such applications on the ground that it did not receive timely notice from a given applicant or directly from the State Water Board, other than publication on the Division' s website. *See, e.g.*, letter from Rodney R. McInnis, Regional Administrator, NOAA, to Arthur G. Baggett, Jr., Chair, SWRCB (May 23, 2003) (Ex. 10), p. 2.

Preparation of Environmental Document

56. The State Water Board now requires that an applicant enter into a Memorandum of Understanding for Preparation of Environmental Documents." *See* Form EIR-MOU (April 2003), *available at* http://www.waterrights.ca.gov/forms/MOU%2011-19-03.pdf. Pursuant to such MOU, the applicant is responsible for engaging a consultant to prepare and implement a work plan, which: (A) identifies necessary environmental studies, (B) determines the permits required to construct and implement the project, (C) provides for consultation with DFG and NOAA Fisheries or other public agency with permitting authority, and (D) results in preparation of the Initial Study under CEQA and any subsequent documents required by the State Water Board.

57. The MOU form does not require that the applicant provide notice to DFG, NOAA Fisheries or a County before execution of the MOU. It does not require that these agencies or protestants to the application have an opportunity to review or comment on the

work plan. It does not establish a procedure for resolution of any dispute related to the draft work plan.

58. More generally, the State Water Board and other public agencies have not entered into a general MOU that describes how they will coordinate in the environmental review of a water right permit applications. In the absence of such an MOU, the State Water Board does not tend to ask or allow DFG or NOAA Fisheries to participate in review or drafting of the CEQA document for a given application. This is inconsistent with Public Resources Code section 21080.3, which requires the lead agency to consult with all responsible agencies and with any other public agency which has jurisdiction by law over natural resources affected by the project which are held in trust for the people of the State of California.

59. In comments on the Federal Energy Regulatory Commission's (FERC) "Notice of Proposed Rulemaking Hydroelectric Licensing Under the Federal Power Act" (68 Fed. Reg. 13987 (Mar. 21, 2003), the State Attorney General (on behalf of State Water Board, DFG, and other State agencies) complained about FERC's inadequate co ordination and collaboration in the preparation of environmental documents that serve as the basis for licensing and related regulatory decisions for hydropower projects. "An important reform FERC could implement to eliminate unnecessary duplication of effort in the licensing process and to integrate review by federal, state and tribal agencies is to provide for the preparation of joint environmental documents." "Com ments of the State of California" (April 1, 2003), *available at http://ferris.ferc.gov/idmws/file_list.asp?accession_num=20030421-5080* (hereafter, ILP Comments), p. 28. FERC subsequently adopted an Integrated Licensing Process, which although not tested yet contemplates that FERC and other resource agencies

will take appropriate steps to ensure timely preparation of joint environmental documents. 68 Fed. Reg. 51,069 (Aug. 25, 2003). We agree with the State's com ments that sought to ensure a better Integrated Licensing Process in hydropower regulation, and we encourage similar coordination and collaboration in the preparation of environmental documents related to water right applications.

Guidelines for Substantive Review of Water Right Permit Applications

60. The State Water Board may approve a permit application on proof that (A) water is available for diversion and (B) the diversion will be put to reasonable and beneficial use. *See* Water Code § 1240. It may establish streamflow and other conditions as it deems necessary to protect fish and wildlife resources. *See id.* § 1257.5. It will consider the Basin Plans applicable to the affected stream and may subject the permit to those conditions necessary to implement the plan. *See id.* § 1258; *see also id.* § 1243.5. A.B. 2121 requires consideration of such plans. *Id.*, § 1259.4(a)(2).

61. In the early 1990s, the State Water Board effectively suspended the processing of permit applications in the Russian River Basin. In 1997, after public comment, the Division published its Staff Report: Russian River Watershed (Aug. 15, 1997) (hereafter, 1997 Staff Report) to "describe act ions recommended ... [for] pending water right applications within the Russian River watershed ... to protect fishery resources...." The 1997 Staff Report recommended: (A) an allowable season of diversion from December 15 to March 31, (B) a minimum bypass flow of 60% of the average annual flow; (C) disapproval of on-stream reservoir except where it permits fish passage; (D) a limitation on the maximum rate of diversion, to be determined on a case-by-case basis; (E) installation of fish screens on any new

diversions; and (F) measures to demonstrate compliance, to be determined on a case-by-case basis. *See* 1997 Staff Report, pp. 36-37.

62. The Division commissioned a peer review of the 1997 Staff Report by Drs. Peter Moyle (UC Davis) and G. Mathais Kondolf (UC Berkeley). *See* "F ish Bypass Flows for Coastal Watersheds, A Review of Proposed Approaches for the State Water Resources Control Board" (June 12, 2000) (Ex. 11) (hereafter, Joint Guidelines Peer Review). TU submitted extensive comments by Dr. Bill Trush on recommended amendments to the 1997 Staff Report. *See* Griffin Declaration, Ex. 2, ¶ 18.

63. DFG and NOAA Fisheries thereafter recommended the 2002 Joint Guidelines for diversions from Central Coastal streams subject to the steelhead and coho listings. These guidelines, attached as Exhibit 2, recommend: (A) an allowable season of diversion from December 15 to March 31; (B) subject to limited exceptions, a prohibition on further on-stream reservoirs; (C) a minimum by-pass flow determined on the basis of site-specific data, or absent that, not less than the median unimpaired February median flow at each point of diversion; (D) prevention of cumulative impact, by limiting the cumulative diversion at a point to diversion to 15% of the estimated 20% exceedance flow or 10% of the unimpaired runoff between October 1 and March 31 in a normal water year; (E) adequate facilities for fish passage and screening; and, (F) compliance and monitoring measures satisfactory to the State Water Board, DFG, and NOAA Fisheries, including permission for DFG's access to ea ch point of diversion or use. *Id.* at pp. 5-8. "These joint guideli nes represent the first time state and federal fish agencies presented to the board specific fish measures in guideline format that are the *minimum necessary conditions* to preserve stream flow that ensures that anadromous

salmonids will not be adversely impacted by diversions." A.B. 2121, Section 1(c) (emphasis added).

64. The State Water Board has not formally adopted the 1997 Staff Report or the 2002 Joint Guidelines as the basis for action on pending permit applications. The Board considered the Staff Report at three additional workshops on October 23, 1997, November 27, 2000, and September 5, 2001. It directed further Staff effort. The Division has stated to recent applicants that it will apply the 2002 Joint Guidelines. *See, e.g.*, letter from Harry M. Schueller, Chief, Division Water Rights, SWRCB, to Thomas and Mary Elke (Nov. 8, 2002) (Ex. 12), p. 2.

65. In individual proceedings, the State Water Board, DFG, and NOAA Fisheries have often disputed two fundamental issues in the application of the 2002 Joint Guidelines, discussed in paragraphs 66-67.

66. First, should the cumulative diversion at a proposed point of diversion be calculated to include only authorized diversions (licensed, permitted, pre-1914, and riparian), or should it include all actual diversions, including unauthorized? *See* memo from Robert W. Floerke, DFG Regional Manager, to Edward C. Anton, Chief, Division of Water Rights, SWRCB (April 25, 2003) (Ex. 13), p. 3. Further, how will all authorized diversions be calculated if the holders of such rights do not timely file accurate Statements of Use pursuant to Water Code sections 5100 *et seq.*? The Joint Guidelines expressly state: "... a prerequisite for reasonable flow allocation and habitat protection, is an accounting of existing diversions and enforcement of unpermitted diversions." 2002 Joint Guidelines, Ex. 3, p. 11. The

Guidelines further conclude, "[i]t is essential ... that an accurate evaluation of all existing diversions be conducted prior to the issuance of any new water rights permits." *Id.*

67. A second unresolved issue is: what monitoring measures should be included in a permit to assure compliance? Without specifying such measures, the Joint Guidelines recommend that the State Water Board develop a compliance program that, on a watershed scale, includes the following features:

(A). Installation of stream flow gauging and recording devices at key locations within each stream basin for determining compliance with bypass flow requirements and current level of impairment;

(B). Separate schedule for routine, random compliance inspections for each watershed, which is based upon the level of impairment and sensitivity of anadromous salmonid habitat;

(C). Requirement that applicants develop and implement measures that will ensure compliance with bypass terms, and a specific recommendation of "passive" bypass facilities; and

(D). Procedure for documenting that bypass facilities have been installed and are being maintained.

See Ex. 3, pp. 11-12.

68. A.B. 2121 requires that, by January 1, 2007, the State Water Board shall adopt instream flow guidelines for these coastal streams in accord with water quality standards for the purpose of water rights administration. *See* Water Code § 1259.4(a)(1). Prior to such formal adoption, the Board may consider the 2002 Joint Guidelines. *Id.* § 1259.4(b).

Schedule

69. The State Water Board does not publish a schedule for next steps (other than a protest, as subject to Water Code sections 1302 and 1333), publication of a CEQA document,

or its own final action on an application once filed. Accordingly, even though many of the pending applications for the streams at issue in this Petition were filed more than five years ago, the applicants and protestants do not have any information when next steps will occur. *See* Griffin Declaration, Ex. 2, ¶ 25.

70. Again, we believe that it is helpful to consider the State Water Board's comments in the context of reforming hydropower regulation. It asked FERC to establish and enforce a schedule in its licensing proceedings for hydropower projects. "Lack of accountability for applicants to meet project schedules [under the then-existing rule] is the single greatest reason that project relicensing is delayed." ILP Comments, p. 32.

71. A.B. 2121 requires that the Board shall annually prepare a written chart that shows the status of each pending application within the Geographic Scope of this Petition, any actions taken in the preceding year, proposed actions in the subsequent year, and proposed date for final action. Water Code § 1259.2(a). The Petitioners welcome this greatly needed reform and, as stated in paragraph 6, view this Petition as a vehicle to assist in implementation. However, A.B. 2121 does not answer the next question: what is an appropriate period for processing a water rights application within this Geographic Scope?

E. <u>Registration of Small Domestic Uses and Livestock Stockponds</u>

72. A short-form process applies to small domestic uses (not to exceed 4,500 gallons/day or 10 acre-feet/year) or livestock ponds (same). *See* Water Code §§ 1228.9; 1228.1(b), (c). First, the property owner completes and files a basic application form, including Fish and Game Information Form. The latter requires the applicant to contact the DFG Water Rights Coordinator for the applicable region where the diversion will be located.

DFG may impose conditions on the diversion. Pursuant to Water Code section 1228.3(c), the State Water Board publishes a monthly list of registrations. *See* List of Small Domestic Use Registrations for Counties 1990-2004 (Ex. 14), List of Livestock Stockpond Registrations for Counties 1990-2004 (Ex. 15). A protest may be filed against a livestock stockpond registration, but not a small domestic use registration.[2] The State Water Board does not require a licensed engineer to prepare the plan for a small domestic use or livestock stockpond. It does not conduct CEQA review of the registrations. Personal Communication, Jeff Newman, SWRCB (Mar. 2, 2004). Its policy is that such registrations are ministerial actions exempt from CEQA processing under CEQA Guidelines § 15268. *See id.* It does not, as a matter of practice, perform any inspection of the completed diversion facilities to confirm consistency with the information provided in the registration. *See id.*

73. Unlike water permit applications, the State Water Board has approved small domestic use and livestock stockpond registrations expeditiously in the Central Coast streams. The Joint Guidelines Peer Review expressed concern that such registrations may have significant cumulative impacts on small streams. *See* Joint Guidelines Peer Review, (Ex. 10), p. 10 n. 4.

F. Approvals by the Department of Fish and Game

74. DFG has independent authorities to approve and condition any facility or activity that alters stream flow or channel or affects fish passage.

Section 1603 Streambed Alteration Agreement

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[2] "The follo wing is a list of Small Domestic Use Registrations filed with the SWRCB, Division of Water Rights during May of 2003. This list is provided for information purposes. Protest or objections are not allowed for small domestic use registrations (California Code section 1228.3(c))." *Small Domestic Use Registrations Filed in May 2003, available at http://www.waterrights.ca.gov/application/appnot/DOMESTIC%20June2003.pdf.*

75. Section 1603 of the Fish and Game Code requires that a property owner notify DFG before commencing any substantial diversion or obstruction of the natural flow of a stream (including river or lake), or any substantial change to the bed, bank, or channel. Upon determining that such modification will have a substantial impact on flow, or the form or function of the stream, the owner and DFG will negotiate an agreement that includes any measures necessary to protect fish and wildlife. *See id.* The diversion or other activity may commence only once the agreement is final.

76. DFG issued nearly 1,800 Streambed Alteration Agreements to property owners in Mendocino County in the past 10 years. *See* "List of Streambed Alteration Agreements issued to Property Owners from January 1993 to April 2003" (Ex. 16). DFG did not review such agreements under CEQA prior to Mendocino Environmental Center v. DFG (No. CV 76761) (Feb. 3, 1999). Thereafter, the number of Section 1603 notices dropped substantially. *See* Ex. 16.

77. We have not located any written guidelines that explain: (A) how DFG determines the level of protection that is "necess ary" under Section 1602; (B) how DFG will coordinate with State Water Board in implementing Title 14 sections 750-781.5 of the California Code of Regulations, in the environmental review for a decision under Section 1602;[3] or (C) how any required measure will be monitored to assure compliance.

Section 5901 Prohibition on Impediment to Fish Passage

[3] The regulations state "earl y consultation shall include all responsible agencies," but it does not provide any procedures for accomplishing early consultation. 14 CCR § 758. DFG will circulate the results of the Initial Study to the agencies for their comments and regulations for the proposed Negative Declaration. *See id.* The Fish and Game Code likewise does not provide any specific procedures to assure early and adequate consultation for any projects for which DFG is a lead agency.

78. Section 5901 of the Fish and Game Code provides, "it is unlawful to con struct or maintain in any stream in Districts 1, 1½, 2,2½ ... any device or contrivance which prevents, impedes, or tends to prevent or impede, the passing of fish up and down stream."

79. Districts 1, 1½, 2, and 2½ include the Counties named in this Petition. *See* Fish and Game Code §§ 11001 - 11007.

80. We have not located any written guidelines that explain: (A) whether DFG considers existing devices or contrivances that impede passage in Central Coast streams to comply with Section 5901; or (B) how DFG will coordinate with State Water Board in the environmental review for a decision under Section 5901. *See* Fish and Game Code; 14 CCR §§750-781.5.

Section 5930 Inspection of All Dams

81. Section 5930 requires: "The department shall, fr om time to time, examine all dams in all rivers and streams in this State naturally frequented by fish."

82. Section 5931 requires that, if the Fish and Game Commission finds, "the re is not free passage for fish over or around a dam," DFG will "... cause plans to be furnished for a suitable fishway, and order in writing the owner of the dam to provide ... a durable and efficient fishway...."

83. Section 5900(a) defines dam to include "all artificial obstruct ions."

84. We have not located any written guidelines that explain: (A) DFG's schedule for inspection of dams in the Central Coast streams; (B) whether DFG considers Section 5931 to apply to these streams, in light of the prohibition in Section 5901; or (C) how any fishway requirement will be monitored to assure compliance.

Section 5937 Requirement for Adequate Flow

85. Section 5937 provides:

> "The owner of any da m shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam. During the minimum flow of water in any river or stream, permission may be granted by the department to the owner of any dam to allow sufficient water to pass through a culvert, waste gate, or over or around the dam, to keep in good condition any fish that may be planted or exist below the dam, when, in the judgment of the department, it is impracticable or detrimental to the owner to pass the water through the fishway."

86. This statute, and its predecessors dating to 1872 (*see* Fish and Game Code § 5937, "Notes, Histo rical Derivation"), apply to diversion involving (A) a dam, defined as an artificial obstruction and (B) any claim of right.

87. We have not located any written guidelines that explain: (A) how DFG determines the flow schedule necessary to maintain the good condition of the fishery downstream; (B) how DFG will coordinate with State Water Board in the environmental review for a decision under Section 5937; or (C) how any required measure will be monitored to determine compliance.

Section 6100 Requirement for Screened Diversion

88. Section 6100 provides that, after 1971, no diversion may occur from a water with a steelhead or coho salmon fishery until DFG has: (A) received notice from the diverter; (B) investigated whether the diversion may be deleterious to these fisheries; and if so, (C) determined measures necessary to protect these fisheries. The diversion may commence only once these measures have been incorporated into the plan and construction of such diversion.

89. We have not located any written guidelines that explain: (A) how DFG determines the level of protection necessary to protect the fishery as required by Section 6100; (B) how DFG will coordinate with State Water Board in the environmental review for a decision under Section 61007; or (C) how any required measure will be monitored to determine compliance.

G. County Permits

90. Each of the Counties included in the Petition requires a form of land use permit (such as a grading permit) for land use associated with a diversion outside of the streambed.

91. All of the Counties named in the Petition have adopted Chapter 70 of the Uniform Building Code (UBC), which establishes: (A) rules for excavation, grading, and earthwork construction; (B) administrative procedures for issuance of permits; and (C) procedures for inspections and approval of plans. *See* UBC, Chapter 70, § 7002 (1991). Most permits issued by the Counties for ponds, dams, and reservoirs are classified as exempt or regular grading.

92. We focus on Mendocino County, which we believe is generally representative of the other Counties so included.

Pond Exemptions

93. Under the UBC, a grading permit is not required when a project is approved by the building official as grading in an "isolated, s elf-contained area, and determined to pose no danger to private or public property." UBC, Chapter 70 § 7003. Due to the rural nature of much of the Counties named in the Petition, these criteria are over broad. According to the criteria, a pond may be exempt even though more than 5,000 cubic yards of material is moved

in the course of construction. *Id.*; letter from Chris Warrick, Chief Building Inspector, Mendocino County, to Fred and Alberta Zmarzly (Aug. 16, 2000) (Ex. 17) (approving exemption for pond located in drainage and requiring approximately 5,000 cubic yards of material to be moved); letter from Chris Warrick, Chief Building Inspector, Mendocino County, to Marietta Vineyards LLC (Feb. 23, 2000) (Ex. 18) (approving exemption for pond located in drainage and requiring approximately 24,400 cubic yards of material to be moved).

94. The Counties have adopted different guidelines and regulations for reviewing permit applications. In Mendocino, an application for a pond exemption involves the following steps. First, the applicant submits a building permit application form to the County's Planni ng and Building Services Department (Building Department). Then, upon receiving the application for an exempt pond, the Building Department sends a building inspector to inspect the project. The Building Department does not have any written office policy, regulation, or ordinance according to which inspectors conduct their inspection and prepare their reports. *See* memo from Scott Ward, Building Inspector II, Mendocino County, to Chris Warrick, Chief Building Inspector, Mendocino County (Ex. 19). Next, the Chief Building Inspector renders a decision on the application based on the Building Inspector's report. Finally, if the Chief Building Inspector approves a proposed pond, there is no follow-up inspection to ensure that the proposed plans were followed.

95. By contrast, Marin and Napa counties forward permit applications to their respective planning departments for environmental review. But, like the other counties, they do not require post-construction inspection to ensure compliance with the proposed plans.

Grading Permits

96. An application for a regular grading permit (grading not in excess of 5,000 cubic yards) involves more detailed review. A complete application for a regular grading permit includes "a plan in sufficient clarity to in dicate the nature and extent of the work."[4] UBC § 7006(g). Signature by a licensed engineer is not mandatory. *See id.* § 7014(a), § 7006. The steps that follow track the pond exemption process.

Environmental Review

97. As a matter of policy, Mendocino, Humboldt, and Sonoma Counties hold that issuance of permits for pond exemptions and regular grading are not subject to CEQA because they fall under the statutory exemption for ministerial projects, which "in volve little or no personal judgment by the public official as to the wisdom or manner of carrying out the project." CEQA Guidelines §§ 15268, 15369; *see also* letter from Harry M. Schueller, Chief, Division of Water Rights, SWRCB, to Rosalind Peterson (April 6, 2001) (Ex. 20).

98. By contrast, Marin and Napa Counties forward applications for grading permits to their respective planning departments for environmental review. Napa County initiated CEQA review in response to a suit filed by the Napa County Chapter of the Sierra Club.

99. The Counties do not require proof that the applicant has: (A) complied with all other relevant state regulations or submitted the necessary applications; or (B) notified DFG, NOAA Fisheries, or the State Water Board of any intention to store or divert water. *See, e.g.*, Humboldt County, Title III Land Use and Development Division 3, Building Regulations Section 331-12(E).

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[4] We have been unable to locate any standards that describe what constitutes "suf ficient clarity."

100. The State Water Board has requested that every County notify property owners that any diversion of water, except under existing rights, prior to obtaining a permit or registration from the Board, is unlawful. *See* letter from Harry M. Schueller, Chief, Division of Water Rights, SWRCB, to Chairmen of the County Boards of Supervisors and Regional Director of NRCS (July 28, 2000) (Ex. 21); *see also* letter from James W. Kassel, SWRCB, to Raymond Hall, Building Department, Mendocino County (Feb. 27, 2002) (Ex. 22). The State Water Board has stated that many pumping facilities, ponds and reservoirs permitted by the Counties had been constructed without proper water rights. *See id.* It further stated that many property owners claimed that the Counties had not informed them of the water rights regulation. *See id.*

H. Enforcement Proceedings to Correct Unauthorized Diversions

101. A large but unknown number of unauthorized diversions occur in the Central Coast streams.

102. Most of the pending permit applications in the Petition's Geographic Scope are probably for unauthorized diversions. *See* Griffin Declaration, Ex. 2, ¶ 3 0. In the Watershed Investigation Program (WIP) in 1998, the State Water Board determined that approximately 69 percent of the reservoirs identified by the investigation in the Navarro watershed were unpermitted.[5] *See* State Water Board, Order WR 2000-03 (April 26, 2000) (Ex. 23). It later determined that approximately 77 percent of the reservoirs identified by the investigation in the Maacama watershed were unpermitted. *See* State Water Board, Order WR 2000-06 (June 15, 2000) (Ex. 24). DFG has referenced "profligate unauthorized diversion s now occurring in

[5] Given the fact investigators used GIS maps from 1991, it is likely the investigation did not uncover a number of newer, unauthorized diversions.

Mendocino County," and we have reason to believe this is the case throughout the Petition scope. Letter from Robert W. Floerke, Regional Manager, DFG, to Edward C. Anton, Chief, Division of Water Rights, SWRCB (May 28, 2003) (Ex. 25), p. 2.

103. In some instances, unauthorized diversions have continued for decades.

> "In your letter you ask why protests have been accepted against your project when these reservoirs *have been in existence since the 1960s* and no objections were received during construction. It is my understanding that *these reservoirs have been storing water without a valid basis for right for over 40 years* and that this application was filed in order to legalize the use of water as described in your application" (emphasis added).

Letter from Division of Water Rights, SWRCB, to Ash Creek Vineyards (Oct. 22, 2002); *see* Ex. 26.

104. We address enforcement to prevent unauthorized diversions as follows: (A) Watershed Investigation Program (paragraphs 105-106), (B) Administrative Civil Liability and related remedies initiated by the State Water Board (paragraphs 107-115), (C) responses to complaints filed by third parties before the State Water Board (paragraphs 116-117), and (D) enforcement proceedings by DFG (paragraphs 118-120), State Lands Commission (paragraph 121), NOAA Fisheries (paragraph 122), and Counties (paragraph 123) under their independent authorities.

Watershed Investigation Program

105. The State Water Board has undertaken WIP since 1998. This compliance program includes the following steps: (A) reviewing satellite photos to locate reservoirs; (B) determining whether an apparent claim of right exists for each such reservoir; (C) notifying

each property owner for which no apparent claim of right exists; and (D) directing the landowner to state a claim of right or file an application.

106. As a matter of practice, the State Water Board selects four watersheds for investigation *throughout the entire State* in any given year. Since 1998, to our knowledge, it has only completed two such investigations within the Geographic Scope: namely, Maacama Creek and Navarro River watersheds. There are many hundreds of streams (including tributaries) that are anadromous fish habitat in the Central Coast ESU. The Petition's Geographic Scope is larger than New Hampshire, New Jersey, Connecticut, Delaware, and Rhode Island. At this pace, the State Water Board will complete the first inspection of all such watersheds within this scope at an unknown date more than a decade hence.

Administrative Civil Liability and Other Compliance Remedies Initiated by State Water Board

107. Under Water Code section 1052, the State Water Board may impose an Administrative Civil Liability (ACL) up to $500/day of unauthorized diversion. This is a form of civil penalty, subject to judicial review, for trespass on this public property. Pursuant to Water Code section 1055.3, "[i]n determining the amount of civil liability, the board shall take into consideration all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the length of time over which the violation occurs, and the corrective action, if any, taken by the violator."

108. The State Water Board does not have written penalty standards under Section 1055.3. By contrast, CalEPA has adopted such a policy for RCRA violations, in order to motivate compliance.[6] *See* 42 U.S.C. § 6928.

109. As a matter of practice, the State Water Board does not impose ACL for an unauthorized diversion if the property owner, once caught, applies for a water right permit. "[There is a n]e ed to encourage owners of unpermitted diversions to file applications to enable identification and rectification of any shortcoming in water rights. Enforcement may penalize such curative conduct, which reduces the amount and accuracy of water use information." State Water Board, "Analysis of Water Rights Process and Procedures, Water Rights Improvement Project" (Aug. 27, 2002), p. 4.

110. For example, in the course of the Navarro WIP, the State Water Board imposed ACL on only one property owner. That owner stored water diverted from an unnamed stream in an unpermitted reservoir. *See* Ex. 23, p. 4. The State Water Board found that the unauthorized diversion had continued since at least 1991 despite repeated warnings; the State Water Board imposed an ACL of $2,000. *See id.*, p. 1. The statutorily permitted ACL for that period of time could have been in excess of $1.6 million.

111. DFG has objected that this penalty practice motivates unauthorized diversions. "The already profligate unauthorized divers ions now occurring in Mendocino County will

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[6] Violations of RCRA are subject to penalties of $25,000 per day of noncompliance for each violation. *See* 42 U.S.C. § 6928. The EPA has stated, "[a]n effective hazardous waste enforcement program should impose penalties that remove the economic advantage of noncompliance with regulations and also reflect the gravity and duration of violations." EPA, *Further Improvements Needed in the Administration of RCRA Civil Penalties, available at* http://www.epa.gov/oigearth/reports/1997/rpensum.htm.

continue to flourish unless there is active SWRCB enforcement of the Water Code." Ex. 25, p. 2. The Peer Review took a similar position:

> "The presence of many unauthorized diversions, some of long standing, creates a dilemma for the SWRCB. On the one hand, effective government depends on the consent of the governed, and taking too strong a position against people who honestly do not realize that they need a permit for their diversions is likely to be counterproductive. On the other hand, taking too weak a position invites non-compliance, and deals with the problem at the expense of the public trust. We are not confident that there is a good resolution to this dilemma, but a vigorous program to identify unauthorized diversions and bring them into the water rights process would be an important step in the right direction. If the problem is ignored it will only get worse."

Ex. 11, p. 10.

112. As another recent example, the State Water Board issued an ACL complaint against Omnium Estates located in the Russian River watershed in November 2002, alleging violation of Water Code section 1052(a). *See* " Notice of Pubic Hearing for Complaint No. 252.5-31" (Mar. 21, 2003). In the course of a compliance inspection in 2001, State Water Board staff observed Omnium's property was pl anted in a mature vineyard and that an offstream reservoir constructed on the property was storing water. *See id.*, p. 2. Based on aerial photographs, staff concluded the reservoir had been constructed prior to July 1993. *See id.* Omnium failed to file a permit application, despite repeated warnings from State Water Board staff. *See id.* The State Water Board proposed an ACL liability of $3,000. This did not even cover the costs of the State Water Board's investi gation. In its comments, DFG stated: "future enforcem ent efforts should include stronger disincentives to illegal water use in order to ensure that the resource impacts of water projects are eventually mitigated by appropriate and effective permit conditions." Ex. 25, p. 1. More specifically:

> "The $3,000 imposed results in an amount of ap proximately $7.50 per day for each trespass after notification. We question the economic deterrent value of this amount and believe it sends a message to other unauthorized diverters that illegal water use is an acceptable and economic alternative to the more costly and restrictive lawful permitting process ... It also appears that, after paying the ACL and submitting the required water rights application, this diverter is tacitly being allowed to continue diversions without penalty until the completion of the required California Environmental Quality Act (CEQA) review prior to permit issuance. If this is the case, the argument for the ACL acting as a disincentive to unauthorized diversions is further eroded."

Id., p. 2.

113. As a matter of practice, the State Water Board has not required that the property owner who has undertaken an unauthorized diversion include in the corrective permit application any measure to remedy the past adverse impacts on the stream and fish and wildlife resources.

114. The State Water Board may issue a cease-and-desist order against an unauthorized diversion. *See* Water Code § 1831 *et seq.* As a matter of practice, it does not issue such order in that circumstance provided the property owner files a permit application. The unauthorized diversion thus may continue unabated without mitigation until the State Water Board takes final action on such application. To our knowledge, the State Water Board has not scheduled final action on any of the pending applications. *See* Griffin Declaration, Ex. 2, ¶¶ 25, 27, 28.

115. DFG has objected that allowing an unauthorized diversion to continue during review of a permit application will result in unlawful degradation of the environmental baseline used to determine the permit conditions. *See* Ex. 25, p. 2. In other words, since the State Water Board conditions a permit to prevent degradation of beneficial uses which exist at the

time of permit issuance, a permit does not require mitigation for any preexisting degradation caused by the unauthorized diversion. Thus, for a permit application which, as filed in 1994, includes an already constructed dam and diversion, the State Water Board will condition the permit to prevent degradation from 2004 forward and will disregard the degradation caused by the unauthorized diversion between 1994 to 2004.

Complaints Brought by Third Parties before State Water Board

116. Any person may file a complaint before the State Water Board seeking a cease-and-desist order or ACL. *See* 23 CCR § 820; "I nformation Pertaining to Investigating Water Right Complaints in California" (Dec. 2003), *available at* *http://www.waterrights.ca.gov/forms/compBooklet.pdf* (Investigating Complaints). According to this program, a complaint will be dismissed unless it includes prima facie proof that: (A) there are valuable public trust resources in the stream; (B) unauthorized diversion by the defendant adversely affects these resources; and (C) modification or termination of diversions from the stream would benefit public trust resources. *See id.*, at pp. 4-5. The State Water Board will not provide relief on such a complaint unless the complainant provides this proof. *Id.*; *see also* letter from Edward C. Anton, Chief, Division of Water Rights, SWRCB, to Robert W. Floerke, Regional Manager, DFG, p. 3 (July 7, 2003) (Ex. 27) ("unless we have substantial evidence, which shows that an applicant's divers ion causes specific harm, the Division may allow the diversion to continue"); email from Chuck Rich, Chief, Complaints Unit, SWRCB, to Alan Levine (Aug. 8, 2003) (Ex. 28) ("If the necessary evidence is not available, I doubt there is much we can do to establish and enforce minimum flow standards").

117. This burden of proof means that a complaint is generally an ineffective procedure to address an unauthorized diversion, since a complainant cannot gain access without the property owner's consent. *See* email from Chuck Rich, Chief, Complaints Unit, SWRCB, to Alan Levine, complainant, (Sept. 10, 2003) (Ex. 29) ("unless I were to initiate my own investigation in the meantime to determine where water is being used (which would be difficult due to workload requirements and the fact that I don't know the area and have NO right to trespass on the Stornetta ranch or any other private property"); *see also* letter from Robert Swain to David LaBrie, SWRCB (April 11, 2002) (Ex. 30), p. 1 ("all three of these ponds are located on private property with no public access, to gather the pictures and information [complainant] says she submitted she or her agents would have needed to enter and trespass").

Enforcement Proceedings by DFG under Fish and Game Code

118. DFG has several independent authorities under Fish and Game Code sections 1601, 5901, 5937, and 6100 to prevent unauthorized diversion of water and degradation of riparian habitat. These statutes provide for: (A) compensation for damages to the fish and wildlife resources, in an amount equal to the detriment to this public property (*see, e.g.*, Fish and Game Code § 2014(b)); (B) civil penalties up to $25,000 per violation (*see id.*, § 1603.3); and (C) criminal penalties (*see id.*, § 12000).

119. However, relief under these statutes is available only in a judicial case that the Attorney General or District Attorney brings for the relevant County. *See, e.g.*, Fish and Game Code § 1603.3; letter from Tom Pedersen, Regional Patrol Chief, DFG, to Rosalind Peterson (May 2, 2001) (Ex. 31). Prosecution of unauthorized diversions under these statutes

is rare. Such prosecution is not a priority for a typical District Attorney, given the caseload of crimes against persons and other competing priorities. DFG wardens do not have the time, expertise or other resources to develop the evidence necessary for such a *prima facie* case. Staff is limited for the Central Coast streams, and their priority tends to be poaching. *See* Griffin Declaration, Ex. 2, ¶ 34. DFG does not have a written procedure for enforcement of the Fish and Game Code against unauthorized diversions. DFG wardens are often refused access to property absent a Court order. *Id.*

120. Twenty-six years ago, the Legislature found:

> "...the department has in the past not been properly funded. The principal cause has been the fixed nature of the department's revenues in contrast to rising costs resulting from inflation. This lack of funding has prevented proper planning and manpower allocation. The lack of funding has required the department to restrict warden enforcement and to defer essential repairs to fish hatcheries and other facilities. The lack of secure funding for fish and wildlife activities other than sport and commercial fishing and hunting activities has resulted in inadequate nongame fish and wildlife protection programs."

Fish and Game Code § 710. Time has not changed these findings. We are aware of no cases brought by DFG against unauthorized diversions from Central Coast streams in the past ten years. *See* Griffin Declaration, Ex. 2, ¶ 34.

Enforcement Proceedings by State Lands Commission under Public Resources Code

121. State Lands Commission has independent authorities to obtain civil damages and injunction against unauthorized use or occupancy of the ungranted submerged lands. *See* Pub. Resources Code § 6224.1. These authorities may reach diversion or storage facilities. However, we have been unable to determine whether the State Lands Commission has completed the survey required by Public Resources Code section 6370.2 to determine the

locations of such trust lands in the Petition' s area. We are also unaware of any enforcement proceedings brought on behalf of the State Lands Commission against unauthorized diversions from Central Coast streams in the past ten years.

Enforcement Proceedings by NOAA Fisheries under Endangered Species Act

122. NOAA Fisheries has independent authority to prosecute take of listed fish in the Central Coast streams. *See* 16 U.S.C. § 1540, Final 4(d) Rule, 65 Fed. Reg. ¶ 42,422 (July 10, 2000). We are aware of only a handful of cases brought by NOAA Fisheries against unauthorized diversions from these streams in the past ten years. *See* Griffin Declaration, Ex. 2, ¶ 34. No administrative remedy is available, and exclusive venue for an enforcement case lies in U.S. District Court. *See* 16 U.S.C. § 1540(g). NOAA Fisheries only has two or three enforcement staff within the Petition' s Geographic Scope. *See* Griffin Declaration, Ex. 2, ¶ 34. U.S. Department of Justice, which would represent NOAA Fisheries in such enforcement cases, also has its own significant budgetary limitations. Property owners have denied access to NOAA Fisheries staff for the purpose of inspections, absent court order. Finally, any enforcement case must prove with scientific evidence that the diversion was a direct cause of take. In short, State agencies may not rely on federal enforcement cases to prevent or remedy unauthorized diversions in Central Coast streams.

Enforcement Proceedings by Counties

123. The Counties named in the Petition rely upon UBC 70 to regulate grading activities. The Mendocino Grand Jury has stated that the UBC does not address erosion prevention or water quality protection. *See* "19 98-1999 Mendocino County Grand Jury Final Report," *available at* http://www.co.mendocino.ca.us/grandjury/Complete%2098-

99%20Final%20Report.pdf, p. 27. Further, "[t]here seems to be little enforcement of UBC 70 which states that a permit is necessary for the movement of more than two cubic yards of soil." *Id.*

V.
CLAIMS FOR RELIEF

124. These claims state the legal basis for our request that the State agencies reform their guidelines and procedures for water rights regulation on the Central Coast streams, as specifically recommended in Section VI. However, before stating the specific claims, we respectfully address possible defenses against such reform, as raised by several agencies in individual proceedings. Such defenses, which maintain the status quo in Central Coast streams, do not comply with the spirit or the letter of applicable laws, and specifically, will not contribute to the recovery of the listed fisheries to good condition as required by State laws and the ESA alike.

125. It is no defense that the exact impacts of unauthorized diversions vary by stream and have not been precisely quantified. The best scientific evidence (including NOAA Fisheries' li sting notices under the ESA) confirms that such diversions are a significant and worsening cause of the threatened condition of these fisheries. The 2002 Joint Guidelines concur. Likewise, unauthorized diversions cause loss of riparian habitat necessary for wildlife. The public trust doctrine and other State laws require effective regulation of water diversions, whether on a navigable river or non-navigable tributaries, to protect fishing, navigation, and other beneficial uses.

126. The Gold Run Ditch case is a useful precedent for the reform of guidelines and procedures that we seek through this Petition. *See* People of the State of California v. Gold Run Ditch and Mining Company, 66 Cal. 138, 146-47 (1884). There, the California Supreme Court prohibited hydraulic mining that had resulted in discharges of soil and other debris into non-navigable tributaries, eventually impairing navigation in the Sacramento River. The Court confirmed that the public trust prohibits actions, even located on private lands distant from navigable waters, that impair navigation.

> "As a navigable river, the Sa cramento is a great public highway, in which the people of the State have paramount and controlling rights. These rights consist chiefly of a right of property in the soil, and a right to the use of the water flowing over it, for the purposes of transportation and commercial intercourse. ... To make use of the banks of a river for dumping places, ... is an encroachment upon the soil of the latter, and an unauthorized invasion of the rights of the public to its navigation; and when such acts not only impair the navigation of a river, but at the same time affect the rights of an entire community or neighborhood, or any considerable number of persons, to the free use and enjoyment of their property, they constitute, however long continued, a public nuisance."

Id. at 146-147.

127. While the miners had acted independently and separately, and while their individual actions may have been "slight" or "s carcely appreciable," the "common r esult" was impairment of navigation on the Sacramento River. Accordingly, they were jointly and severally liable for the public nuisance, and subject to a "coordinate re medy...." *Id.* at 149-50.

128. The Court imposed a new regulation of hydraulic mining even though such mining was otherwise consistent with local custom and State law.

> "...[A] legitimate private business, founded upon a local custom, may grow into a force to threaten the safety of the people, and destruction to public and private rights; and when it develops into that condition, the custom upon which it is founded becomes unreasonable, because [sic] dangerous to public and private rights, and cannot be invoked to justify the continuance of the business in an unlawful manner.... Accompanying the ownership of every species of property is a corresponding duty to so use it as that it shall not abuse the rights of other recognized owners. Upon that underlying principle, neither State nor Federal legislatures could, by silent acquiescence, or by attempted legislation, ... divest the people of the State of their rights in the navigable waters of the State for the use of a private business, however extensive or long continued."

Id. at 151. These words in 1884 ring as true today.

129. Property owners undertaking unauthorized diversions will bear additional costs to come into compliance. As the California Supreme Court held in the Mono Lake Cases:

> "We recognize the substantial concerns voiced by Los Angeles - the city's need for water, its reliance upon the 1940 [SWRCB] decision [granting the water rights], the cost both in terms of money and environmental impact of obtaining water elsewhere. Such concerns must enter into any allocation decision. We hold only that they do not preclude a reconsideration and reallocation which also takes into account the impact of water diversion on the Mono Lake environment."

National Audubon, 33 Cal.3d at 447. Plainly, the State agencies here should adopt guidelines and procedures that protect trust uses while minimizing such compliance costs. In this respect, the Central Coast streams are similar to other areas throughout the State, notably Southern California. Los Angeles and other appropriators have taken many measures on their own budget, such as use of reclaimed water, necessary to reduce their historical levels of diversions and now bear the costs and share the benefits of such balanced management of water resources.

130. The reforms recommended in Section VI will require significant effort by the State Water Board and other public agencies, at a time of extraordinary budgetary limitations.

However, that merely restates the problem. These budgetary limitations are a direct cause for the status quo where permit applications pend for many years and where unauthorized diversions of California's most precious natural resource are the rule rather than the exception. The problems will worsen in the absence of the good government reforms sought here.

131. These budgetary limitations are nothing new, although the severity may be. As discussed in paragraph 120, the Legislature acknowledged in 1978 that DFG's budgets had consistently frustrated adequate enforcement of the Fish and Game Code. It even codified that acknowledgement. As stated in paragraph 50, in 1988 the State Water Board had only one staffer to manage field inspections, and the situation today is not materially better. We are fully prepared – and we hope that the State agencies will agree – to develop innovative guidelines and procedures that will be within the agencies' respective cap acities and will assure effective regulation of diversions from in the Central Coast streams. Failure to achieve such reform will cause further harm to the public trust as well as private property owners, who will face continual regulatory uncertainty because the State Water Board has not taken final action for any of the pending permit applications for at least a decade.

132. We organize our claims below by agency. Section V.A states claims that run equally to each agency; Section V.B, State Water Board; Section V.C, DFG; Section V.D, State Lands Commission; and Section V.E, the Counties within the Petition's Geographic Scope.

A. Claims Running to All State Agencies

Claim One. The State Agencies Have Not Protected The Public Trust Uses Of The Central Coast Streams Against Unauthorized Diversions.

133. Waters, submerged lands (up to the high water mark), and fish and wildlife resources are public properties. The public trust doctrine requires protection of the trust uses to the extent feasible. *See* National Audubon, 33 Cal.3d 419, 446-7; *see also* Illinois Central R.R. Co. v. Illinois, 146 U.S. 387, 436-37, 457 (1892); Water Code § 1201.

134. Unauthorized use of such public properties is trespass.

135. There is a worsening pattern and practice of unauthorized diversions from Central Coast streams.

136. These diversions are a significant cause for the threatened condition of the coho and steelhead fisheries in these streams.

137. The State agencies named in this Petition have abused their discretion by not acting jointly to prevent or correct this pattern and practice of unauthorized diversions from these streams.

Claim Two. The State Agencies Have Not Adopted Adequate Procedures For Coordinated Environmental Review Of Water Right Permit And Related Applications.

138. CEQA requires that each public agency adopt procedures necessary for the "orderly evaluation" of a project preparatory to adoption of feasible mitigation of any significant adverse impacts. CEQA Guidelines § 15022(a). Among other things, such procedures are intended to provide for: (A) deliberate determination which agency will be the lead agency, and what responsibilities will be assumed by the responsible or trustee agencies

(*id.*, § 15051); (B) the timely preparation of a single environmental document that will serve as the basis for all regulatory approvals (*id.*, § 15050(a)); and (C) pro-active consultation between the lead and responsible agencies in the course of preparing that document, beginning before the first application is filed (*id.*, §§ 15022(a)(5), 15060.5).

139. These State agencies have not adopted a MOU or other *standing procedures* for effective cooperation in the preparation of the environmental document related to applications for water right permits and related regulatory approvals under the Fish and Game Code, Public Resources Code, Government Code, and local ordinances.

140. There are at least 276 permit applications pending in the Central Coast streams. The workload will increase in the foreseeable future, particularly if and as applications are filed to correct unauthorized diversions. As discussed above, DFG and NOAA Fisheries have frequently objected that the absence of certain standing procedures for inter-agency coordination, including filing notice from the applicants, interferes with their effective participation in the proceedings before the State Water Board. In turn, the State Water Board has also objected to inadequate notice and other procedures by the Counties in their processing of land use applications. The State agencies have abused their discretion under CEQA by failing to adopt standing procedures to coordinate environmental review of water diversions.

B. Claims Running to State Water Board

Claim Three. State Water Board Does Not Have An Adequate Procedure To Assure Timely Action On Water Right Permit Applications.

141. Under Water Code section 1250, the State Water Board "shall consider and act upon all applications for permits to appropriate water and shall do all things required or proper

related to such applications." This statute creates an implied duty of timely action of a given permit application.[7] The State Water Board has not adopted a written procedure under which it sets the schedule to process each permit application.

142. Under CEQA, each lead agency "shall adopt time limits to govern ... implementation...." CEQA Guidelines § 15100. CEQA states specific deadlines for review of an application for completeness and subsequent steps in preparation of the environmental document. *See id.*, §§ 15101-15112. The State Water Board has not adopted such time limits for the purpose of action on each permit application.

143. As a matter of practice, the State Water Board does not publish a schedule that shows status, past actions, future actions, and deadline (or even target date) for decision, for a pending permit application. Since 1990, uncertainty about the schedule for action on permit applications has encouraged the pattern and practice of unauthorized diversions in Central Coast streams.

144. A.B. 2121 requires the State Water Board to henceforth publish a schedule for its action on each permit application within the Petition's Geographic Scope. While this is much needed progress, it does not moot this claim. We seek both *transparent and expeditious* action. Many applications within the Petition's Geographic Scope have been pending up to ten years, and most, for five years or longer.

145. The State Water Board abuses its discretion by failing to adopt and implement a schedule for expeditious action on permit applications in Central Coast streams.

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[7] Water Code section 1302 provides for a protest within 60 days of the notice of application, and section 1333 provides for resolution of a protest within 180 days. These are the only steps subject to express time limits.

Claim Four. The State Water Board Does Not Have An Adequate Procedure For Consultation With Responsible Agencies In The Preparation Of The Environmental Document For Its Action On A Permit Application.

146. Claim Two addresses the collective failure to adopt an inter-agency MOU to establish standing procedures for coordination of the several regulatory proceedings that relate to any water diversion. In addition, the State Water Board does not have adequate procedures for the effective participation of DFG, NOAA Fisheries, or other responsible agencies in its own proceedings. Specifically, the standard form of MOU described in paragraph 56 does not require consultation with these responsible agencies regarding the study plan or scoping that the applicant undertakes preparatory to the CEQA document; and it does not provide for resolution of any related disputes. This is an abuse of discretion under CEQA Guidelines §§ 15060.5(b) (pre-filing consultation) and 15006(g) (consultation before as well as during preparation of the EIR).

Claim Five. The State Water Board Improperly Exempts Small Domestic Water Uses And Stockponds From Environmental Review Of Cumulative Impacts.

147. The State Water Board exempts from CEQA review the registration of small domestic uses and stockponds under Water Code section 1228 *et seq.* Its policy is that such registration is ministerial under CEQA Guidelines section 15268.

148. "Minister ial" describes a

> "governmental decision involving little or not personal judgment by the public official as to the wisdom or manner of carrying out the project. The public official merely applies the law to the facts as presented but uses no special discretion or judgment in reaching a decision. A ministerial decision involves only the use of fixed standards or objective measurements...."

CEQA Guidelines § 15369.

149. The State Water Board has discretion to require applicants to provide information it deems necessary for the review of a registration form (Water Code § 1228.3(a)(8)), and to establish reasonable general conditions applicable to such registrations, including a requirement for beneficial use (*id.*, § 1228.6). Further, a given registration shall incorporate any specific conditions required by DFG for the protection of fish and wildlife in the affected stream (*id.*, § 1228.6(a)(2)). Such conditions are not statutorily prescribed. *See id.* The Water Code does not prescribe the *manner* of diversion pursuant to a registration. As such, a registration is a discretionary project. *See* Leach v. City of San Diego, 220 Cal.App.3d, 389, 395 (1990); Mountain Lion Foundation v. Fish and Game Comm'n , 16 Cal.4th 105, 117 (1997).

150. DFG and NOAA Fisheries have submitted evidence to the State Water Board in individual proceedings that such registrations, in combination with diversions under other claims of right, contribute to the threatened status of the coho and steelhead fisheries and loss of riparian habitat and associated wildlife species. As such, registrations are "cumulatively considerable" on these streams, meaning that the "incremental effe cts of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." CEQA Guidelines § 15064(j).

151. If the State Water Board disagrees with the expert opinion of DFG and NOAA Fisheries about the cumulative impact of such registrations, as described in paragraphs 66-67, the statutory exemption still does not apply. "If t here is disagreement among expert opinion

supported by facts over the significance of an effect on the environment, the Lead Agency shall treat the effect as significant..." *Id.*, § 15064(g).

152. The State Water Board abuses its discretion by failing to require CEQA review for small domestic uses and stockponds.

Claim Six. State Water Board Does Not Have Guidelines Adequate To Determine the Existing Diversions From Central Coast Streams.

153. A permit may be granted only for water that the State Water Board determines is available for diversion. *See* Water Code § 1202. This requires a deduction of existing diversions from natural flow in the stream subject to the application.

154. The 1997 Staff Report proposed a method for determining the availability of unappropriated water at a proposed point of diversion in the Russian River Basin. The 2002 Joint Guidelines also proposed a method applicable to Central Coast streams. The State Water Board has not formally adopted either method. The State Water Board has not resolved objections by NOAA Fisheries, DFG, TU and other stakeholders that it does not have a method adequate to estimate: (A) unauthorized diversions upstream of the point of diversion; or (B) storage or diversion under pre-1914, riparian, or other rights, in light of the routine failure to file Statements of Use. Uncertainty regarding the substantive basis for determining the availability of unappropriated water has contributed to the pattern and practice of unauthorized diversions.

155. The State Water Board abuses its discretion by failing to adopt guidelines which will serve as the substantive basis for its decisions whether water is available for diversion under a permit application in the Central Coast streams.

Claim Seven. The State Water Board Does Not Have Guidelines Adequate to Establish Permit Conditions Which Protect And Restore Coho And Steelhead Fisheries In Good Condition.

156. The State Water Board may approve a permit application for unappropriated water, only on conditions that protect fish and wildlife as a beneficial use of water (*see* Water Code § 1243) and prevent impairment of water quality standards (*see id.*, §§ 1243.5, 1258).

157. In the early 1990's, the State Water Board undertook to develop a policy stating permit conditions necessary to protect the coho and steelhead fisheries of the Russian River Basin. It has not formally adopted the 1997 Staff Report. Similarly, it has not formally adopted the 2002 Joint Guidelines, which DFG and NOAA Fisheries recommend in place of that prior report.

158. Existing practices for review of permit applications do not protect the steelhead and coho fisheries in good condition. DFG and NOAA Fisheries have submitted substantial evidence that such existing permits, as well as unauthorized diversions, s have contributed to the listing of these fisheries as threatened under the federal and state Endangered Species Acts.

159. Existing practices for review of permit applications do not assure compliance with water quality standards applicable to the Central Coast streams. These fisheries, including the life stage of propagation, are beneficial uses designated in the applicable Basin Plans. The condition of these fisheries has been degraded since 1968, when the State Water Board adopted its anti-degradation policy applicable to all designated beneficial uses. DFG and NOAA Fisheries have submitted substantial evidence that diversions are a significant cause for such degradation of designated beneficial uses since 1968.

160. The State Water Board has authority to adopt such guidelines under Water Code section 13140 (for the purpose of controlling water quality impacts of diversions) as well as section 275. A.B. 2121 recognizes this authority. *See* Section 3, adopting Water Code section 1259.4(a)(2).

161. The State Water Board abuses its discretion by failing to adopt guidelines which result in permit conditions which prevent degradation of beneficial uses of the Central Coast streams.

Claim Eight. The State Water Board Does Not Have Guidelines Adequate To Establish Permit Conditions For Mitigation Monitoring And Reporting.

162. CEQA requires that a discretionary approval include monitoring and reporting conditions to assure effective implementation of required mitigation measures. *See* CEQA Guidelines § 15097(a).

163. The State Water Board has not adopted written guidelines for permit conditions for mitigation monitoring and reporting.

164. As discussed in paragraphs 60-63, the 1997 Staff Report and 2002 Joint Guidelines acknowledge that such conditions are essential to prevent further degradation of the listed fisheries and other beneficial uses of these waters. Both documents anticipate that such conditions will be developed on a case-by-case basis.

165. An agency may adopt guidelines to guide individual monitoring and reporting conditions to address: (A) relative responsibilities of the applicant and the agency, (B) guidelines for determining compliance with mitigation measures, (C) an enforcement procedure

for non-compliance, and (D) reporting of the relative success of mitigation measures as a programmatic basis for improving such future measures. *See* CEQA Guidelines § 15097(e).

166. The State Water Board abuses its discretion by failing to adopt guidelines for monitoring and reporting conditions, given: (A) substantial uncertainty about the cumulative total of actual diversions under existing diversions and (B) substantial evidence that new diversion in excess of the flow or other thresholds specified in the 2002 Joint Guidelines (*see* paragraph 63) will contribute to further degradation of the steelhead and salmon fisheries.

167. Lead and responsible agencies "should coordinate" their respective mitigation and reporting requirements (*id.*, § 15097(a)) where each has authority to approve or mitigate (*see id.*, §§ 15040, 15041). The State Water Board has not adopted guidelines or procedures for such coordination with DFG or other responsible agencies. The State Water Board abuses its discretion by failing to adopt such coordinated guidelines or procedures.

Claim Nine. The State Water Board Does Not Take Adequate Enforcement Actions To Prevent Or Correct Unauthorized Diversions.

168. Water Code section 100, which implements California Constitution Article X, section 2, provides: "... general welfare *requires* that the water resources of the State be put to beneficial use to the *fullest extent* of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented..." (emphasis added).

169. Water Code section 1825 provides: "[i]t is the intent of the Legislature that the state should take vigorous action to enforce the terms and conditions of existing permits and licenses to appropriate water and to prevent the unlawful diversion of water."

170. Diversion in the absence of a permit or valid pre-1914 or riparian basis is unlawful and thus, by operation of law, an unreasonable use of water.

171. There is a worsening pattern and practice of unauthorized diversions from the Central Coast streams within the Geographic Scope of this Petition.

172. Under its Watershed Investigation Program, the State Water Board will complete a once-over investigation of unauthorized diversions from Central Coast streams at an unknown date more than a decade hence.

173. As a matter of practice, once it determines that an unauthorized diversion is occurring, the State Water Board permits that diversion to continue provided the diverter files a permit application. Thus, it permits unauthorized diversion to continue as long as such application is pending, in exchange for payment of the annual fee. Many of the permit applications in Central Coast streams have been pending for ten years or longer.

174. The State Water Board abuses its discretion by failing to take adequate enforcement actions to prevent and correct, in the foreseeable future, the pattern and practice of unauthorized diversions that contribute to the degradation of the coho and steelhead fisheries in the Central Coast streams.

C. Claims Running to Department of Fish and Game

Claim Ten. DFG Does Not Have An Adequate Procedure For Consultation With The State Water Board In The Environmental Review Under Fish And Game Code Sections 1603, 5901, 5930, 5937, And 6100.

175. Each of DFG's decisions under Fish and Game Code sections 1603, 5901, 5930, 5937, and 6100 is discretionary and thus subject to CEQA review.

176. DFG does not have a written procedure for consultation with the State Water Board to assure that the environmental document prepared by the State Water Board provides an adequate basis for its decision whether to approve or condition a diversion under each of these statutes. DFG abuses its discretion by failing to adopt an adequate procedure for such consultation.

Claim Eleven. DFG Does Not Have An Adequate Procedure To Monitor Approvals Under Fish And Game Code Sections 1603 *Et Al*.

177. The CEQA duty to monitor mitigation measures, as described in Claim Eight, applies to a responsible as well as lead agency.

178. DFG abuses its discretion by failing to adopt written guidelines for monitoring and reporting conditions, given: (A) substantial uncertainty about the cumulative total of actual diversions under existing rights and (B) substantial evidence that new diversion in excess of the flow or other thresholds specified in the 2002 Joint Guidelines will contribute to further degradation of the steelhead and salmon fisheries.

Claim Twelve. DFG Does Not Take Adequate Enforcement Actions Under Fish And Game Code Sections 1603 *Et Seq.*

179. Fish and Game Code sections 1603 *et seq.* prohibit any diversion that DFG has not conditioned to include a flow schedule, fishway, screen, and other measures necessary to conserve fish and wildlife resources in good condition.

180. Fish and Game Code section 5930 *requires* DFG to periodically investigate all dams in all waters frequented by fish. "Dam" is defined to include any artificial instruction. *Id.*, § 5900(a).

181. Taking of fish and wildlife resulting from unauthorized diversion is a trespass under Fish and Game Code sections 2014, 2080 (take of endangered or threatened species).

182. DFG abuses its discretion by failing to periodically inspect all dams in the Central Coast streams, or otherwise enforce the prohibitions in Sections 1603 *et seq.*, given substantial evidence (including its own) that the pattern and practice of unauthorized diversions contribute to the degradation of the coho and steelhead fisheries.

D. Claim Running to State Lands Commission

Claim Thirteen. State Lands Commission Has Not Complied With Its Mandatory Duty To Complete A Survey Of Ungranted Submerged Lands.

183. Public Resources Code section 6331.5, enacted in 1975, requires the State Lands Commission to survey all ungranted submerged lands in rivers and streams. That survey is the necessary precursor for enforcement of the various statutes that require a permit or lease for any use or occupancy of such lands

184. Although it does not establish an express deadline, Section 6331.5 inherently requires timely action to prevent trespass and degradation of these lands.

185. The State Lands Commission has not complied with its mandatory duty to complete that survey for Central Coast streams.

Claim Fourteen. The State Lands Commission Does Not Take Adequate Enforcement Actions Under Public Resources Code Sections 6301 Et Al.

186. Unauthorized use of ungranted submerged lands is a trespass. Pub. Resources Code § 6224.1.

187. The State Lands Commission abuses its discretion by failing to adopt and implement procedures to prevent trespass on such lands in the Central Coast streams, given

substantial evidence that the pattern and practice of unauthorized diversions contribute to the degradation of the coho and steelhead fisheries.

E. **Claims Running to Counties**

Claim Fifteen. Humboldt, Mendocino, And Sonoma Counties Improperly Exempt Ponds And Grading Permits From CEQA Review.

188. Humboldt, Mendocino, and Sonoma Counties exempt from environmental review the pond exemptions and grading permits associated with water diversions, on the ground that approval of such a facility is a "ministerial pro ject" pursuant to CEQA Guidelines section 15268.

189. Claim Five states the definition of a "ministerial project." CEQA Guideline section 15369 gives as a relevant example:

> "A buildi ng permit is ministerial if the ordinance requiring the permits limits the public official to determining whether the zoning allows the structure to be build in the requested location, the structure would meet the strength requirements in the Uniform Building Code, and the applicant has paid his fee."

By contrast, the issuance of building permits may be considered discretionary where the standards guiding decision makers are "relatively general," or where there are no standards and where the question of compliance involves "relatively personal decisi ons addressed to the sound judgment and enlightenment of the Administrator." *See* Friends of Westwood v. City of Los Angeles, 191 Cal.App.3d 259, 271-72 (1987). Such a permit is discretionary if the County may condition the permit to minimize its environmental impacts. *See* Leach v. City of San Diego, 220 Cal.App.3d 389 (1990).

190. The applicable ordinance permits each County to condition a pond exemption or grading permit. Such authority to condition approval means that a pond exemption or grading permit is a discretionary project subject to CEQA review.

191. Humboldt, Mendocino, and Sonoma Counties do not have a programmatic EIR that determines that pond exemptions and grading permits associated with water diversions will not have significant environmental impacts.

192. Each County abuses its discretion by failing to undertake CEQA review of pond exemptions and grading permits associated with water diversions.

Claim Sixteen. Each County Named in this Petition Does Not Have Adequate Procedures For The Participation Of Other Public Agencies In The Approval Of Pond Exemptions Or Grading Permits.

193. Each County is the lead agency under CEQA for the purpose of pond exemptions or grading permits. None has adopted a procedure necessary for consultation, during a proceeding on such an application, with the State Water Board and responsible agencies have related authorities to approve or condition water diversion to a pond or other facility subject to the County approval. Each County abuses its discretion by failing to coordinate regulatory reviews related to water diversions.

VI.
REQUESTS FOR RELIEF

194. We respectfully request the following process (Section A) and remedies in the form of guidelines and procedures (Section B) in response to this Petition.

A. Coordination of Agencies' Response to Petition, Including Participation of Stakeholders

195. We request that the State agencies named here will coordinate their response to this Petition.

196. The State Water Board will function as lead, given its primary jurisdiction over the public waters of the Central Coast streams. It will publish notice and then hold a public workshop not later than January 15, 2005 to address: (A) the merits of the claims in the Petition; (B) the merits of proposed remedies; and (C) the interest of the named agencies and other stakeholders (including appropriators) to establish requested guidelines and procedures through a collaborative process. In light of the long pendency of the proceeding that resulted in the 1997 Staff Report, Petitioners will support such a process provided the named agencies and participating stakeholders commit to its conclusion not later than June 1, 2006, which is six months prior to A.B. 2121's deadline for the Board's adoption of new guidelines for this purpose.

B. Guidelines and Procedures Recommended to Address Claims

197. We request the following actions, guidelines, and procedures to resolve the claims stated in Section V. These are within the existing authorities of the respective agencies.

All Agencies

198. The State Water Board, DFG, State Lands Commission, and the Counties will adopt an inter-agency MOU for coordination of their respective proceedings to approve or condition water diversion and related facilities and activities. At a minimum, the MOU will include the following procedures.

(A). The agency which receives an application, or the applicant, will provide actual notice to all other agencies of such filing, concurrent with the filing;

(B). The agency that receives the application will undertake early and proactive consultation with all other agencies, regarding the potential environmental impacts and appropriate mitigation, monitoring, and reporting measures.

(C). The lead and responsible agencies will agree to a schedule, scope, and division of responsibilities for preparation of the environmental document that will serve as the basis for their respective decisions.

(D). The mitigation, monitoring, and reporting measures in the approvals issued by the several agencies will be coordinated as necessary to prevent direct, indirect, or cumulative effects.

199. Using methods agreed-to in the stakeholder process described in paragraph 196, the agencies will undertake systematic investigation of Central Coast streams to identify unauthorized diversions. The investigation will be completed by December 31, 2006, which is prior to A.B. 2121's deadline for adoption of new guidelines, in that manner necessary to determine whether notice required by paragraph 203(C) will be provided to property owners on a given stream within the Geographic Scope.[8]

State Water Board

200. The State Water Board will amend its standard form of MOU with a permit applicant, to be consistent with the inter-agency MOU provided in paragraph 198.

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[8] High-resolution aerial photographs may be suitable as an economical and expeditious method for comprehensive survey of storage and diversion facilities within the Geographic Scope. We understand that a contractor to Mendocino and Sonoma County agencies undertook such a survey of the Russian River Basin in August 2004, and that the photographs have at least a 2-foot resolution, which permits identification of such facilities. We have been informed that the cost of that survey of the 2,000 square-mile watershed was roughly $80,000, or $40/square mile. Similar photographs may be available from satellite sources and in archives dating back to the 1940s.

201. It will adopt a general time limit for the processing of permit applications on Central Coast Streams, *not to exceed 3 years*. For each pending or future permit application, it will adopt an expeditious schedule consistent with such time limit.

202. Pursuant to Water Code section 13140, the State Water Board will adopt guidelines for the substantive review of permit applications. It will use the 2002 Joint Guidelines as the starting point and will consider the following amendments and any others agreed to in the collaborative process described in paragraph 196.

(A). The guidelines will apply to modified as well as new permit applications.

(B). Each permit will specify management objectives for fish and associated riparian habitats in the reach affected by a diversion. The objectives will be measurable either directly or through an indicator, such as the depth criterion described in paragraph 64, or by indicators of riparian health such as canopy, standards for which have been developed for timber harvest practices or as determined through stream surveys and GIS analysis. The management objective for a given reach will be sufficient to maintain or restore a functional range of naturally occurring spawning and rearing habitat where salmonids can exist. Similarly, management will also be for protection or restoration of functional riparian systems and associated wildlife.

(C). The design of each storage or diversion facility will, without active intervention (such as an operator's control), limit di version to the allowed maximum and allow the required bypass flow. A licensed engineer will certify the adequacy of such design.

(D). Each point of diversion will include continuous monitoring and reporting of diversion, or (if infeasible) an alternative that provides the functional benefit.

(E). Each point of diversion will include real-time monitoring and reporting of physical conditions necessary to achieve a quantifiable management objective for the affected reach, such as inflow, outflow, water quality conditions, depth or width of wetted channel, or some combination.

(F). State Water Board or RWQCB staff, alone or with DFG or NOAA Fisheries staff, will have reserved authority to inspect a point of diversion without prior notice. Peace officer status will not be necessary.

(G). State Water Board will have reserved authority to remedy cumulative impacts on fisheries, riparian habitat, and associated wildlife under applicable law (including ESA), in addition to general reservation to protect public interest. The term will specify the procedures for exercise of this authority, including a duty to periodically assess the cumulative impacts.

203. The State Water Board will take enforcement actions and use enforcement procedures that effectively prevent or correct unauthorized diversions in the Central Coast streams. At a minimum:

(A). The State Water Board will evaluate the results of the inspection undertaken in paragraph 198 to determine whether a permit or other colorable claim of right appears to exist for the diversion.

(B). It will provide notice to each property owner without an apparent basis of right of diversion.

(C). The notice will direct each property owner identified in the survey to prove the adequacy of its claim of right for the diversion, or file a permit application, not later than six months from the receipt of notice. For each stream known or believed to be anadromous fish habitat, the penalty for failing to file a permit application or state a colorable claim of right will be proportional to the delay in filing following the Board's notice, in addition t o other factors under applicable law.

(D). The State Water Board will amend the standard form of application to require representations under oath, and with appropriate proof of the date when any existing diversion subject to the application began, and how much water has been stored or diverted.

(E). An applicant who has undertaken unauthorized diversion will implement within two years of notice of violation (as a condition of application approval) an agency approved plan to remedy the environmental impacts that resulted form such unauthorized diversion, regardless of the status permit approval. Impacts to be addressed include, but are not limited to, fish passage (adult and juvenile), impairment of natural sediment transport, and diminished or lost riparian habitat.

(F). An applicant with unauthorized diversion will not continue such diversion pending final decision on the application, unless it demonstrates that no harm

will result, or unless it agrees to interim mitigation implemented during pendency of application.

(G). The State Water Board will issue a cease-and-desist order against any unauthorized diversion for which the property owner does not file a timely permit application.

(H). It will set standards for assessing ACL adequate to remove the business advantage of unauthorized diversion. A guideline for such standards could be an assessment for the water appropriated without authorization, valued at a comparable price as that being charged for similar water by the current highest-priced water district in the Central Valley (chosen from the largest 25 districts).

(I). The State Water Board will assess ACL for unauthorized diversions in a timely manner.

204. The State Water Board will adopt regulations for ensuring small domestic use and livestock stockpond registrations comply with CEQA.

DFG

205. DFG will adopt the 2002 Joint Guidelines (as proposed to amended by paragraph 202) as policy applicable to all decisions under Fish and Game Code sections 1603 *et seq.* in the Central Coast streams.

206. It will take enforcement actions and use enforcement procedures that: (A) establish a schedule for periodic inspection of all dams on Central Coast streams pursuant to Fish and Game Code section 5930; (B) provide for civil damages or other relief for any diversion unauthorized under the Fish and Game Code, sufficient to remove the business advantage of unauthorized diversion; (C) provide an adequate remedy for environmental degradation resulting from unauthorized diversion such that a reasonable level of natural form and function are returned to the stream and associated biological resources, including fish

passage; (D) provide penalties for unlawful take of state-protected fish and wildlife, and (E) refer incidents of illegal take of federally listed species to NOAA Fisheries.

State Lands Commission

207. The State Lands Commission will complete the survey required by Public Resources Code Section 6370, not later than December 31, 2006 for the Central Coast streams.

208. It will take enforcement actions and use enforcement procedures that (A) provide notice to all property owners of any unpermitted use or occupancy of State lands, following the completion of the survey; and (B) provide for civil damages or other relief for any diversion unauthorized under the Public Resources Code, sufficient to remove the business advantage of that unauthorized diversion.

Counties

209. Each County will undertake a proceeding to adopt or amend its ordinance, as appropriate, to provide for CEQA review of any land use permit, including pond exemption or grading permit, for a facility or activity related to a water diversion.

210. All past permits issued by the counties for dams that were classified as "exempted" shall be rev iewed for conformity with State and Federal law that was in place at the time that the exemption was granted.

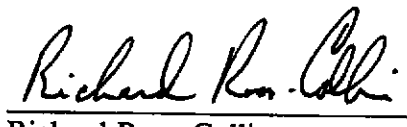
211. A list of dams and ponds that were exempted by the counties, but are found to have not met State or Federal permitting requirements shall be forwarded to the appropriate State and Federal agencies for their review.

VII.
CONCLUSION

Trout Unlimited and National Audubon Society, Peregrine Chapter respectfully request that the State act on this Petition to establish guidelines and procedures necessary to protect and restore the steelhead and salmon fisheries of the Central Coast streams in good condition.

Dated: October 27, 2004

Respectfully submitted,



Richard Roos-Collins
Julie Gantenbein
NATURAL HERITAGE INSTITUTE

Attorneys for TROUT UNLIMITED and NATIONAL AUDUBON SOCIETY, PEREGRINE CHAPTER

Charlton H. Bonham
California Counsel,
TROUT UNLIMITED

EXHIBIT LIST

Number	Title or Subject
1.	SWRCB, Water Rights Information Management System, "Water Rights Applications 1990-2004 for Humboldt, Marin, Mendocino, Napa, and Sonoma Counties"
2.	Declaration of Stan Griffin, Northern California President of Trout Unlimited of California (October 27, 2004)
3.	DFG and NOAA Fisheries, "Guidelines for Maintaining Ins tream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams, an Update of the May 22, 2000 Guidelines" (June 17, 2002)
4.	SWRCB, Resolution No. 68-16, "State ment of Policy with Respect to Maintaining High Quality of Waters in California" (Oct. 28, 1968)
5.	Letter from James R. Bybee, NOAA Fisheries, to Ray Hall, Mendocino County Planning & Building Services Department (April 12, 2001)
6.	Redacted letter from James R. Bybee, NOAA Fisheries, to Laura Vasquez, Division of Water Rights, SWRCB (Aug. 8, 2000)
7.	Redacted letter from James R. Bybee, NOAA Fisheries, to Laura Vasquez, Division of Water Rights, SWRCB (Nov. 22, 2000)
8.	NOAA Fisheries, "Draft Executive Summary Comments on the State Water Resources Control Board (SWRCB) report on Proposed Actions on Pending Water Rights Applications within the Russian River Watershed and NMFS Draft Recommended Guidelines for Maintaining Instream Flows to Protect Fisheries Resources in Tributaries of the Russian River" (Jan. 11, 2000)
9.	Letter from Robert C. Hight, CDFG, to Mark J. Del Piero, Russian River Flood Control & Water Conservation Improvement District (undated)
10.	Letter from Rodney R. McInnis, Acting Regional Administrator, NOAA Fisheries, to Arthur G. Bagget, Jr., Chair, SWRCB (May 23, 2003)
11.	Peter B. Moyle and G. Mathais Kondolf, "Fish Bypass Flows for Coastal Watersheds, A Review of Proposed Approaches for the State Water Resources Control Board" (June 12, 2000)

12. Letter from Harry M. Schueller, Chief Deputy Director, SWRCB, to Thomas and Mary Dimmick Elke c/o Drew L. Aspegren, Napa Valley Vineyard Engineering, Inc. (Nov. 8, 2002)

13. Memorandum from Robert W. Floerke, Regional Manager, DFG, to Edward C. Anton, Chief, Division of Water Rights, SWRCB (April 25, 2003)

14. SWRCB, Water Rights Information Management System, Small Domestic Use Registrations 1990-2004 for Humboldt, Marin, Mendocino, Napa, and Sonoma Counties

15. SWRCB, Water Rights Information Management System, Livestock Stock Pond Registrations 1990-2004 for Humboldt, Marin, Mendocino, Napa, and Sonoma Counties

16. DFG, list of Streambed Alteration Agreements 1993-2002 for Mendocino County

17. Letter from Chris Warrick, Chief Building Inspector, Mendocino County, to Fred and Alberta Zmarzly (Aug. 16, 2000)

18. Letter from Chris Warrick, Chief Building Inspector, Mendocino County to Marietta Vineyards LLC (Feb. 23, 2000)

19. Memorandum from Scott Ward, Building Inspector II, to Chris Warrick, Chief Building Inspector, Mendocino County, Re: "Po nd Exemption for Larry Smith" (Aug. 31, 1999)

20. Letter from Harry M. Schueller, Chief Deputy Director, SWRCB, to Rosalind Peterson (April 6, 2001)

21. Letter from Harry M. Schueller, Chief Deputy Director, SWRCB, to the Chairmen of the County Boards of Supervisors and Regional Director of National Resources and Conservation Service (NRC) (July 28, 2000)

22. Letter from James W. Kassel, Chief, License and Compliance Section, SWRCB, to Raymond Hall, Director of Planning & Building, Mendocino County Planning and Building Department (Feb. 27, 2002)

23. SWRCB, Order WR 2000-03 "Imposing Admini strative Civil Liability in the Matter of Phillip W. Wasson and Geneva Wasson" (April 26, 2000)

24. SWRCB, Order WR 2000-11 "Imposing Admini strative Civil Liability in the Matter of William and Jennifer Sloan" (July 20, 2000)

25. Memorandum from Robert W. Floerke, Regional Manager, DFG, to Edward C. Anton, Chief, Division of Water Rights, SWRCB (May 28, 2003)

26. Letter from SWRCB to Mr. And Mrs. Statzer, Ash Creek Vineyards (Oct. 22, 2002)

27. Memorandum from Edward C. Anton, Chief, Division of Water Rights, SWRCB, to Robert W. Floerke, Regional Manager, DFG (July 7, 2003)

28. Email from Charles Rich, Chief, Complaint Unit, SWRCB, to Alan Levine (Aug. 8, 2003)

29. Email from Charles Rich, Chief, Complaint Unit, SWRCB, to Alan Levine (Sept. 10, 2003)

30. Letter from Robert Swain, Winemaker, Parducci Wine Cellars, to David LaBrie, Division of Water Rights, SWRCB (April 11, 2002)

31. Letter from Tom Pedersen, Regional Patrol Chief, Central Coast Region, DFG, to Rosalind Peterson (May 2, 2001)

DECLARATION OF SERVICE

I, Shane Conway, declare that I today served the attached "***TROUT UNLIMITED AND THE PEREGRINE CHAPTER OF THE NATIONAL AUDUBON SOCIETY'S PETITION FOR TIMELY AND EFFECTIVE REGULATION OF WATER DIVERSIONS IN CENTRAL COAST STREAMS***," to each person below by first-class mail as follows:

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Exhibit 1

Exhibit 1

Water Rights Applications 1990-2004
Humboldt County

Application ID	Applicant	Date Filed	Date Issued
A029681	Cole	3/7/1990	8/21/1997
A029981	Garberville Water Company	7/22/1991	5/15/1995
A029994	Young	8/26/1991	12/22/1992
A030424	Ruth	1/11/1995	3/4/1998
A030611	Brown	4/14/1997	11/30/1999
A030941	Sun Tan Glen Subdivision	9/17/1999	5/28/2002
A030970	Morais	10/14/1999	
A031073	California Department of Transportation	6/20/2000	
A031164	City of Rio Dell California Municipal Water Corporation	3/20/2001	
A031222	Shannon	8/23/2001	
A031439	Mierau	9/2/2003	

Water Rights Applications 1990-2004
Marin County

Application ID	Applicant	Date Filed	Date Issued
A029905	Evergreen Alliance Golf Ltd	2/14/1991	2/6/1997
A029993	Marin-Bolinas Botanical Garden	8/21/1991	5/2/1994
A030121	Nan Tucker McEvoy	4/30/1992	11/9/1995
A030658	Murphy	10/24/1997	
A031014	Lucas Film Ltd	1/21/2000	
A031036	Minne A Corda	3/21/2000	
A031076	McEvoy	6/20/2000	
A031077	McEvoy	6/20/2000	

Water Rights Applications 1990-2004
Mendocino County

Application ID	Applicant	Date Filed	Date Issued
A029645	Helluva Vineyards LLC	1/18/90	9/28/90
A029646	Helluva Vineyards LLC	1/18/90	9/28/90
A029672	Henneberg	3/6/90	7/1/91
A029723	Ford	4/23/90	10/30/91
A030052	Romer	12/26/91	8/27/92
A029719	Foster	4/11/90	9/23/92
A029995	Wilson	8/26/91	10/8/92
A029984	HH LLC	8/7/91	2/28/94
A029795	Ciancutti	8/13/90	3/30/94
A029933	Martin	4/2/91	2/20/96
A029679	Redwood Grove Vineyards	3/7/90	1/17/97
A030373	Bewley-Motluk Family	6/20/94	5/12/97
A029907	Scommegna Family Vineyards	2/14/91	2/29/00
A030560	Moerman	8/22/96	5/23/00
A030564	Moerman	8/28/96	5/23/00
A030036	Johnson Orchards	11/12/91	7/26/00
A029711	Bennett	4/4/90	4/19/01
A029744	Schwindt	5/14/90	
A029753	Nick Alexander Imports	5/25/90	
A029760	Brutocao Vineyards	6/11/90	
A029763	Nelson and Sons	6/22/90	
A029764	Nelson and Sons	6/15/90	
A029765	Nelson and Sons	6/15/90	
A029783	Middleridge Vineyards	7/31/90	
A029810	Day Ranch	8/29/90	
A029910	Savoy	3/4/91	
A029911	Savoy	3/4/91	
A030015	M-R Vineyard	10/10/91	
A030024	Cahn	10/24/91	
A030161	Thomas	7/16/92	
A030162	Thomas	7/16/92	
A030162A	Thomas	7/16/92	
A030162B	Thomas	7/16/92	
A030163	Thomas	7/16/92	
A030170	Gannon	8/4/92	
A030290	White	10/12/93	
A030349	Light	4/13/94	
A030363	Todd	5/10/94	
A030448	Jackson	6/6/95	
A030449	Jackson	6/6/95	
A030451	Elk County Water District	6/8/95	
A030474	Cahn	8/15/95	
A030479	Jones	9/12/95	
A030492	Wallo	10/24/95	
A030533	Schoeneman	4/23/96	
A030553	Milovina Brothers	7/1/96	
A030554	Milovina Brothers	7/1/96	
A030615	Bartolomei	4/24/97	

Water Rights Applications 1990-2004
Mendocino County

A030638	Redwood Valley County Water District	8/20/97	
A030656	Brutocao Vineyards	10/21/97	
A030683	Frey Vineyards	2/27/98	
A030717	Jenks	6/19/98	
A030718	Elke	6/19/98	
A030721	Boltz	6/30/98	
A030722	Donnelly Creek Vineyards	7/1/98	
A030735	Meyer	7/28/98	
A030761	Marks	9/14/98	
A030779	Feliz Creek	10/2/98	
A030780	Feliz Creek	10/2/98	
A030789	Wentzel	10/9/98	
A030792	Day Ranch	10/9/98	
A030794	Demuth	10/13/98	
A030804	Moreno and Company	11/2/98	
A030808	Green	11/9/98	
A030828	Battinich	12/15/98	
A030859	Gaines	4/9/99	
A030860	Baker	4/9/99	
A030861	Redwood Grove Vineyards	4/9/99	
A030869	Navarro Fairhills Ranch	4/14/99	
A030870	Navarro Fairhills Ranch	4/14/99	
A030872	Klindt	4/19/99	
A030873	Mathias	4/19/99	
A030877	Fetzer	4/27/99	
A030878	Fetzer	4/27/99	
A030892	Point Arena Water Works	5/13/99	
A030912	Lalanne Vineyards	7/1/99	
A030926	Donovan	7/29/99	
A030930	Rose Family Vineyards	8/18/99	
A030934	White	9/17/99	
A030966	Holland	10/14/99	
A030967	Cold Creek Compost Inc.	10/14/99	
A030982	Rosetti	11/22/99	
A030986	Haiku Vineyard	11/22/99	
A030987	Fetzer Vineyards	11/22/99	
A030988	Fetzer Vineyards	11/22/99	
A030994	Savoy	1/21/00	
A031003	Elke	1/21/00	
A031004	Wiley	1/21/00	
A031040	Henwood	4/13/00	
A031057	McGhee	5/12/00	
A031059	Linholme Properties	6/5/00	
A031060	Linholme Properties	6/5/00	
A031080	Schoeneman	6/20/00	
A031085	Patiana Organic Vineyards	7/27/00	
A031086	Masut Du Ho Vineyards	7/31/00	
A031087	Masut Du Ho Vineyards	7/31/00	
A031091	Fetzer	8/21/00	

Water Rights Applications 1990-2004
Mendocino County

A031092	Fetzer Vineyards	8/22/00	
A031093	Fetzer	8/22/00	
A031094	Fetzer Vineyards	8/22/00	
A031096	William Charles and Nancy Charles Trust	8/29/00	
A031097	Wasson	8/30/00	
A031105	Fetzer	9/15/00	
A031133	Cakebread Vineyards	1/30/01	
A031135	Bergner	1/30/01	
A031138	Robert Mondavi Properties	1/30/01	
A031139	Robert Mondavi Properties	1/30/01	
A031140	Robert Mondavi Properties	1/30/01	
A031141	Robert Mondavi Properties	1/30/01	
A031159	Fetzer	3/14/01	
A031171	Tri Marguerite Vineyards	3/26/01	
A031178	Hayward	4/27/01	
A031179	East Sanel Irrigation Co.	5/1/01	
A031181	Shadowbrook Farms	5/3/01	
A031183	Rustic Retirement	5/10/01	
A031184	Lakeview Vineyards	5/15/01	
A031194	Alaska Water Exports	6/6/01	
A031195	Alaska Water Exports	6/6/01	
A031250	Kuimelis	11/19/01	
A031253	Golden	12/10/01	
A031255	Gerhart	12/11/01	
A031258	Rhodes	12/17/01	
A031259	Mid Mountain Vineyards	12/18/01	
A031260	Rhodes	12/18/01	
A031261	East Sanel Irrigation Co.	12/19/01	
A031282	Golden	1/23/02	
A031296	M-R Vineyard	2/19/02	
A031305	Surprise Valley Ranch, Inc.	3/14/02	
A031311	Rosetti	3/26/02	
A031315	Milovina	4/8/02	
A031336	Bloom	6/20/02	
A031337	Redwood Valley County Water District	6/20/02	
A031339	Golden Vineyards	6/27/02	
A031344	Geomar Corporation	7/9/02	
A031348	Christensen	8/8/02	
A031360	Carley	9/23/02	
A031383	Dolan & Son	1/15/03	
A031386	Fetzer Vineyards	1/22/03	
A031387	Beckstoffer Ranches	1/22/03	
A031399	Milovina	2/25/2003	
A031401	Mendocino County Russian River Flood Control	3/10/03	

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A031418	Cox	4/24/03	
A031425	Stonecraft Homes	5/15/03	
A031426	Welch	5/15/03	
A031434	Donnelly Creek Vineyards	7/28/03	
A031435	Richardson	7/28/03	
A031437	Buich Family Trust	7/30/03	
A031445	Walker Lake Association	9/11/03	
A031446	Middleridge Vineyards	9/11/03	
A031447	Omnium Estates	9/16/03	
A031461	Salans	11/10/03	
A031463	Chase	11/13/03	
A031464	Flight Rail Corporation	11/25/03	
A031467	Sullivan	11/25/03	

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Application ID	Applicant	Date Filed	Date Issued
A029773	Stonebridge Cellars Inc	7/6/1990	9/17/1991
A029689	Moore	3/14/1990	6/3/1992
A029845	Vivette & Company	10/25/1990	9/15/1992
A029775	Huneeus	7/6/1990	5/5/1993
A029871	Clifton	12/3/1990	8/19/1993
A029747	Heide	5/21/1990	9/21/1993
A030193	Sinskey	11/17/1992	11/16/1993
A029640	Ahmann	1/12/1990	4/18/1994
A030098	Peck	4/8/1992	5/9/1994
A029699	Hubert Paul & Colleen Lauffs Trustees	3/26/1990	5/11/1994
A029700	Hubert Paul & Colleen Lauffs Trustees	3/26/1990	5/11/1994
A029701	Hubert Paul & Colleen Lauffs Trustees	3/26/1990	5/11/1994
A029702	Hubert Paul & Colleen Lauffs Trustees	3/26/1990	5/11/1994
A030247	Kirkland Vineyards	4/28/1993	12/6/1994
A030206	The Hess Collection Winery	12/23/1992	12/20/1994
A029882	Usibelli Coal Mines Inc.	12/17/1990	2/15/1995
A030004	V Sattui Winery	9/13/1991	3/8/1995
A030005	V Sattui Winery	9/13/1991	3/8/1995
A030006	V Sattui Winery	9/13/1991	3/8/1995
A029903	De Simoni	2/6/1991	6/13/1995
A029742	Komes	5/14/1990	6/22/1995
A030125	York Creek Vineyards	5/5/1992	11/1/1995
A030303	Napa Valley Country Club	11/15/1993	11/6/1995
A030236	Beringer Blass Wine Estates	3/17/1993	11/28/1995
A030118	William Hardin Trust	4/28/1992	1/26/1996
A030119	Jeanne Hardin Trust	4/28/1992	1/26/1996
A029972	Young	7/1/1991	2/6/1996
A030245	Pride	4/19/1993	2/28/1996
A030356	Clos du Val Wine Company	4/18/1994	3/18/1996
A030242	Shafer	4/12/1993	4/2/1996
A030102	Robert Mondavi Vineyards	4/13/1992	6/10/1996
A030103	Robert Mondavi Vineyards	4/13/1992	6/10/1996
A030104	Robert Mondavi Vineyards	4/28/1992	6/10/1996
A030023	Kenefick	10/22/1991	6/14/1996
A030122	Ferrari-Carano Vineyards & Winery	4/30/1992	6/15/1996
A030073	Clarke	3/5/1992	7/3/1996
A029820	Taylor	9/11/1990	7/15/1996
A029825A	Taylor	9/18/1990	7/15/1996
A029825B	Martin	9/18/1990	7/15/1996
A030244	Congdon	4/16/1993	8/28/1996
A030421	Nerlove	12/27/1994	10/18/1996
A030293	Heublein, Inc.	10/19/1993	2/10/1997
A030392	Domaine Carneros	8/15/1994	5/7/1997
A030229	Acacia Winery	3/1/1993	5/12/1997
A030512	Kerson	2/29/1996	10/8/1997
A030471	Jamieson Vineyards	8/9/1995	10/16/1997
A030119A	Alana Hardin Trust	4/28/1992	12/10/1997
A030119B	Lam	4/28/1992	12/10/1997
A030441	Olney	5/4/1995	1/12/1998
A030032	Mahoney	11/6/1991	2/3/1998
A030396	Hudson	9/7/1994	7/10/1998

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A030753	Borge	8/25/1998	11/29/1999
A030386	Franciscan Estates Selections	7/21/1994	12/13/1999
A030610	Sinskey	4/11/1997	2/23/2000
A030825	Murray	12/11/1998	2/25/2000
A030630	Dean	7/8/1997	3/3/2000
A029909	The Hess Collection Winery	2/28/1991	3/29/2000
A030678	Konrad	2/19/1998	3/29/2000
A030483	Nichelini	9/29/1995	5/15/2000
A030484	Nichelini	9/29/1995	5/15/2000
A029740	Scully	5/7/1990	5/24/2000
A030485	California Wine Company - Gilson	9/29/1995	6/23/2000
A030486	California Wine Company - Gilson	9/29/1995	6/23/2000
A030513	California Wine Company - Hopman	2/29/1996	6/26/2000
A030514	California Wine Company - Hopman	2/29/1996	6/26/2000
A030515	California Wine Company - Gilson	2/29/1996	6/26/2000
A030516	California Wine Company - Gilson	2/29/1996	6/26/2000
A030490	Heitz Wine Cellars	10/11/1995	7/3/2000
A030491	Heitz Wine Cellars	10/11/1995	7/3/2000
A030096	Lewelling Family Trust	4/7/1992	9/19/2000
A030675	Franciscan Vineyards	1/26/1998	1/17/2001
A030504	Truchard	1/19/1996	4/5/2001
A030505	Truchard	1/19/1996	4/5/2001
A030561	Truchard	8/23/1996	4/5/2001
A030664	Wilson	12/5/1997	6/19/2001
A030584	The Hess Collection Winery	12/18/1996	4/4/2002
A030627	R Stanley Dollar 1996 Trust	7/8/1997	3/13/2003
A029475	Atwater	3/7/1990	
A029676	Atwater	3/7/1990	
A029677	Atwater	3/7/1990	
A029686	David	3/13/1990	
A029687	David	3/13/1990	
A029736	Berglund Family Vineyards	5/2/1990	
A029748	Ciudaj	5/23/1990	
A029767	Vista del Lago Vineyards	6/26/1990	
A029800	Leonard	8/17/1990	
A029801	Leonard	8/17/1990	
A029852	Beckstoffer Vineyard	11/6/1990	
A029853	Howell Mountain Mutual Water Co.	11/6/1990	
A029865	Pine Lake Ranch	11/26/1990	
A029892	Vintage Grapevine Inc.	1/22/1991	
A029929	Chateau Potelle, Inc.	3/22/1991	
A029951	Moskowite	5/9/1991	
A029973	Cadden	7/1/1991	
A030012	Hudson	10/4/1991	
A030144	Temple	6/15/1992	
A030252	Beckstoffer Vineyard	5/6/1993	
A030253	Beckstoffer Vineyard	5/6/1993	
A030322	Russ Trust	12/17/1993	
A030323	Russ Trust	12/17/1993	
A030384	Nichelini	7/21/1994	
A030408	US Bureau of Land Management	10/14/1994	
A030473	WHL Corporation	8/15/1996	

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A030476	Pine Ridge Winery	8/28/1995	
A030477	Pine Ridge Winery	8/28/1995	
A030539	Gomez	5/15/1996	
A030542	Dellagana	5/23/1996	
A030545	Pope Valley Partners	6/3/1996	
A030546	Pope Valley Partners	6/3/1996	
A030594	Grgich Hills Cellar	2/27/1997	
A030597	Komes	3/4/1997	
A030605	Domaine Carneros	4/7/1997	
A030655	Nemerever	10/21/1997	
A030674	Brodman	1/26/1998	
A030679	Cain Vineyard	2/23/1998	
A030690	Newton Vineyard	4/1/1998	
A030697	Stagecoach Vineyard	4/21/1998	
A030698	Sydney Apartments	4/21/1998	
A030725	G3 Properties	7/8/1998	
A030726	City of St. Helena	7/9/1998	
A030737	O'Shaughnessy	7/30/1998	
A030738	Ladera Vineyards	7/30/1998	
A030739	Renteria Family Trust	7/30/1998	
A030740	Sutter Home Winery	7/30/1998	
A030756	G3 Properties	8/31/1998	
A030803	Levitin	10/26/1998	
A030824	Hudson	12/10/1998	
A030827	Ghisletta	12/15/1998	
A030856	Cutler	4/7/1999	
A030857	Talcott	4/7/1999	
A030858	Vintner	4/7/1999	
A030913	Newton Vineyard	7/1/1999	
A030914	Keebler	7/1/1999	
A030929	Kirlin	8/18/1999	
A030935	McFeely	9/17/1999	
A030950	Dina	9/17/1999	
A030959	Acacia Winery	10/14/1999	
A030965	Turnbull Wine Cellars	10/14/1999	
A031020	Roy	2/29/2000	
A031034	Gordon Family Ranch	3/21/2000	
A031262	Ash Creek Vineyards	12/19/2001	
A031279	Joseph Emil Usibelli Trust	1/22/2002	
A031280	Markham Vineyards	1/22/2002	
A031312	Work	3/27/2002	
A031345	Carpenter Family Revocable Trust	7/16/2002	
A031361	UCC Vineyard Fund	9/25/2002	

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Application ID	Applicant	Date Filed	Date Issued
A029662	Collard	2/20/1990	8/8/1991
A029789	Spight Properites	8/3/1990	8/19/1991
A029678	Kulleberg	3/7/1990	10/4/1991
A029671	Bacigalupi	3/5/1990	11/15/1991
A029682	Gallo Vineyards	3/7/1990	1/24/1992
A029836	Siles	10/11/1990	2/6/1992
A029755	Gallo Vineyards	5/30/1990	5/5/1992
A029847	Morelli	10/30/1990	8/26/1992
A029698	Sleepy Hollow Properties	3/23/1990	9/9/1992
A029912	Farrow	3/7/1991	1/7/1993
A029637	Paradise Vineyards	1/8/1990	5/18/1993
A030132	Page	5/21/1992	1/12/1994
A029986	Vera H. Kreck Trust	8/7/1991	2/17/1994
A030173	Ridge Vineyards	8/27/1992	3/22/1994
A030114	Friese	4/24/1992	6/3/1994
A030109	Thornton	4/22/1992	11/16/1994
A029666	Domaine Chandon	2/26/1990	12/15/1994
A030382	Timber Cove County Water District	7/18/1994	3/13/1995
A030438	Sea Ranch Water Company	3/22/1995	7/13/1995
A030124	York Creek Vineyards	5/5/1992	11/1/1995
A030125	York Creek Vineyards	5/5/1992	11/1/1995
A030196	Domaine Chandon	12/8/1992	6/19/1996
A030298	Stuller	10/28/1993	6/13/1997
A029893	Pacheco	1/25/1991	10/30/1997
A030609	McDowell	4/10/1997	11/24/1998
A029901	Russian River County Water District	2/6/1991	1/6/1999
A030703	Griffin	5/14/1998	4/14/1999
A030199	Riverview II Homeowners Association	12/10/1992	8/5/1999
A030412	Fieldstone Winery & Vineyard	11/10/1994	10/25/1999
A030673	DeMartin	1/26/1998	1/25/2000
A030391	Sweetwater Springs Road Mutual Water Company	8/15/1994	3/9/2000
A030397	Helmholz	9/7/1994	3/23/2000
A030282	Ferrari-Carano Vineyards & Winery	9/22/1993	9/13/2000
A029802	Splan	8/17/1990	1/18/2001
A030797	Brecht	10/15/1998	3/8/2001
A029848	Furth	11/1/1990	3/30/2001
A029849	Furth	11/1/1990	3/30/2001
A029850	Furth	11/1/1990	3/30/2001
A029998	Carr	8/26/1991	10/18/2001
A030437	Maniar	3/20/1995	11/12/2002
A030051	Cloverleaf Ranch	12/23/1991	6/26/2003
A029652	Gilardi	1/31/1990	
A029703	Jackson Family Investments	3/27/1990	
A029704	Jackson Family Investments	3/27/1990	
A029705	Jackson Family Investments	3/27/1990	

Water Rights Applications 1990-2004
Sonoma County

A029706	Jackson Family Investments	3/27/1990	
A029707	Jackson Family Investments	3/27/1990	
A029708	Jackson Family Investments	3/27/1990	
A029715	Ferrari-Carano Vineyards & Winery	4/9/1990	
A029737	Town of Windsor Water District	5/2/1990	
A029754	Foothill Property Owners' Association	5/29/1990	
A029772	Sass	7/5/1990	
A029784	Burton	7/31/1990	
A029811	Jackson Family Investments	8/31/1990	
A029858	Grigg	11/13/1990	
A029983	Ogg	8/2/1991	
A030077	Cazadero Water Company	3/17/1992	
A030126	Marcheschi	5/11/1992	
A030181	Ritchie	10/5/1992	
A030182	E & J Gallo Winery	10/5/1992	
A030186	Austin Acres Mutual Water Company	10/19/1992	
A030187	Williams	10/26/1992	
A030223	Sonoma Cutrer Vineyards	2/10/1993	
A030259	Galef	6/10/1993	
A030336	Degrange	3/22/1994	
A030364	Rickards	5/18/1994	
A030365	Rickards	5/18/1994	
A030368	Arthur Kunde & Sons	6/7/1994	
A030369	Wildwood Vineyards	6/7/1994	
A030405	Wildwood Vineyards	9/30/1994	
A030429	E R Stern Trust	2/10/1995	
A030518	Calpine Geyers Company	3/8/1996	
A030534	Maniar	4/26/1996	
A030536	Alta Vista Ranch	4/26/1996	
A030558	Cardoza	8/21/1996	
A030579	Roche	10/16/1996	
A030583	Jackson Family Investments	12/10/1996	
A030592	Kullberg	12/18/1997	
A030635	Ricci	8/1/1997	
A030663	City of Healdsburg	12/5/1997	
A030687	Klein Foods	3/23/1998	
A030688	Klein Foods	3/23/1998	
A030695	Hanna	4/10/1998	
A030711	Financial Portfolio Ltd.	6/8/1998	
A030730	Neerhout	7/20/1998	
A030744	Bendich	8/7/1998	
A030745	Michael	8/7/1998	
A030746	McMicking	8/7/1998	
A030747	McMicking	8/7/1998	
A030748	McMicking	8/7/1998	
A030781	Five Bar S Ranch & Vineyards	10/2/1998	
A030782	JVW Corporation	10/2/1998	

Water Rights Applications 1990-2004
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A030787	Bodega Water Company	10/9/1998	
A030788	Williams & Selyem	10/9/1998	
A030796	Sonoma Cutrer Vineyards	10/15/1998	
A030798	Ridge Vineyards	10/15/1998	
A030799	McMicking	10/15/1998	
A030800	Klein Foods	10/15/1998	
A030801	Wetzel	10/15/1998	
A030802	Bavarian Lion Company	10/15/1998	

Water Rights Applications 1990-2004

County	Total Issued	Total Pending	Total Applications	Total Domestic	Total Small Use	Total
Humboldt	6	5	11	33	46	**90**
Marin	3	5	8	2	10	**20**
Mendocino	17	138	155	100	133	**388**
Napa	77	69	146	43	67	**256**
Sonoma	41	59	100	63	99	**262**
Total	**144**	**276**	**420**	**241**	**355**	**1,016**

Exhibit [redacted] 2

Exhibit #2

DECLARATION OF STAN GRIFFIN

I, Stan Griffin, declare as follows.

1. I am the Northern California President of Trout Unlimited of California. I have served in that capacity for two years. I have personal knowledge of the facts state herein except for matters stated upon information and belief, which I believe to be true; if asked, I could competently testify thereto.

2. Prior to my present capacity at Trout Unlimited (TU), I have held the following positions as a member of TU: Regional Vice-President for Hawaii, California, Nevada (1994-2001); and, Member of National Board of Trustees (1994-2001). I have been a member of TU, the nation's largest and leading coldwater fisheries conservation organization, since 1982.

3. During this time, I have either served or am presently serving on the following committees, councils, or groups: Federal Pacific Fishery Management Council (1993-1999); California Advisory Committee for Salmon and Steelhead Trout (1989-present); California Steelhead Subcommittee (1991-present); California Department of Fish and Game Fisheries Restoration Grant Program (1988-present); Technical Advisory Committee to Marin Municipal Water District's Lagunitas Creek Restoration Project (1996-present); Tomales Bay Advisory Committee (1983-present); and, Official Alternate on California Coho Recovery Planning Team (2003).

4. During this time, I have received the following awards or special recognitions of my work on behalf of salmon, steelhead, and trout in California: California Legislature Assembly Resolution, Joint Committee on Fisheries and Aquaculture (Mar. 13, 2002) (special commendation for restoration work); Trout Unlimited 2001 Mortenson Award (annual award for outstanding member leadership); National Oceanic Atmospheric Administration (National

Marine Fisheries Service) 2000 Environmental Hero Award; Trout Unlimited 1996 Distinguished Service Award; and, United Anglers of California 1992 Iron Man Award.

5. In general, my volunteer work for TU has focused on (a) salmon and steelhead recovery in California, particularly coho salmon, (b) the water rights practices, policies, and processes of the California State Water Resources Control Board (Water Board), and (c) the intersection between (a) and (b).

6. In approximately 1982, I began my volunteer work on behalf of TU and started to focus on salmon and steelhead issues in Marin County. Specifically, my work at this time involved Lagunitas and Corte Madera Creeks. This early work resulted in landmark successes with the Water Board and Marin Municipal Water District to restore coho salmon in Lagunitas Creek, in Marin.

7. At that time, I began to expand the scope of my work to include policy and legislative advocacy in addition to grassroots restoration work. Also, at that time, I participated in many watershed and community meetings in Marin County and gradually began participating and monitoring salmon and steelhead issues in Sonoma County, specifically the Russian River.

8. In approximately 1985 or 1986, I began to focus more on Russian River issues in Sonoma County, and in particular on regulation of in-river gravel mining operations in the mainstem Russian to protect and restore coho salmon. This focus ultimately resulted in me working on guidelines for Sonoma County gravel issues (the "Aggregate Resource Management Plan").

9. By approximately 1990, I was regularly monitoring and working on Russian River issues relevant to salmon and steelhead recovery, including securing anadromous fish passage at Healdsburg Dam. I developed this focus because it furthered TU's mission to protect, conserve,

and restore native salmon and steelhead and their habitats in California. The Russian River used to be one of California's healthiest and most abundant coho salmon and steelhead rivers. It also had a legendary past as a recreational fishery, and with its close proximity to the San Francisco Bay Area could become one again once the fish are recovered.

I.
History of Water Rights Issues in Russian River Watershed

10. It was during this time in the first part of the 1990s that I began to become aware through attending meetings and workshops in the Russian watershed that the Water Board was faced with a flood of applications for new water rights permits under the California Water Code to appropriate water, and that if granted these new permits for appropriation could adversely impact water availability in tributaries to the Russian mainstem for coho and steelhead recovery.

11. Consequently, I began to investigate the issue by attending more meetings, gathering information about the Water Board water rights process, and ultimately discovering how to participate in that process as a public citizen on behalf of TU and on behalf of the public trust resources coho salmon and steelhead.

12. This process of investigation and self-education uncovered what I thought was a really significant fish restoration problem. I concluded that state and federal agencies, including the Water Board, California Department of Fish and Game (CDFG), and National Marine Fisheries Service (which I believe is now called NOAA Fisheries), and the general population were paying little attention to the problem.

13. I exercised my citizen and public interest opportunity under the Water Code in 1991 and filed my first formal protest, dated March 14, 1991 (A.29715), to an application for a new water rights permit to appropriate water from a tributary to the Russian, on public interest,

environmental, and public trust grounds, and specifically the cumulative impacts and water availability issues related to salmon and steelhead protection and restoration. Since that first protest, I have continued to protest additional applications for appropriations and today have approximately a total of 82 protests against applications for approximately 112 new water rights permits and diversions in the Russian River watershed.[1]

14. By the middle 1990s, the Water Board must have accepted it had a large issue on its hands because it noticed and conducted workshops on January 4, 1995 and November 7, 1996 to address information relating to water rights issues on the Russian River. I participated in these workshops and made presentations of TU's position regarding the impact to coho salmon and steelhead from permitting new water rights to appropriate water from the tributaries to the Russian. These workshops were well attended and caused a lot of attention on the issue. However, the Water Board, to the best of my knowledge, did not provide or announce any official policy or practice changes at this time.

15. The next thing that really happened was in August 1997 when the Water Board published something called "*SWRCB Staff Report, Russian River Watershed, Proposed Actions to be taken by the Division of Water Rights on Pending Water Right Applications within the Russian River Watershed*" (Aug. 15, 1997) (1997 Staff Report). During this time, I kept receiving official notices of more and more applications for new permits being filed with the Water Board. Many of these applications were related to expansion and vineyard growth in Sonoma and Mendocino counties. The 1997 Staff Report basically proposed actions and a process for dealing with pending applications.

16. Although the Water Board acknowledged in 1997 that a general consensus existed

[1] There is a numerical discrepancy between protests and applications because many official notices consolidate multiple applications or proposed diversions.

for a comprehensive watershed management plan to address long-term fisheries protection and restoration (*see* 1997 Staff Report at 4-5), it did not provide or announce any official policy or practice changes consistent with this admission at that time. I continued to file protests against new applications during this period, because no new policy or practice was created to adequately ensure salmon and steelhead protection.

17. On October 23, 1997, the Water Board conducted another workshop where it indicated that "[u]nless directed otherwise, Division staff will proceed with processing applications as outlined . . ." in the 1997 Staff Report. *See* SWRCB Workshop Meeting Agenda, Oct. 23, 1997.

18. Because of the combination of experiencing the complicated Water Board process and my opinion that the 1997 Staff Report was incomplete and seriously flawed in its approach to water availability issues and cumulative effects on salmonids, around this time, I contacted Dr. William Trush, of McBain and Trush, a highly respected North Coast consulting firm, to assist TU in attempting to correct the shortcomings of the 1997 Staff Report and develop a sound scientific approach to flow and biological conditions for salmonids in these mid-coastal streams as to water rights permits issued by the Water Board. For TU, Dr. Trush has submitted into this ongoing effort the following documents:

a. McBain and Trush, Trout Unlimited, A Commentary on the SWRCB Staff Report: *Russian River Watershed, Proposed Actions To Be Taken By The Division Of Water Rights On Pending Water Rights Applications Within The Russian River Watershed, August 15, 1997*, dated March 12, 1998;

b. McBain and Trush, Trout Unlimited, *Commentary on the SWRCB Staff Protocol For Water Allocations In The Russian River And Other North Coastal Rivers*, dated May 4, 1999; and,

c. McBain and Trush, Trout Unlimited, *Allocating Streamflows to Protect and Recover Threatened Salmon and Steelhead Populations in the Russian River and other North Coast Rivers of California*, dated July 10, 2000 (Draft).

19. The Water Board must have also felt that the 1997 Staff Report was lacking because they noticed and conducted another workshop on the issue and assembled a peer review panel to address information submitted at the workshop. The Water Board-Division of Water Rights established the peer review to respond to meetings with TU, NOAA Fisheries, and CDFG regarding fishery concerns. I believe this technical workshop took place on January 31, 2000. Subsequently, Drs. Peter Moyle, UC-Davis, and Mathais Kondolf, UC-Berkeley, published a peer review, "*Fish Bypass Flows for Coastal Watersheds: A Review of Proposed Approaches for the State Water Resources Control Board,*" on June 12, 2000, which found several Water Board practices flawed and presented recommendations for improving the process based on review of competing proposals and comments. This workshop was also heavily attended.

20. Yet again, on November 27, 2000, the Water Board conducted another noticed workshop on the issue to ostensibly discuss improving the water rights process and procedures. On July 18, 2001, staff released an analysis of this meeting responding in chart format to comments received. For the sixth and final time, the Water Board conducted a noticed workshop on September 5, 2001 to discuss improving the water rights process and procedures. TU provided written comments and attended each noticed workshop that occurred over this six year-workshop span.

21. During this entire time period I continued to file formal protests to new applications; however, again, I am not aware of the Water Board announcing any new policy or practice changes, including adopting or modifying and adopting the 1997 Staff Report. I last filed a formal protest on August 2, 2004, because as of that date, to the best of my knowledge, no new Water Board policy or practice had been created to adequately ensure salmon and steelhead protection and recovery, despite this issue being squarely on the radar since at least 1991.

II.
Water Rights Permit Application Process

22. In my experience, the water rights application process in the Russian River watershed typically follows certain steps. First, the Water Board sends a notice in the mail stating that an application is now on file for a new appropriation of water. This notice contains a brief description of the proposed project. Second, within the time allowed to me, I review the notice and determine whether it is for additional appropriation from a tributary to the Russian River; if so, I formally file a written protest on public interest, environmental and public trust grounds. Remarkably, given the size of the tributary watersheds for which an application typically proposes to appropriate water, the scale of the proposed project often includes dams in excess of 100 feet in height. (*See* A. 29715.) Third, the Water Board, Division of Water Rights staff (Division Staff) acknowledges in written form that my protest is acceptable.

23. Division Staff has never rejected a TU protest against an application for a *new* water rights permit. However, in some cases, the notice relates to a petition or request to modify an *existing* water right permit to change the amount, purpose, or place of diversion. I also review these notices and periodically protest them as well. Division Staff has accepted some of these protests and rejected others. Division Staff, in these cases, has never provided any basis for rejection as compared to acceptance, nor has staff indicated that there is any policy or guidelines in use to prevent inconsistencies in decisions on protests in these cases. I have not been able to discover the rhyme or reason to why some are summarily accepted and others summarily rejected in these limited instances.

24. To return to the application process, it usually takes about two to three months from me receiving a noticed application for a new permit and Division Staff acceptance of my

protest. Fourth, Division Staff generally directs the applicant to contact TU as the protestant and request withdrawal of the protest. I have withdrawn only one protest during my work on this issue. In that specific case, the Applicant approached TU and adequately described certain factual, material misstatements in the Division Staff original notice of the application, *and* made a persuasive showing that the application, if approved, would not impact salmon and steelhead. Although TU has a strong preference for collaborative solutions, in my experience, all most all applicants request withdrawal without proposing permit conditions or other fish protection requirements at this stage.

25. The next and fifth step is generally nothing. Nothing happens for most of my TU protests as far as public involvement is allowed. TU has filed approximately 82 protests against approximately 112 applications since our first protest in 1991. Of those applications, only 12 have advanced to the next step that I am aware of in the process for public input and involvement, which is a Division Staff noticed field visit and site inspection to the view the Applicant's project. I have received notice of and attended only 12 field visits despite almost a decade of involvement as a public interest voice in the water rights application process. I have never seen or been provided with any schedule regarding the administrative timeline for an individual application.

26. On the field visit and inspection aspect of the water rights application process, the Division Staff notice of a field visit sets a time and date and typically informs me that the purpose of meeting is to view the proposed project and resolve my protest. I attend all noticed field visits for which I have protested an application. Sometimes staff from NOAA Fisheries and CDFG attends, in addition to Division Staff, the applicant, and occasionally the applicant's

consultant, if they have one, and other interested members of the public.[2] During these visits, Division Staff attempt to mediate or facilitate my withdrawal of the relevant protest. The focus is almost exclusively on whether I will withdraw the protest and very little discussion or effort, in my experience, takes place on whether sufficient or new evidence exists to show the proposed project will not contribute to the harm of listed species.

27. At each field visit that I have attended, Division Staff inform the Applicant that the next step, because I will not withdraw TU's protest, is for staff to issue a "Division Decision." My first noticed filed trip was September 28, 2000 (A.29772 and A.30126). My last noticed filed trips were in the summer of 2003. I have not received one Division Decision for any of the 12 applications for which I have attended field visits. Therefore, it is unclear to me exactly what a Division Decision is. I can find no policy or practice guideline describing Division Decisions.

28. As mentioned previously, I have withdrawn only one protest. Division Staff action and final Water Board action on applications for new water rights permits are subject to the California Environmental Quality Act (CEQA). Of all my protests regarding approximately 112 applications, in the past twelve years only one application has progressed through the CEQA process to the point of publication of draft environmental documentation, specifically a Draft Initial Study and Proposed Negative Declaration (A.30933). To my knowledge, *none* of the other applications that I have protested have progressed to this stage in CEQA, even those applications which I protested in the early 90s. I have never seen or been provided with an

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[2] I know that the agencies, and in particular NOAA Fisheries, are hard-pressed to meet the grind of the permitting review process because I have received letters stating that: "With the limited NMFS staff assigned to assist the Board in reviewing applications, it is extremely difficult to attend the numerous and mandatory public workshops and field inspections without getting our protests dropped from consideration by the Board." Letter from Mr. James Bybee, Habitat Manager, Northern California, NOAA Fisheries to Mr. Harry Schueller, Chief, Division of Water Rights, SWRCB p.1 (Nov. 9, 2000).

administrative schedule or timeline for the CEQA process on an individual application. The same is true for Division production of the "water availability analysis", which serves as the basis for CEQA determinations and Water Code compliance.

III.
Unauthorized Diversions

29. This one particular application for which Division Staff released a Proposed Negative Declaration pursuant to CEQA raises a larger problem with the Water Board's application process for water rights permits; and, frankly the Water Board's failure to monitor and enforce on a consistent, system-wide basis. On April 8, 2002, I received the environmental documentation for the subject application. Then about one year later, on March 28, 2003, Division Staff conducted a formal site visit and inspection to view the proposed project. Two summers earlier, however, on August 31, 2000, I had actually accepted an informal invitation from the applicant to inspect the proposed project *site*. (This application was filed September 17, 1999.) That day, in *2000*, I spent the morning touring the proposed site with the applicant and a representative of NOAA Fisheries. At that time, there was absolutely no physical construction of any manmade barrier in the streambed. However, in the summer of *2003*, when I arrived for the Water Board-noticed field visit, I discovered a *constructed diversion dam* in the exact location that one year earlier had been merely a *proposed site* for construction. This dam had been built in the middle of the waterway, blocked the entire streambed, and appeared to be positioned to capture all rainfall from the smaller sub-watershed on the property. The reservoir that the dam formed was full of water and I did not see any flow bypass mechanism. All of this new evidence post dates the publication of the CEQA documentation and therefore was not analyzed in the Draft Initial Study or Proposed Negative Declaration. However, I was informed during the field

visit that a "Division Decision" was forthcoming on this particular application despite an apparently stale CEQA documents. To date, I have received no such decision.

30. This site visit is an example of a much larger problem with the process. Based on my experience, it is my opinion that this dam (and obvious on-stream reservoir) was built without Water Board permission. Moreover, based on my experience, it is my opinion that this dam was also likely built without the permission of CDFG pursuant to Fish and Game Code section 1600 et seq., which requires approval to manipulate a streambed. Without permission such dams and reservoirs and the diversion of water with them is illegal. When asked whether I would withdraw my protest during the field visit for this application, I remarked that in the summer of 2000 I had not seen a dam constructed instream and that therefore I could not withdraw. Division Staff at that time informed the applicant not to be concerned with my objection about construction of a diversion dam in advance of completion of the application process for a new water rights permit, because so long as an application was on file construction and diversion would be overlooked. I understand that this "grandfathering" policy exists even though the Water Board appears to not have approved any new permits in the last decade.

31. This particular application is emblematic of the same problem with a majority of applications that I have protested. As discussed, the Water Board notices all applications for new permits to appropriate water. A description of the proposed project is included in the notice. A careful reading of the notice can determine whether the proposed project is actually to construct a diversion dam or storage reservoir *or* whether the proposed project seeks a permit for an *already constructed* dam or reservoir. In the case of the later, the notice language may actually state "existing instream dam." Proof of this problem from the notices may also be inferred; notices for not yet constructed facilities clearly state that the project is "to be

constructed."[3]

32. ***I have reviewed all the notices for applications that I have protested and of approximately 112 applications 64 seek a permit for an already constructed dam or reservoir (several in fact involve multiple existing on-stream dams on the same waterway). In other words, 57% of these applications request retroactive permission.*** I make the reasonable assumption that for applications for which I have not protested a similar pattern or percentage exists. It is my understanding that approximately 200 applications are pending before the Water Board just in the Russian River watershed alone and another 40 in the Navarro.

33. Based on my experience, the Water Board and Division Staff informally but publicly condone a policy that does not penalize such applications. I am not aware of any case where an application that seeks a permit for already constructed dams or reservoirs has suffered administratively in the application process; nor am I aware of Division Staff or the Water Board requiring mitigation for any adverse environmental harm associated with these applications. In addition to actual construction in advance of permitting, I believe based on my experience that appropriation of water is occurring in advance of permitting at these dams and reservoirs. In some cases, for example with my earliest protested applications in 1991, this would mean un-permitted appropriation of water may have been occurring for twelve years, *while the relevant application to appropriate is pending*. Finally, it is important to note that in my experience the

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[3] In some cases, the proof is even clearer. For example, I received a copy of a reply letter from Division Staff to an applicant, dated October 22, 2002, responding to the applicant's complaint that Division Staff accepted TU's protest. Division Staff stated:

> "In your letter you ask why protests have been accepted against your project when these reservoirs *have been in existence since the 1960s* and no objections were received during construction. It is my understanding that *these reservoirs have been storing water without a valid basis for right for over 40 years* and that this application was filed in order to legalize the use of water as described in your application." (emphasis added)

Letter from Division Staff to Ash Creek Vineyards (A.31262) (Oct. 22, 2002).

application and the subsequent paperwork never states whether the applicant has obtained a 1603 permit from CDFG, a county grading ordinance, or any other affirmative showing of compliance with applicable laws or regulations, even in the case of applications were construction or appropriation has already happened.

IV.
Enforcement, Compliance, and Monitoring

34. I conclude that Division Staff and Water Board enforcement of water rights permits, and particularly those conditions within permits designed to protect and restore salmon and steelhead, is inadequate to prevent continuing harm to listed species. I also conclude that monitoring of compliance with permit conditions is insufficient. In the nine years that I have focused on water rights issues in Sonoma and Mendocino counties I have personally worked with staff from NOAA Fisheries, CDFG, and the Water Board. During this time, at any given moment, to the best of my knowledge, NOAA Fisheries has never had more than 2-3 field staff dedicated to water rights monitoring and enforcement and the application process, CDFG has never had more than 2-3 staff, and the Water Board never more than 6-7 Division Staff for a geographic area in Trout Unlimited and Audubon's petition that is approximately the size of Vermont state. I am not aware of any of these staff regularly monitoring any presently permitted diversion or appropriation.

35. During field visits for review of proposed projects, I consistently raise the issue of permit compliance and monitoring. I have never heard or seen discussed orally or in written form during any individual application process the prospect of real-time flow monitoring equipment becoming a permit condition. In fact, in one instance when I requested the opportunity to be involved in the development of monitoring conditions regarding a particular

application, Division Staff informed me that I had no grounds to participate in such a discussion, despite having timely obtained standing as a protestant to the application. Finally, I am not aware of any instance where the Water Board and/or Division Staff have formally adopted the Joint Guidelines, and specifically the recommendations on monitoring and compliance.

36. I declare under penalty of perjury of the laws of the State of California and the United States of America that the foregoing is true and correct and that this declaration was executed October 27, 2004 at Albany, California.

Respectfully submitted,

Dated: October 27, 2004

Stan Griffin

Exhibit ~~2~~

Exhibit # 3

STATE OF CALIFORNIA - THE RESOURCES AGENCY

DEPARTMENT OF FISH AND GAME

POST OFFICE BOX 47

YOUNTVILLE, CALIFORNIA 94599

(707) 944-5500

UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

777 Sonoma Avenue, Room 325

Santa Rosa, California 95404

June 17, 2002

Mr. Ed Anton, Chief
State Water Resources Control Board
P O Box 2000
Sacramento, California 95812

Dear Mr. Anton:

In May 2000, DFG and NMFS distributed draft guidelines for maintaining instream flows to protect fisheries resources downstream of water diversions in mid-California coastal streams. These guidelines provided bypass flow recommendations and measures for protecting natural hydrographs that were reviewed and supported by peer review (Moyle et al. 2000). Previously permitted on-stream reservoirs have limited the ability of the SWRCB to use the guideline component concerned with avoiding cumulative impacts. Subsequent analysis and discussions by SWRCB, DFG, and NMFS staff have resulted in an alternative approach for conserving natural hydrographs and assessing cumulative impacts of multiple water projects. This method, which has been adopted by SWRCB staff, involves computation of a Cumulative Flow Impairment Index (CFII)

Although DFG, NMFS, and SWRCB environmental staff are in agreement on the application of this new method, there has been no clear written description of this procedure. Furthermore, the relationship of this procedure to DFG/NMFS guidelines for water diversions has been unstated. For that reason, we have updated DFG/NMFS May 22, 2000 guidelines to include use of the CFII method for conserving natural stream hydrographs and addressing the issue of cumulative impacts. Enclosed are six copies of these updated draft guidelines.

We greatly appreciate the efforts of SWRCB staff in helping to develop components of these guidelines. We look forward to continued opportunities for the State Water Resources Control Board and our agencies to cooperate in the conservation of listed species. If you have any questions or comments concerning the guidelines, contact Dr. William Hearn (NMFS) at (707) 575-6062 or Ms. Linda Hanson (DFG) at (707) 944-5562.

Sincerely,

Mr. James Bybee
NMFS Habitat Manager
Northern California

Mr. Robert W. Floerke, Regional Manager
Department of Fish & Game
Central Coast Region

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ERRATA

These guidelines were initially distributed to the California State Water Resources Control Board on June 17, 2002. Copies were then widely distributed to interested parties. A minor error and inconsistency in the guidelines was subsequently detected. For clarification the following error and intended correction is noted:

On page 7, in paragraph 2 under Section II-B-Item 5 (Protection of the Natural Hydrograph and Avoidance of Cumulative Impacts), Line 16 and Line 18 incorrectly provide a season of October 1 to March 31 for computations of unimpaired runoff. Consistent with Appendix A, the correct season for computation of unimpaired runoff is December 15 to March 31.

DRAFT

Guidelines for Maintaining Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams

1. INTRODUCTION

The California Department of Fish and Game (DFG) and the National Marine Fisheries Service (NMFS) jointly developed draft guidelines for diverting water from central-coastal watersheds in California. Those guidelines, which were dated May 22, 2000, were developed in response to concern that current practices for issuing water rights were not adequate to protect and recover anadromous salmonids in coastal watersheds. These watersheds are often highly regulated, extensively developed and subject to significant levels of impairment. Depletion and storage of stream flows have significantly altered natural hydrological cycles and adversely affected aquatic habitats and resources. Reduced flows also interrupt invertebrate drift, disrupt channel dynamics, increase deposition of fine sediments, inhibit recruitment of spawning gravels, and promote encroachment of riparian and non-endemic vegetation into spawning and rearing areas.

The May 22, 2000 guidelines were developed pursuant to respective agency mandates and missions to protect and restore anadromous salmonids and their habitats. These guidelines provide standard recommended protective terms and conditions to be followed in the absence of site-specific, biological, and hydrologic assessments. The guidelines call for limiting new water right permits to diversions during the winter period (December 15-March 31) when stream flows are generally high. Minimum bypass flows and cumulative maximum rates of diversion are recommended to ensure that streams are adequately protected from new winter diversions. The guidelines also recommend that, except for limited circumstances, storage ponds should be constructed off-stream, rather than on-stream. Water diversions should also be screened using NMFS or DFG screening criteria, and fish passage facilities should be provided where appropriate.

The May 22, 2000 guidelines recommended that conservation of the natural hydrograph and avoidance of significant cumulative impacts could be accomplished by limiting the cumulative maximum rate of diversion from a watershed. The recommended cumulative maximum rate of diversion is equivalent to 15% of the "winter 20% exceedence flow" at the point of diversion. Following its distribution, the State Water Resources Control Board (SWRCB) staff stated that the DFG/NMFS guideline element for protecting the natural hydrograph and limiting cumulative impacts to salmonids was impractical, because many existing, legal storage ponds store 100% of a stream's runoff while they are filling. Therefore, on-stream ponds inherently exceed any maximum rate of diversion, at least temporarily. Rather than adopt a quantitative procedure to address this problem, SWRCB proposed an alternative approach for protecting the natural hydrograph and limiting cumulative impacts of numerous diversions. That alternative

approach, described in SWRCB (2001), limits cumulative impacts and conserves the natural hydrograph by limiting the maximum cumulative volume of water that can be diverted in a watershed. Similar to the maximum rate of diversion, this maximum cumulative volume guideline is recommended for projects for which there has been insufficient site-specific, biological assessment of instream flow needs to protect fisheries. DFG and NMFS accept the reasonableness of this alternative "cumulative volume" approach to limiting cumulative impacts. Therefore, this update of the May 22, 2000 guidelines provides a technical description of the calculations required for this alternative method (see Appendix A). This update also reflects a minor change to the May 22, 2000 guidelines by noting that protecting spawning habitat for salmonids is largely achieved through conservation of the natural hydrograph. Except for these two changes, this update of the DFG/NMFS guidelines for maintaining instream flows in Mid-California coastal streams is unchanged from the May 22, 2000 draft guidelines.

These guidelines are recommended for use by permitting agencies, planning agencies and water resource development interests when taking proposed actions that would divert or act to reduce stream flows in California's mid-coastal watersheds containing anadromous salmonids. These guidelines do not constitute a final agency action for purposes of the National Environmental Policy Act or the California Environmental Quality Act. Nor do these guidelines define, or authorize take for purposes of State or Federal Endangered Species Acts. Rather, the guidelines are intended to preserve a level of flow that ensures that anadromous salmonids will not be adversely impacted by diversions. Altering stream flows outside these guidelines may impact salmonids by: blocking and/or delaying migration; reducing usable habitat; impacting habitat quality; stranding fish; entraining fish into poorly screened or unscreened diversions; and increased juvenile mortality resulting from increased water temperatures.

These joint guidelines are organized in two parts. The first, (*Terms and Conditions to be Incorporated into Water Rights Permits for Small Diversions)* consists of specific terms and conditions to be incorporated into water rights permits, issued by the State Water Resources Control Board (SWRCB) for small diversions where adequate site-specific biological data are not available. The guidelines were developed based on the biology and ecology of anadromous salmonids and their habitat requirements. The second part of these guidelines (*Implementation and Effectiveness Monitoring*) is programmatic in nature, addressing watershed-level initiatives necessary to ensure that the standards and protocols are consistent with conserving salmonids and their habitats.

The following guidelines are not developed for use in areas outside of the identified mid-coastal region. NMFS and DFG may develop similar guidelines for other regions of California in the future. Those guidelines should be based on anadromous salmonid habitat requirements, hydrologic characteristics, and other specific factors for those

areas.

DRAFT

II. TERMS AND CONDITIONS TO BE INCORPORATED INTO WATER RIGHTS PERMITS FOR SMALL DIVERSIONS

1. Diversions > 3 cfs or > 200 acre-feet

For diversions larger than 3 cfs or greater than 200 acre-feet from streams in watersheds that currently or historically contained anadromous salmonids, water right permit applicants must consult with the NMFS and DFG to plan and conduct a site specific study for the purpose of determining appropriate flow related terms and conditions to be incorporated into the permitted water right. The study plan should include, at a minimum, the following:

1) A habitat based stream needs assessment that incorporates habitat, species, and life history criteria specific to each diverted stream or stream reach;

2) An evaluation of the existing level of impairment (diversion) and limiting factors for salmonid restoration based upon habitat, species, and life history specific criteria for each diverted stream or stream reach;

3) A specific proposal to provide periodic channel maintenance and flushing flows that are representative of the natural hydrograph; and

4) A plan to monitor the effectiveness of stipulated flows and procedures for making subsequent modifications, if necessary.

2. Small Diversions <3 cfs and <200 acre-feet

1) Geographic Limitations

For small diversions less than or equal to 3 cfs and less than or equal to 200 acre-feet, default guidelines have been developed for coastal watersheds from the Mattole River to San Francisco, and for coastal streams entering northern San Pablo Bay. This area generally includes streams within California's Mendocino, Sonoma, Marin, and Napa Counties, as well as a few coastal streams in Humboldt County south of the Eel River. The default guidelines are based on the hydrology and life history requirements of resident anadromous salmonids in this area. For streams within this area, the default guidelines may be incorporated into the terms and conditions of a permitted water right, in lieu of results from site-specific biological studies.

For coastal streams north of the Mattole River or coastal watersheds to the south of San Francisco, DFG and NMFS have yet to develop detailed default guidelines for maintaining stream flows to protect fisheries resources downstream from water diversions. However, until such guidelines are developed, these agencies recommend that, in the absence of site-specific studies, in watersheds north of the Mattole River or south of San Francisco: 1) the diversion season for new water rights permits should be limited to the period of seasonal "high-flows", 2) additional on-stream reservoirs should not be constructed or permitted unless consistent with the exemptions provisions described below, 3) sufficient minimum bypass flows should be maintained to protect fisheries resources, 4) the cumulative maximum rate of withdrawal should be limited to maintain a near natural hydrograph and avoid cumulative impacts, 5) adequate passage and protection measures must be provided to facilitate instream movements of fishes and avoid entrainment in diversion intakes, and 6) the applicant should describe the project specific mechanism(s) that adequately ensure compliance with diversion limits. For coastal watersheds north of the Mattole River or south of San Francisco, default guidelines for the bounds of the diversion season, minimum bypass flows, and cumulative maximum rates of withdrawal have yet to be determined. Until detailed guidelines are available for diversions in these watersheds, applicants seeking diversion permits for those areas should consult with DFG and NMFS for stream flow recommendations.

2) Seasonal Limits on Additional Diversions:

The diversion season will be limited to the period December 15 to March 31. From April 1 to December 14 instantaneous inflow to the point of diversion must equal the instantaneous outflow to downstream reaches past the point of diversion.

Justification: In its water rights proceedings for the Russian River, Navarro River, and Napa River watersheds, the SWRCB has found that new water diversions should be confined to the period December 15 to March 31. This period is the time of highest winter flow and the time when water withdrawals would be least likely to adversely affect fisheries resources. Additional water withdrawals between April 1 and mid-May may adversely affect anadromous salmonids, because flows generally subside during that time, and juveniles typically emigrate during the higher flow events in that period. Additional water withdrawals between May 1 and October 1 may adversely affect salmonids, because rainfall in north-

central coastal streams is minimal during that period, and diversions during that time would probably reduce the availability of already limited habitat for juvenile salmonids. Additional water withdrawals between September 1 and December 15 may unnecessarily affect salmonids, because that is a time when flows are relatively low, and high flows are infrequent and sporadic.

3) No Additional Permitting of Small On-stream Reservoirs:

Water diversion projects requiring new permits should avoid construction or maintenance of on-stream dams and reservoirs, including existing unpermitted storage ponds. Thus, storage must be to an off-stream reservoir. Exceptions are provided for special circumstances involving Class III streams as defined by 14 CCR 916, riparian management regulations for protecting watercourses and lake protection zones (see Exemptions below).

Justification: On-stream reservoirs should be prohibited, because they 1) eliminate, within the reservoir footprint, free-flowing stream habitat that may either support listed salmonids or the production of riffle-dwelling aquatic invertebrates that serve as food sources for downstream fishes (Corrarino and Brusven 1983; Resh and Rosenberg 1984; Keup 1988), 2) eliminate or reduce the magnitude and frequency of naturally occurring intermediate and high flows necessary for natural channel maintenance processes, 3) trap coarse bedload material and impede bedload transport, 4) act as barriers to migrating fishes, and 5) provide habitat for non-native aquatic species (*e.g.*, bullfrogs).

4) Maintenance of Minimum Bypass Flows:

Provide bypass flow regimes that adequately protect salmonids and aquatic resources in reaches downstream from the point of diversion. The determination of the bypass flow's adequacy can be based on site specific biological investigations conducted in consultation with NMFS and DFG, or in the absence of site-specific data, it would be not less than the estimated unimpaired February median flow at the point of diversion.

Justification: The unimpaired February median flow guideline is based partly on the observation that (at relatively low to moderate flows) available spawning and incubation habitat is generally positively correlated with discharge, but that naturally higher flows must be sustained for a substantial period of time in order to have "effective spawning and incubation habitat". The February median flow is a conservatively high

bypass flow because it conserves "typical" winter flows to which native fishes are adapted. February is generally the wettest month in the 4-county area, and therefore the long-term February median flow is a hydrologic metric that permits diversions only during the higher flows of winter. This is appropriate given uncertainties regarding site specific flow needs for numerous aquatic biological processes (including both invertebrate and vertebrate production). However, it must be recognized that a minimum bypass flow equivalent to the February median does not protect all stream functions including channel maintenance flows, migratory flows in headwaters, and in many small watersheds, spawning flows for salmonids. To protect these latter functions it is necessary to protect the natural hydrograph as described in Item 5 below. The unimpaired February median flow can be estimated using a modification of the SWRCB Stream Simulation model for the Russian River Watershed Region or comparable hydrologic analytical techniques.

5) Protection of the Natural Hydrograph and Avoidance of Cumulative Impacts:

The diversion will be operated with a maximum rate of withdrawal that preserves a natural hydrograph with no appreciable diminishment (<5%) in the frequency and magnitude of unimpaired high flows necessary for channel maintenance (e.g., unimpaired flows with a recurrence interval of 1.5 or 2 years). The diversion will also not appreciably reduce the frequency and magnitude of unimpaired moderate and high flows (*e.g.*, flows higher than median February) used by migrating and spawning fishes in small streams. Unless there is compelling site-specific biological and hydrologic information indicating that additional water can be diverted without adversely impacting anadromous salmonids, diversions should not be permitted or otherwise sanctioned if 1) the cumulative maximum rate of instantaneous withdrawal at the point of diversion exceeds a flow rate equivalent to 15% of the estimated "winter 20% exceedence flow" OR 2) the total cumulative volume of water to be diverted from the stream at historical points of anadromy exceeds 10% of the unimpaired runoff between October 1 and March 31 during normal water years. For projects contributing to a cumulative diversion of 5 to 10% of the normal unimpaired runoff between October 1 and March 31, hydrologic analysis must demonstrate that the project will not cause or exacerbate significant adverse cumulative effects to migration and spawning flows for salmonids. The "winter 20% exceedence flow" is the 20% exceedence value of the stream's daily average flow duration curve for the period December 15 to March 31. Cumulative reduction refers to the effects of this and other permitted or licensed projects as well as diversions under riparian rights.

Justification: Natural, periodic, intermediate and high flows should be maintained downstream of diversion sites (Barinaga 1996; Poff et al. 1997). High flows are essential for 1) cleansing fine sediments from coarse substrates, 2) removing encroaching vegetation and contributing to the deposition of instream woody cover, and 3) serving as cues for and facilitating the migratory movements of fishes. Protection of intermediate and high flows during winter months must be accomplished through an assessment of cumulative impacts and placing limits on the cumulative rate of instantaneous water withdrawals from the stream, or on the total volume of water diverted. A discussion of the need for and rationale for limiting cumulative maximum instantaneous withdrawals to a portion of the "winter 20% exceedence flow" in northern coastal California streams is provided in NMFS (2000). Procedures for assessing cumulative impacts of water diversions based on the cumulative total volume of diverted water are described in Addendum A.

6) Fish Passage and Protection Measures:

The potential effect of stream flow diversions on upstream and downstream movements of anadromous salmonids must be addressed. If anadromous salmonids have the likely potential to ascend the stream to the point of diversion, then adequate passage facilities and screening at the diversion intake must be provided. Screening must be in accordance with NMFS and DFG's screening criteria.

Justification: Diversion structures and instream reservoirs may block fishes from reaching their natal spawning areas. Diversion structures also have the potential to entrain fishes, with resulting mortality.

7) **Special circumstances allowing onstream reservoirs:**

If a proposed diversion is located 1) in a stream reach where fishes or non-fish aquatic species were not historically present upstream, and 2) where the project could not contribute to a cumulative reduction of more than 10% of the natural instantaneous flow in any reach where fish are at least seasonally present, and 3) where the project would not cause the dewatering of any fishless stream reach supporting non-fish aquatic species, then no stream flow or fish passage protection measures are required. By cumulative reduction we refer to the effects of this and other permitted or licensed projects as well as diversions under riparian rights. For diversion sites meeting the above three criteria, on-stream reservoirs

may be permitted.

Justification: The need for the above instream flow and fish protection measures is dependent upon the quality of the stream at the diversion site. Instream diversions and on-stream reservoirs on a limited number of ephemeral headwater streams naturally without fish or other aquatic species (*i.e.*, Class 3 streams, under 14 CCR 916) will not significantly impact fisheries resources, if the flows of streams with fishes (*i.e.*, Class 1 streams, under 14 CCR 916) are not reduced by more than10% from unimpaired levels. Exemptions under the above criteria will enable water users to develop small on-stream reservoirs while ensuring that stream reaches containing fishes (either year-round or seasonally) will not have additional on-stream dams or stream flows reduced more than 10% from unimpaired levels. Stream reaches containing aquatic species without fishes (*i.e*, Class 2 streams, under 14 CCR 916), will not be dewatered. These exemptions are consistent with allocating water for beneficial uses and protecting fishery resources.

8) Quantify All Water Rights of Applicant

To facilitate assessment of stream diversion impacts to fisheries, the applicant must identify all other basis of rights (appropriative, riparian, adobe, pre-1914), in streams potentially affected by the proposed diversion.

Justification: The determinations of maximum rate of withdrawal and potential impacts of cumulative withdrawals require information concerning all water withdrawals within the impacted watershed. Records concerning existing water rights are limited. Applicants seeking additional appropriative rights should provide known information concerning their diversion activities within the affected watershed.

9) Compliance and Monitoring Measures:

Prior to issuance of permit, the applicant must identify, to the satisfaction of NMFS, DFG, and the SWRCB the mechanism(s) that assure that the bypass flows will be maintained and rates of diversion will not be exceeded at the project. The applicant will provide a description of mechanism(s) for assuring bypass flows and rates of diversion to the SWRCB. The SWRCB will provide this information to NMFS and DFG for review and comment. Diversion projects will provide DFG personnel access to all points of diversion and places of use for the purpose of conducting routine and or random monitoring and compliance inspections.

However, the responsibility for ensuring compliance and enforcement of water rights issued by the SWRCB and/or any other permit or regulatory instrument that approves or allows water diversion or causes reduction in stream flows, rests with that permitting agency.

Justification: In order to protect anadromous salmonid habitat, mechanisms must be provided to ensure that bypass flows and constraints on diversion rates are maintained. Mechanisms to verify compliance with permit conditions may vary and be dependent on site-specific conditions. The determination of the specific mechanisms for assuring compliance with the diversion guidelines is the responsibility of the applicant and subject to approval by NMFS, DFG, and SWRCB.

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III COMPLIANCE AND EFFECTIVENESS MONITORING

Inherent in the application of this, as well as any other, instream flow standard setting technique is the need for effectiveness monitoring to address and corroborate assumptions used in developing the flow standard. In addition, a prerequisite for reasonable flow allocation and habitat protection, is an accounting of existing diversions and enforcement of unpermitted diversions. It is essential, if instream resources are to be protected and over-allocation is to be avoided, that an accurate evaluation of all existing diversions be conducted prior to the issuance of any new water rights permits. Therefore, DFG and NMFS recommend the following initiatives:

1) Program to Verify Effectiveness and Refine the Flow Standard as Necessary

The SWRCB, DFG, and NMFS will cooperate in the development and implementation of an evaluation plan to monitor the effectiveness of flow standards being applied in the water rights process. This program should include specific monitoring activities to determine whether the standard provides a consistent and protective level of salmonid habitat conservation for streams of various size, order, elevation and geomorphic characteristics. The effectiveness monitoring program should also contain a protocol for making any refinements to the flow standard, as necessary to mitigate adverse affects on anadromous salmonid resources and their habitats.

2) Compliance and Enforcement Program

A compliance and enforcement program should be developed. This program should include flow gaging and routine, random compliance inspections. This program should be focused on a watershed approach and include the installation of stream flow gaging and recording devices at key locations within each stream basin for determining compliance with bypass flow requirements and current level of impairment. In addition, a separate schedule for routine, random compliance inspections should be developed for each watershed, based upon the level of impairment and sensitivity of anadromous salmonid habitat. As part of this program the SWRCB should require applicants to develop and implement measures that will ensure compliance with the bypass terms. The plans should specify measuring and recording devices and bypass facilities to be installed, the criteria for operation of the reservoir, and other measures that will be taken by the applicant to confirm compliance with permit terms. DFG and NMFS encourage water rights permit applicants to install "passive" bypass facilities (*i.e.*, facilities that will automatically bypass flows without any action by the permittee) whenever feasible. The plan should also include a measure for documenting that facilities have been installed and are being maintained.

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Guidelines for Maintaining Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams

(An update of the May 22, 2000 Guidelines)

California Department of Fish and Game

and the

National Marine Fisheries Service

June 17, 2002

(Errata note, dated 8-19-02)

California Department of Fish and Game
1416 Ninth Street
Sacramento, California 95814

National Marine Fisheries Service
Southwest Region
777 Sonoma Ave, Rm 325
Santa Rosa, California 95404

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3) Preventing Stream Over-Allocation

In order to prevent the over-allocation of anadromous salmonid streams by new diversions and to identify those streams currently over-allocated, it is necessary to document actual and potential levels of impairment. Prior to issuance of any new water rights the SWRCB should provide an evaluation and comprehensive accounting of all diversions currently in place including a disclosure of all basis of right in effect on the stream to be diverted and quantify the total maximum volume and maximum rate of withdrawal possible at any given time including rights not fully and/or currently exercised. The results of this evaluation should be compared on a month by month basis to the estimated unimpaired hydrograph to ensure that sufficient flow remains in the stream to provide a sufficient minimum bypass flow to protect salmonids in downstream reaches. Further, that the maximum cumulative rate of withdrawal from proposed and existing diversions will not appreciably diminish the natural hydrograph (<5%) in the frequency and magnitude of unimpaired high flows necessary for channel maintenance and will not appreciably reduce the frequency and magnitude of unimpaired moderate and high flows (*e.g.*, flows higher than median February) used by migrating and spawning fishes.

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Addendum A

Procedures for assessing cumulative impacts of water diversions based on the cumulative total volume of diverted water

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Procedures for assessing cumulative impacts of water diversions based on the cumulative total volume of diverted water

Determination of water availability:

Before issuing any new Water Rights permits, the State Water Resources Control Board (SWRCB) must first determine whether water is available for diversion. This determination is achieved through a Water Availability Analysis (WAA). Among other things, the WAA must estimate expected unimpaired stream flow (the natural flow without diversions) at the diversion site. In addition, it must then consider the water that has already been allocated to existing water rights holders (both riparian and senior appropriative) and the water that is required for the protection of public trust resources.

Requirements for resource protection based on potential cumulative impacts:

Minimum bypass flows must be maintained to ensure that threatened and endangered salmonid species are protected. At the same time, additional mechanisms must be employed to conserve intermediate and high flows (*i.e.*, maintaining a near natural hydrograph) so that other life history requirements of these species are met (see guidelines section for justification).

In the central coastal counties (Napa, Marin, Sonoma, and Mendocino), near natural hydrographs can be preserved by 1) limiting cumulative maximum instantaneous rates of withdrawal consistent with the DFG and NMFS guidelines (*i.e.*, 15% of the "winter 20% exceedence flow"), or 2) by limiting the cumulative volume of water diverted from the watershed. The guidelines section of this document addresses preserving the natural hydrograph using the "maximum instantaneous rate of withdrawal" approach. This addendum describes an alternative "volumetric" cumulative impact assessment method based on the total volume of water being diverted.

An analysis of site-specific flow requirements of anadromous salmonids in many western streams indicates that in small watersheds the optimal flows for spawning are variable, and often higher than the long-term, unimpaired February median flow (Hatfield and Bruce 2000). Hydrologic analysis indicates that adequate spawning flows, and near natural hydrographs, are generally maintained when the natural volume of winter runoff is impaired (*i.e.*, reduced) by less than 10% (SWRCB unpublished data). Spawning habitat for anadromous salmonids can be adversely affected by diverting more than 10% of winter runoff. Cumulative diversions of even 5 to 10% of annual runoff can also impact spawning habitats if the diversions reduce stream flows to minimum levels for several days during critical spawning periods in early winter.

Determining the Cumulative Flow Impairment Index (CFII):

To evaluate the potential cumulative effects of water diversions using a "volumetric" approach, the volume of water that is naturally available must be compared with the total volume of water that is, or can be, legally diverted from the watershed through existing water rights. The potential level of impairment to stream flow caused by these cumulative diversions can be evaluated by calculating the Cumulative Flow Impairment Index (CFII), as follows:

$$CFII = \frac{\text{Cumulative Diverted Volume (CDV)}}{\text{Estimated Unimpaired Runoff (EUR)}}$$

where,

CDV = potential volume of water diverted under all bases of right between October 1 and March 31 in a normal water year (in AF)

EUR = estimated volume of surface flow in the stream passing the point of interest between December 15 and March 31 in a normal water year (in AF)

Calculating the Cumulative Diverted Volume portion of the equation (Impaired flow):

The Cumulative Diverted Volume (CDV) is the volume of water diverted under all water rights potentially affecting the stream flow at a given Point of Interest (Points of Interest are discussed in more detail below). An October 1 to March 31 season is used to calculate the CDV because it reflects the season of diversion for many existing permits. Therefore, use of the CDV season facilitates a more accurate assessment of the cumulative effect of authorized diversions upon flows within a watershed. Calculations of the CDV must include all existing legal diversions (including pre-1914 rights, riparian rights, small domestic and stockpond registrations, and other appropriative rights) together with the proposed project under consideration for a new water right. The computation of CDV is done for average (*i.e.*, normal) water years.

If a portion of the direct or riparian diversion is highly unlikely to occur during most or all of the CDV season, then that portion of the volume of riparian or direct diversion may be discounted when computing the CDV. This is appropriate in situations with year-round water rights that are typically not exercised during the winter months (*e.g.*, when irrigation of a particular crop does not occur during wet winter months). However, riparian diversions for frost protection must be included when calculating CDV. All computations

of CDV must be accompanied by a list of the diversions used in the calculation. The list must also include: 1) the season of diversion, 2) the potential maximum instantaneous rate of diversion, 3) the potential maximum volume of diversion, 4) the existing water rights excluded from the computations, and 5) any other assumptions related to the calculations for each diversion listed.

Calculating the Estimated Unimpaired Runoff portion of the equation (Unimpaired flow):

The Estimated Unimpaired Runoff (EUR) is calculated for the high flow (winter) season from December 15 to March 31. This season represents the period during which it is assumed that some water may still be available for diversion without additional environmental impact. All computations must be done using standard hydrologic techniques that may include prorating known gauge data, application of precipitation runoff models, or other accepted methods. Calculations of EUR (unimpaired flow) will be accompanied with descriptions of computational methods, input data, data sources, and assumptions sufficient for reviewers to fully understand and replicate the results. As with the CDV, these computations are done for average (*i.e.*, normal) water years.

Locations requiring CFII calculations for a project:

A CFII is typically calculated for several Points of Interest (POI's) within the watershed. Generally a POI is calculated at the Point of Diversion (POD) and then again for points immediately downstream at each confluence of a major intervening tributary between the project site and the mainstem of coastal rivers. In the case of small mainstem coastal streams (*e.g.*, Sonoma Creek), points of interest extend to the stream's estuary.

The location of the Points of Interest requiring CFII values will be determined by DFG and NMFS staff. To ensure consistency, POI's will be provided directly by NMFS and DFG to SWRCB staff for dissemination to Applicants, their consultants, and other interested parties.

Level of potential cumulative impact based on the CFII calculations:

The level of impairment identified by the CFII will determine the likely study effort needed to address the significance of cumulative impacts of the new water right project.

- If the CFII is greater than 10%, then there is a reasonable likelihood of significant cumulative impacts. When the CFII is greater than 10%, site specific studies will be required to assess impacts and the water right permit Applicant is referred to NMFS and DFG for the scoping of site-specific fisheries studies to assess these impacts.

- When the CFII is between 5 and 10%, the Applicant must provide additional hydrologic analysis documenting the estimated effects of cumulative diversions on the stream hydrograph at the POI's during three representative normal and two representative dry years. If the natural hydrograph is appreciably impaired during the migratory and spawning period of anadromous salmonid species, additional site specific study may be warranted.

- If the CFII is less than 5%, there is little chance of significant cumulative impacts due to the diversion and the project does not require additional studies to assess these impacts.

Scope and purpose of site specific studies:

Site-specific studies prompted by a CFII greater than 10% (or when there is an appreciable impairment of the hydrograph on projects with CFII between 5-10%) are performed to establish terms and conditions that ensure that habitats for anadromous salmonids are not further degraded. For most projects, three issues need to be addressed:

1) What are the cumulative effects of this and other projects on channel maintenance (flushing) flows needed to protect geomorphological processes downstream from the project site? Does the project under consideration contribute to a significant adverse effect on flushing flows needed to maintain the stream channel and avoid exacerbating stream sedimentation? Does the project affect the timing of the opening or closure of estuarine mouths with sand bars?

2) What minimum bypass flow and maximum instantaneous rate of withdrawal are needed for the project to protect spawning habitat for anadromous salmonids downstream from the project site?

3) What minimum bypass flow and maximum instantaneous rate of withdrawal are needed for the project to facilitate migratory movements of anadromous salmonids downstream from the diversion site(s)?

The Applicant should consult with NMFS and DFG concerning the scope and methods of site-specific studies to address these issues. Performance of site-specific studies does not guarantee that stream flow terms and conditions will be consistent with an economically viable project.

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Exhibit D

Exhibit #4

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO
MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Kerry W. Mulligan
Executive Officer
State Water Resources
Control Board

Exhibit #

Exhibit #5

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Avenue Room 325
Santa Rosa, CA 95404

April 12, 2001

In response refer to:
151422SWR01SR323

Ray Hall
Planning &Building Services Department
County of Mendocino
501 Low Gap Road
Ukiah, California 95482

Dear Mr. Hall:

This concerns your agency's regulation of grading activities in northern California coastal watersheds. While many agencies and other groups are working toward fish and water conservation efforts in northern California coastal watersheds, we believe that more immediate action needs to be taken to address certain existing land management practices that are adversely impacting steelhead.

Last February 20, you and I discussed the National Marine Fisheries Service's (NMFS) interest in Mendocino County's Chapter 70 exemptions for grading activities that are determined to be self contained and at isolated locations. You advised me then that a committee is being formed to focus on a new County grading ordinance and that the first meeting would occur in April. You also suggested that the new ordinance would probably be effective by October, 2001. Further, you suggested that I write and request to be informed of committee schedules and activities. Please do keep NMFS informed on this issue.

I would like to explain our interests in more detail than I did during our earlier conversation and how the federal Endangered Species Act (ESA) might apply to grading activities in Mendocino County. In June, 2000, the NMFS adopted protective regulations under section 4(d) of the ESA prohibiting "take" of 14 groups of salmon and steelhead listed as threatened under the ESA. Take is defined within the ESA as: harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. The definition of harm is further expanded to include altering the essential behavior patterns of spawning, rearing, and migrating. Habitat modification or degradation can be considered take if the modification actually kills or injures a protected species. It is important to note that the injury can include the death of future generations of the listed species. The consequences of being responsible for take under the ESA can result in either civil or criminal penalties.

The 4(d) protective regulations went into effect on September 8, 2000. They describe certain activities that are most likely to cause harm resulting in a violation of the ESA. These activities, as they may pertain to grading activities, include in part:

> Constructing or maintaining barriers that eliminate or impede a listed species' access to habitat or ability to migrate...Constructing or operating dams or water diversion structures with inadequate fish screens or fish passage facilities in a listed species' habitat...Conducting land-use activities in riparian areas and areas susceptible to mass wasting and surface erosion, which may disturb soil and increase sediment delivered to streams....

How does the 4(d) rule apply to Mendocino County grading ordinances? Basically, there must be a listed species, and/or its designated critical habitat, specified under the 4(d) rule and affected by the County's regulation of grading activities. Central California Coast steelhead trout (CCC steelhead), listed as threatened under the ESA, are included in the 4(d) rule and are known historically to inhabit coastal watersheds in Mendocino County. Also, critical habitat is designated for CCC steelhead to include all river reaches and estuarine areas accessible to listed steelhead in coastal river basins from the Russian River to Aptos Creek, California (inclusive). Critical habitat elements potentially impacted by the County's regulation of grading activities include, the channel, substrate, adjacent riparian area, and water quality. Specifically, we are concerned with individual and cumulative effects of authorizing or condoning new on-stream water impoundments, such as Section 70 Exemptions being issued by the county.

I realize the implications of the ESA can be confusing, and I therefore emphasize the importance of the County and its applicants (1) to fully understand ESA obligations and liabilities, and (2) to fully understand and eliminate any impacts. We would like to work cooperatively with the County to conserve and begin restoring steelhead in the Russian River and other coastal watersheds and hope to hear from you soon on the committee's progress. If you have any questions concerning NMFS responsibilities or need clarification on ESA issues please contact us.

Sincerely,

James R. Bybee
Habitat Manager
Northern California

cc: NMFS, D. Torquemada
CDFG, Don Richardson

Exhibit

Exhibit #6

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

August 8, 2000 F/SWR4:WH

Ms. Laura Vasquez
State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, California 95812-2000

Dear Ms.Vasquez:

By this letter the National Marine Fisheries Service (NMFS) registers its protest to applications for appropriative water right[redacted] and [redacted] filed by [redacted] and [redacted] to divert water from Witherell Creek, tributary to Anderson Creek, thence the Navarro River in Mendocino County. The total diversion amounts to 30 acre-feet storage per year, plus a direct diversion of 2 cfs. It involves, in part, storage in an on-stream reservoir. Witherell Creek, which lies within the Navarro River watershed, may support or contribute to sustaining populations of the Central California Coast Evolutionarily Significant Unit (ESU) of coho salmon and the Northern California ESU of steelhead trout.

Background

Coho salmon (*Oncorhynchus kisutch*) comprising the Central California Coast ESU are listed as threatened (61 Fed. Reg. 56138; Oct. 31, 1996) under the Endangered Species Act (ESA). Protective regulations were published for coho on October 31, 1996. These protective regulations make it unlawful to "take" coho under section 9 of the ESA. "Take" as defined in the ESA, includes, in part, to harm or harass the species. These protective regulations describe certain activities that may impact coho and result in legal liability. These activities include, in part:

> *Unauthorized destruction/alteration of the species' habitat, such as removal of large woody debris or riparian shade canopy, dredging, discharge of fill material, draining, ditching, diverting, blocking, or altering stream channels or surface or ground water flow.*

In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple 3-year life cycle. Adult salmon typically begin the freshwater migration from the ocean to their natal streams with the first fall rains. Upstream migration will continue from October to March, generally peaking in December and January

(Shapovalov and Taft 1954).

Coho fry emerge from redds, in 38 to 101 days depending on stream temperature (Laufle et al. 1986). After emergence, the stream flow conditions and water temperature play a large role in survival. Low summer flows reduce potential rearing areas, may cause stranding in isolated pools, and increase vulnerability to predators (Sandercock 1991). Also the combination of reduced flows and high ambient air temperatures can raise the water temperature to the upper lethal limit of 25°C for juvenile coho (Brett 1952). Later in the year, high winter flows in typical coastal streams may be hostile to juvenile coho, causing displacement and disrupting their habitat and food sources. Juvenile coho show a preference for habitat containing deep pools (1 m or more), logs, rootwads, or boulders in heavily shaded sections of stream. Structurally complex streams that contain stones, logs and bushes in the water support larger numbers of fry (Scrivener and Andersen 1982). Although coho juveniles are found in both pool and riffle areas of a stream, they are best adapted to holding in pools (Hartman 1965).

Steelhead trout (*Oncorhynchus mykiss*) comprising the Northern California ESU are listed as threatened (65 Fed. Reg. 36074, June 7, 2000) under the ESA. NMFS intends to designate critical habitat and promulgate regulations under section 4(d) of the ESA for this ESU in separate rulemakings. These regulations will likely be similar to those published for coho salmon and identify water diversion as an activity that may impact the species.

Winter steelhead may enter rivers in the late fall and begin spawning in December. Steelhead are capable of repeat spawning. Up to thirty percent survive to spawn a second or third time, but in large drainages where fish migrate long distances, the proportion is much lower (Meehan and Bjornn 1991). Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Juvenile steelhead will spend one to three years in fresh water before migrating to the ocean (Busby et al. 1996). Winter steelhead prefer water temperatures in the 10°C-15°C (50°-59°F) range with a sustained upper limit of 20°C (68°F) (Barnhart 1986). They can survive short periods up to 27°C (81°F) with saturated dissolved oxygen conditions and a plentiful food supply. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby et al. 1996).

Proposed Diversion

Appropriation of water would be accomplished by storing 30 acre-feet of water behind an existing (constructed in 1980) 30-foot high dam located on Witherell Creek. In addition to this onstream storage, which is the subject of Application 30718, the applicant seeks (under Application 31003) the right to directly divert 2 cfs by pumping directly from Witherell Creek at the reservoir via an existing 8 inch pipeline. The applicants have requested to divert water through storage from October 1 through May 31, and to directly divert water by pumping from March 1 through May 31. Witherell Creek, like other North Coast streams, is rain fed and subject to critical low flows during much of the year. Granting the proposed diversion will reduce flows in Witherell Creek, Anderson Creek, and the Navarro River, and it may degrade

habitat necessary to the existence of certain life stages of coho salmon and steelhead. Alteration of stream flows can result in salmonid mortality for a variety of reasons: migration delay resulting from insufficient flows or habitat blockages; loss of sufficient habitat due to dewatering and blockage; stranding of fish resulting from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions; and increased juvenile mortality resulting from increased water temperatures (Bergen and Filardo 1991; California Advisory Committee on Salmon and Steelhead Trout 1988; California Department of Fish and Game 1991; Columbia Basin Fish and Wildlife Authority 1991; Chapman et al. 1994; Cramer et al. 1995; Palmisano et al. 1993; Reynolds et al. 1993).

Based upon the need to protect and recover runs of listed coho salmon and steelhead in the Navarro River watershed, we find it necessary to protest the proposed project because:

1) the Navarro River watershed supports federally listed coho salmon and steelhead. Witherell Creek, upon which the proposed diversion would occur, lies within the Navarro River watershed and may support or contribute to the survival of these species.

2) by reducing and periodically interrupting stream flows in downstream reaches, the project may reduce available habitat for coho salmon and steelhead. Even if coho salmon or steelhead, or their habitats are not located "immediately" downstream of the point of diversion, the affected stream reach may be an important area for the production or transport of invertebrate foods that subsequently drift downstream to rearing juveniles. In addition, headwater tributaries collectively contribute flow to downstream reaches that support listed salmonids.

3) the Applicants have not proposed to mitigate the effects of those reductions in available habitat by providing an adequate minimum bypass flow.

4) the proposed onstream reservoir may potentially eliminate or appreciably reduce the magnitude or frequency of naturally occurring intermediate and high flows necessary for natural channel maintenance processes and the successful movements of migrating fishes (Barinaga 1996; Poff et al. 1997). The potential cumulative effect of the proposed diversion and other existing permitted and licensed diversions on biologically-important intermediate and high flows within Witherell Creek and Anderson Creek have not been assessed. Limits on the rate of water withdrawal and restrictions on the number of onstream storage reservoirs must be established in order to preserve a natural hydrograph that provides biologically and geomorphologically important intermediate and high flows.

5) the impoundment of water in an onstream reservoir will eliminate free-flowing stream habitat that may either support listed salmonids or the production and transport of riffle-dwelling aquatic invertebrates, which serve as important food sources for downstream fishes (Corrarino and Brusven 1983; Resh and Rosenberg 1984; Keup 1988).

6) The proposed diversion is one of numerous proposed and existing diversions in the Navarro River watershed. Multiple diversions can collectively adversely affect listed salmonids by 1) reducing available habitat for these species and related forage species, 2) reducing flows necessary for upstream and downstream passage of listed salmonids, and 3) interfering with natural stream channel processes. The cumulative effect of this project and other existing permitted and licensed projects in this watershed must be addressed before this permit is granted. If the proposed project and the existing water right permits and licenses have a significant, cumulative adverse effect on listed salmonids, this project should not be permitted. The State Water Resources Control Board (SWRCB) has a duty to disclose, evaluate, and mitigate the potential adverse cumulative impacts of the proposed project and other water diversion projects in the Anderson Creek and Navarro River watersheds on threatened populations of coho salmon and steelhead.

7) The potential effect of the water diversion structure and proposed onstream reservoir on upstream and downstream movements of listed salmonids have not been addressed. Diversion structures and instream reservoirs may block fishes from reaching their natal spawning areas. Diversion structures also have the potential to entrain fishes, with resulting mortality.

8) The applicants have requested the right to divert water each year through storage during the period October 1 through May 31 of the succeeding year. They have requested the right to directly divert at a rate up to 2 cfs during March 1 through May 31. In its water rights proceedings for the Navarro River, the SWRCB has rightfully found that new water diversions in this watershed should be confined to the period December 15 to March 31. This latter period is the time of highest winter flows and the period when water withdrawals would be least likely to adversely affect fisheries resources. NMFS agrees with that finding and encourages the SWRCB to adopt this diversion period to this project. The applicants proposal to withdraw water between October 1 and December 14 may unnecessarily affect salmonids, because that is a time when flows are relatively low, high flows are infrequent and sporadic, and it is a time when coho and steelhead ascend coastal streams to spawn. The applicants proposal to extend the water withdrawal period to May 31 may also unnecessarily affect anadromous salmonids. Flows generally subside during April, although downstream emigration of juveniles often occurs during the higher flow events in this month. Flows are much less during May, and thus diversions during this month would probably reduce the availability of already limited habitat for juvenile steelhead.

Recommendations

Based upon the above concerns and potential impacts of the proposed project, we recommend that the project be modified to include several mitigative provisions. The level of action needed

to mitigate the project is dependent upon the quality of the stream at the diversion site. If a proposed diversion is located 1) in a stream reach where fishes or non-fish aquatic species were not historically present upstream, and 2) where the project could not contribute to a cumulative reduction of more than 10% of the natural instantaneous flow in any reach where fish are at least seasonally present, and 3) where the project would not cause the dewatering of any fishless stream reach supporting non-fish aquatic species, then we do not object to that proposed diversion. By cumulative reduction we refer to the effects of this and other permitted or licensed projects as well as diversions under riparian rights. If the proposed diversion is located on a stream where 1) fishes or aquatic invertebrates were historically present upstream, or 2) the project could contribute to a cumulative reduction of more than 10% of the natural instantaneous flow in any reach where fish are at least seasonally present, then the following terms and conditions must be made part of the proposed water right permit. Failure to incorporate these recommendations may impact listed salmonids.

a) Limit the diversion season to the period December 15 to March 31. From April 1 to December 14 instantaneous inflow to the point of diversion must equal the instantaneous outflow to downstream reaches past the point of diversion.

b) The plan should avoid construction or maintenance of an on-stream dam across, and it should avoid onstream storage. Therefore, storage must be to an off-stream reservoir if fishes or non-fish aquatic species are either always or seasonally present upstream from the point of diversion, or where the project could contribute to a cumulative reduction of more than 10% of the natural instantaneous flow in any reach where fish are at least seasonally present.

c) provide a minimum bypass flow that adequately protects coho salmon and steelhead in reaches downstream from the point of diversion. The determination of the bypass flow's adequacy can be based on site specific biological investigations conducted in consultation with California Department of Fish and Game (CDFG) and NMFS staff, or in the absence of site specific data, it would be not less than the estimated unimpaired February median flow at the point of diversion. A discussion of the need for and rationale for maintaining minimum bypass flows equivalent to the unimpaired February median flow in north coastal California streams is provided in NMFS draft guidelines for maintaining instream flows to protect fisheries resources in tributaries of the Russian River. These draft guidelines are on file with the SWRCB.

d) Natural, periodic, intermediate and high flows should be maintained immediately below the diversion site. This is a complex issue that concerns potential cumulative impacts of this and other upstream permitted and licensed water diversions within the Anderson Creek and Navarro River watersheds. Protection of intermediate and high flows can be accomplished through an assessment of cumulative impacts and placing limits on the rate of instantaneous water withdrawals from the stream. We recommend that the project be operated so that the cumulative maximum rate of instantaneous withdrawal at the point of

diversion not exceed a flow rate equivalent to 15% of the estimated "winter 20% exceedence flow". The "winter 20% exceedence flow" is the 20% exceedence value of a daily average flow duration curve for the period December 15 to March 31. A discussion of the need for and rationale for limiting cumulative maximum instantaneous withdrawals to a portion of the "winter 20% exceedence flow" in northern coastal California streams is provided in NMFS draft recommended guidelines for maintaining instream flows to protect fisheries resources in tributaries of the Russian River. These draft guidelines are on file with the SWRCB.

e) The potential effect of the project on upstream and downstream movements of anadromous salmonids must be addressed. If anadromous salmonids ascend or have the likely potential to ascend Witherell Creek to the diversion site, then adequate passage facilities and screening at the diversion intake must be provided.

Regardless of the quality of stream at the point of diversion, the proposed project should provide California Department of Fish and Game personnel access to all points of diversion and places of use for the purpose of conducting routine and or random monitoring and compliance inspections.

Thank you for your cooperation in the above. We look forward to continued opportunities for NMFS and the State Water Resources Control Board to cooperate in the conservation of listed species. If you have any questions or comments concerning the contents of this letter please contact Dr. William Hearn at (707) 575-6062.

Sincerely,

James R. Bybee
Habitat Manager
Northern California

cc: T. and M. Elke, applicants
R. Hight, CDFG, Sacramento
R. Floerke, CDFG, Yountville

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Exhibit [redacted]

Exhibit #7

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

November 22, 2000 F/SWR4:WH

Ms. Laura Vasquez
State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, California 95812-2000

Dear Ms. Vasquez:

On August 8, 2000, we submitted to you our letter of protest to the application for appropriative water rights [redacted] filed by Thomas and Mary Elke. That letter provided terms for dropping this protest. On October 26, 2000 representatives of the National Marine Fisheries Service (NMFS), California Dept. of Fish & Game (CDFG), the State Water Resources Control Board (SWRCB), and various environmental groups conducted a field investigation at the project site. Based on this investigation, it appears that the project reservoir is located directly on Witherell Creek in a fish bearing reach. Although Witherell Creek is an intermittent stream at the project site, it probably does or has the potential to support anadromous salmonids in the reaches immediately below the dam during winter and spring. The culvert under Route 128, which is only a few hundred feet below the dam, poses no substantial barrier to upstream migration of anadromous salmonids. The fisheries-related impacts of this on-stream dam must be mitigated.

CDFG/NMFS guidelines for water diversions in coastal watersheds strongly recommend that on-stream impoundments be avoided in fish-bearing stream reaches. On-stream impoundments have the capacity to completely alter stream hydrographs -- reducing stream flows to minimum bypass requirements and eliminating intermediate and high flows necessary for successful spawning, fish migrations, and channel maintenance. The 20+ year old dam may be a barrier to fish migrations; however, the extent and significance of spawning and rearing habitat in the seasonal stream above the dam is unknown. Because it may be a barrier to salmonids, the project dam may cause "harm or take" prohibited under the federal Endangered Species Act. The applicants have indicated to NMFS and CDFG that they wish to explore the possibility of relocating their impoundment to an off-stream site (*i.e.*, a pit-type reservoir). We encourage the SWRCB to support and help facilitate such a project modification. If the impoundment were relocated, we would recommend that the project be operated with 1) a minimum bypass flow equivalent to the long-term, February median flow at the site, and 2) a maximum rate of withdrawal limited such that the cumulative maximum rate of withdrawal would not exceed 15% of the "winter 20% exceedence flow". By cumulative rate of withdrawal, we refer to

withdrawals from this project combined with upstream withdrawals from other permitted or licensed projects and upstream diversions under riparian rights. It is important that the cumulative rate of withdrawal be limited in order to maintain intermediate flows necessary for fish passage and active spawning within the stream channels, and to maintain high flows necessary for channel maintenance. In addition to the bypass flow and a limited withdrawal rate, structural mechanisms and compliance terms should be in place for ensuring that these conditions are maintained.

If the Applicant is unable or chooses not to relocate the project impoundment to an off-stream site, NMFS recommends that the project be operated with 1) a minimum bypass flow equivalent to the annual 10% exceedence flow or inflow (whichever is less), 2) demonstrated assurance that the unimpaired 1.5 year high flow event will not be appreciably altered, and 3) demonstrated assurance that flows necessary for upstream fish passage will not be appreciably altered. We recommend the higher minimum flow (10% annual exceedence) if the impoundment remains on-stream, because the project would be unable to limit the maximum rate of diversion during the period of filling. In some small headwater streams, anadromous salmonids may principally spawn at relatively high stream flows that are approximated by the 10% annual exceedence flow (Trush 2000). "Flatlining" the stream to the February median would appreciably reduce available spawning habitat. We recommend that the SWRCB or applicant conduct a site-specific investigation of Witherell Creek to evaluate flow needs to facilitate upstream fish passage in the reaches below the project dam.

Thank you for your consideration and opportunity to provide comment following the site investigation. We look forward to continued opportunities for NMFS and the State Water Resources Control Board to cooperate in the conservation of listed species. If you have any questions or comments concerning the contents of this letter, please contact Dr. William Hearn at (707) 575-6062.

Sincerely,

Patrick J. Rutten
For

James R. Bybee
Habitat Manager
Northern California

cc: T. and M. Elke, Applicant
R. Floerke, CDFG, Yountville
S. Griffin, Trout Unlimited
H. Adams, NWPA
S. Hall, Friends of Navarro

Exhibit H

Exhibit #8

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

January 11, 2000 F/SW03:SAE

Harry Schueller, Chief
Division of Water Rights
State Water Resources Control Board
Division of Water Rights
Box 2000
Sacramento, California 95812-2000

Dear Mr. Schueller :

Thank you for your invitation to participate in the January 31 Technical Workshop on Fish Bypass Flows for Coastal Watersheds. The January 31 technical workshop and subsequent peer review process represent a significant cooperative effort toward integrating the water rights process with anadromous salmon conservation. As per your December 9 letter announcing the technical workshop, attached is our NMFS Draft Guidelines for Maintaining Instream Flows to Protect Fisheries Resources in Tributaries of the Russian River.

We would appreciate the opportunity to meet with your staff to discuss the peer review process and participate in developing questions and guidelines for the peer review panel. I believe that continued inter-agency cooperation can lead to methods of establishing minimum flows in the Russian River and other North Coast streams that are consistent with requirements for conservation of salmonid populations.

If you have questions, please contact Dr. William Hearn at (707) 575-6062 or Mr. Steve Edmondson at (707) 575-6080.

Sincerely,

James Bybee
Habitat Manager
Northern California

Enclosure

DRAFT

EXECUTIVE SUMMARY

Comments on the State Water Resources Control Board (SWRCB) report on Proposed Actions on Pending Water Rights Applications with the Russian River Watershed
And
NMFS Draft Recommended Guidelines for Maintaining Instream Flows to Protect Fisheries Resources in Tributaries of the Russian River

NMFS agrees with the SWRCB staff that tributaries of the Russian River should be listed as fully appropriated for the period April 1 to December 14. We are also supportive of the SWRCB's concept of a bypass flow policy that identifies a minimum stream flow below which new withdrawals will be prohibited during winter months. However, NMFS is concerned with, 1) the adequacy of a bypass flow standard set at 60% of unimpaired mean annual flow, and 2) the absence of clear guidelines for maintaining adequate flushing flows and flows that facilitate migratory movements of anadromous fishes.

Reasons why 60% of mean annual flow does not appear to be a sufficient low flow standard for winter water withdrawals are that

1) it is based on a dry year criterion that places threatened salmonid populations at considerable risk,

2) instream flow studies cited by the SWRCB indicate that optimal flows for salmonid spawning are considerably higher than 60% of mean annual flow,

3) the SWRCB's analysis is based on the erroneous assumption that there is a typical weighted useable area curve that can be applied to derive an estimate of percent maximum habitat,

4) the method is not grounded in a consideration of biological needs during the winter diversion period, and

5) additional analysis of flow hydrographs for Russian River tributaries indicates that a bypass flow standard equivalent to 60% of mean annual flow would appreciably reduce naturally sustained winter flows that provide important spawning habitat for anadromous salmonids.

Given the potential variability of stream flow and habitat-flow relations in Russian River tributaries, any flow standard applied without site-specific information and used over a wide geographic area should be conservatively, yet reasonably biased toward salmon conservation. A bypass flow standard based on the February median flow for tributaries would approximate flows

needed to protect salmonid populations and provide a conservative, practical alternative to the SWRCB's 60% mean annual standard. Reasons why February median is a practical winter minimum bypass flow standard for protecting salmonid populations include:

1. Unlike statistics based on the arithmetic mean, February median flow is not biased upward or downward by a few very high or low flow events. Therefore, it approximates typical flows during winter months.

2. It can be based on the winter hydrology of discrete watershed segments.

3. Based on a review of 81 annual records of winter flows in five tributaries of the Russian River, a bypass flow standard equivalent to the February median flow is a better conservator of sustained winter flows useful to spawning salmonids than a 60% mean annual flow standard.

4. February median flow is higher than monthly median flows for December, January, and March in many tributaries. Thus, the maintenance of the February median flow would likely protect spawning and egg incubation habitat of salmonids, during all months of the winter.

5. A minimum flow standard based on February median flow provides for water diversions during winters. High flow events associated with storm run-off are not sustained, and therefore diversion of a portion of those high flows can be done without significantly impacting spawning and egg incubation. Water users would generally be able to extract and store water about half of the time during normal and wet winters (Dec 15 - Mar 31) and during the higher flow events in dry winters.

Site-specific studies should be required for those seeking a minimum bypass flow lower than the February median. A lower minimum bypass flow should be granted only in cases in which it can be demonstrated that a lower bypass flow would have no signficant adverse effect on aquatic resources. The bypass flow should be maintained at diversions in tributary headwaters even if salmonids or their habitat are not located "immediately" downstream. Headwater tributaries may be important areas for the production or transport of invertebrate foods that subsequently drift downstream to rearing juveniles. Headwater tributaries also contribute flow to downstream reaches that may support salmonids.

In addition to a standard for minimum flows, water diversion guidelines should contain provisions for maintaining the natural hydrograph. The preservation of natural flow variability and high stream flows is highly important for maintaining stream ecosystem function and protecting stream fisheries (Baringa 1996; Poff et al. 1997). Flow hydrographs for tributaries of the Russian River indicate that stream flow is especially high during about 20% of the time during the winter months. Removal of a portion of this high flow would probably have no adverse affect

on salmonids or stream ecosystem function. Comparisons of alternative rates of withdrawal suggest that limiting the instantaneous rate of diversion to less than 20% of the "winter 20% exceedence flow" would 1) preserve the natural high flow events needed for channel maintenance, 2) preserve days with intermediate flows, and 3) provide substantial quantities of water to irrigators and other water users. This should be done in conjunction with the maintenance of a minimum flow equivalent to the February median flow. The institution of a maximum rate of instantaneous withdrawal equivalent to 20% of the "winter 20% exceedence flow" represents a cumulative rate for all diversions located at and upstream of a diversion site.

In summary, NMFS recommends that the SWRCB modify its water diversion guidelines by incorporating the following changes:

1. Adopt the February median flow as the minimum bypass flow standard

2. Protect the natural hydrograph by limiting the cumulative instantaneous rate of withdrawal to 20% of the "winter 20% exceedence flow"

3. Coordinate permitting so that cumulative withdrawals from upstream reaches do not exceed the maximum instantaneous withdrawal rate at any point on the stream.

DRAFT

EXECUTIVE SUMMARY

Comments on the State Water Resources Control Board (SWRCB) report on Proposed Actions on Pending Water Rights Applications within the Russian River Watershed
And
NMFS Draft Recommended Guidelines for Maintaining Instream Flows to Protect Fisheries Resources in Tributaries of the Russian River

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3) the SWRCB's analysis is based on the erroneous assumption that there is a typical weighted useable area curve that can be applied to derive an estimate of percent maximum habitat,

4) the method is not grounded in a consideration of biological needs during the winter diversion period, and

5) additional analysis of flow hydrographs for Russian River tributaries indicates that a bypass flow standard equivalent to 60% of mean annual flow would appreciably reduce naturally sustained winter flows that provide important spawning habitat for anadromous salmonids.

Given the potential variability of stream flow and habitat-flow relations in Russian River tributaries, any flow standard applied without site-specific information and used over a wide geographic area should be conservatively, yet reasonably biased toward salmon conservation. A bypass flow standard based on the February median flow for tributaries would approximate flows

needed to protect salmonid populations and provide a conservative, practical alternative to the SWRCB's 60% mean annual standard. Reasons why February median is a practical winter minimum bypass flow standard for protecting salmonid populations include:

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2. It can be based on the winter hydrology of discrete watershed segments.

3. Based on a review of 81 annual records of winter flows in five tributaries of the Russian River, a bypass flow standard equivalent to the February median flow is a better conservator of sustained winter flows useful to spawning salmonids than a 60% mean annual flow standard.

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Site-specific studies should be required for those seeking a minimum bypass flow lower than the February median. A lower minimum bypass flow should be granted only in cases in which it can be demonstrated that a lower bypass flow would have no signficant adverse effect on aquatic resources. The bypass flow should be maintained at diversions in tributary headwaters even if salmonids or their habitat are not located "immediately" downstream. Headwater tributaries may be important areas for the production or transport of invertebrate foods that subsequently drift downstream to rearing juveniles. Headwater tributaries also contribute flow to downstream reaches that may support salmonids.

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on salmonids or stream ecosystem function. Comparisons of alternative rates of withdrawal suggest that limiting the instantaneous rate of diversion to less than 20% of the "winter 20% exceedence flow" would 1) preserve the natural high flow events needed for channel maintenance, 2) preserve days with intermediate flows, and 3) provide substantial quantities of water to irrigators and other water users. This should be done in conjunction with the maintenance of a minimum flow equivalent to the February median flow. The institution of a maximum rate of instantaneous withdrawal equivalent to 20% of the "winter 20% exceedence flow" represents a cumulative rate for all diversions located at and upstream of a diversion site.

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2. Protect the natural hydrograph by limiting the cumulative instantaneous rate of withdrawal to 20% of the "winter 20% exceedence flow"

3. Coordinate permitting so that cumulative withdrawals from upstream reaches do not exceed the maximum instantaneous withdrawal rate at any point on the stream.

Exhibit 4

Exhibit #9

State of California - The Resources Agency
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
1416 Ninth Street
Sacramento, CA 95814
(916) 653-7667

Mr. Marc J. Del Piero
Russian River Flood Control &
Water Conservation Improvement District
Post Office Box 2980
Ukiah, California 95482

Dear Mr. Del Piero:

The Department of Fish and Game's Central Coast Region staff has reviewed your request regarding information on 1600 agreements issued for diversions from the upper Russian River in Mendocino County. We understand your agency's concerns and certainly are willing to work with the District. The issue of water diversions is one of the most problematic facing the 1600 program. The issue is the cumulative effect of many small diversions which by themselves may have minimal impacts, particularly if appropriately screened.

The normal process for providing public and agency review of streambed alteration agreements is through the environmental review process (California Environmental Quality Act). The Department is currently working to develop a method for adequately reviewing the impacts of diversions from the Russian River without stopping diversions altogether while the review is completed. We would be interested in sitting down with the District to discuss how this could be done.

Regional staff will also look at ways by which we can provide the District with summary information on 1600 applications which are of interest to the District.

Mr Carl Wilcox, Habitat Conservation Manager, Central Coast Region, will be contacting you to arrange a meeting to discuss these issues. You may reach Mr. Wilcox at Department of Fish and Game, Central Coast Region, Post Office Box 47, Yountville, California 94599. telephone (707) 944-5525.

Sincerely,

Robert C. Hight
Director

cc: Mr. Edward Anton, Executive Director
State Water Resources Control Board
Sacramento, California

Conserving California's Wildlife Since 1870

Exhibit J

Exhibit #10

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

RECEIVED
MAY 29 2003
NAT. MARINE FISHERIES SVC.
SANTA ROSA, CA

In Response Refer To:
151416SWR03SR

MAY 23 2003

DOC NO. SR59168
AR NO. 151416SWR03SR3677
AR ORIGINAL
DESK COPY

Mr. Arthur G. Baggett, Jr., Chair
State Water Resources Control Board
1001 I Street
P.O. Box 100
Sacramento, California 95812-0100

Dear Mr. Baggett:

The National Marine Fisheries Service (NOAA Fisheries) has only recently become aware of the State Water Resources Control Board (SWRCB) proceedings and hearing on Applications 18334X02, 30521, 30522, and 30552 of Pajaro Valley Water Management Agency (PVWMA) to appropriate water from College Lake (Salsipuedes Creek), Harkins and Watsonville Sloughs, and the Pajaro River in Santa Cruz County. The Certified Mail and also Regular Mail Service Lists prepared and submitted by the SWRCB's staff to all parties for the Public Notice of Hearing, do not show that NOAA Fisheries was served with a copy of the Public Notice for this Water Rights Hearing, although numerous other agencies and parties were served.

The Notice for this hearing states that the proposed amount of water to be appropriated under State Filed Application (SFA) 18334X02 is 200 cubic feet per second (cfs) (maximum diversion rate) to be diverted from January 1 to December 31 of each year to offstream storage at a proposed 21,000 acre-feet (af) reservoir. That SFA, which was filed by SWRCB in 1958 can be released from priority or a portion assigned to any application with some restrictions. On December 23, 1996, PVWMA filed a petition for partial assignment of SFA 18334X02. However, in the event that PVWMA's petition for partial assignment is not approved by the SWRCB, PVWMA seeks a release from priority of SFA18334 in favor of additional water rights Applications 30521, 30522, and 30552, all of which were filed in 1996. The total amount of water to be diverted under PVWMA's petition or the applications is 10,600 acre-feet annually (afa) at a combined maximum rate of diversion of 65 cfs.

NOAA Fisheries is responsible for conserving, protecting, and recovering anadromous salmonid species listed under the Federal Endangered Species Act (ESA). In 1997, NOAA Fisheries listed steelhead in the South-Central California Coast Evolutionarily Significant Unit (ESU), which includes the steelhead of the Pajaro River, as a federally listed threatened species (62 FR 43937 August 18, 1997). At this time, we are concerned that the scheduled hearing for Application SFA 18334, and Applications 30521, 30522, and 30552 would likely lead to decisions that have the potential to significantly impact this local, already threatened steelhead population. We are also concerned that diversions under these proposed applications would cause the "take" of many individuals of this species.

Reasons for our concern that steelhead will likel be adversely affected by the develop ent of these diversion projects are:

1. The final Program EIR on the Pa ro Valley Water Basin Management P an was completed and certified in 1993 l efore the South-Central Coast ESU wa listed for protection under the provisio s of the ESA.

2. The volume of water and maxim m instantaneous rate of withdrawal requested b PVWMA is large relative to natu al stream flows in the Pajaro River. Therefore, there is significan potential that e diversions will substantially dimni ish the availability of habitat for steelhe d. For example, at the Rte 129 bridge on the Pajaro River, the long-term medi n flow for the months of February and March (the wettest winte months) are 9 and 96 cfs, respectively, for the perio of record 1939 though 1999. [*The U SGS gage records from which these sta tistics are derived are from a gaging site th t monitors flow downstream from mor than 90% of the Pajaro River watersh d area.*] With a maximum instantaneo s diversion rate of 15 cfs at Murph 's crossing and a total diversion rate o 65 cfs i the lower watershed, the propose project could substantially reduce wi ter flow that facilitate upstream migratio and spawning of steelhead.

3. The proposed sea on of diversio for SFA 18334x02 is September 15 th ough May 31. Under A30521, A3052 , and A30552, the proposed diversion season is November 1 to May 31. Stream flows are relatively low during the mo ths of November, Dece ber, April and May (see Table 1). The results are flo s that were exceeded 20, 30, 40, and 5 percent of the time during the specifie months. The large volume of water and h gh maximum diversion rates proposed for this project could pot ntially have a ignificant adverse effect on stream flo s that facilitate downstream migration f juvenile steelhead during spring and adverse effects on flows t at sustain ove wintering and rearing juvenile steelhea.

Table 1. Average daily s ream flows (cf) expressed as percent exceedence at the USGS gage located on the Pajaro River at Chi enden during April, May, November, nd December for the period 1939 to 1999.

	Month			
Exceedence	April	ay	November	December
20%	225	6	18	54
30%	134	6	13	26
40%	76	7	9	19
50%	47	0	7	14

In addition, given that the EIR prepared for the proposed project was completed prior to the listing of steelhead in the Pajaro River, the adequacy of that environmental analysis is questionable. NOAA fisheries requests additional consideration of flow needs to protect steelhead, including site specific analysis conducted in consultation with NOAA Fisheries and the California Department of Fish and Game. Because of the magnitude of the volume of water and the maximum instantaneous rate of diversion requested by PVWMA, we recommend that the SWRCB postpone the hearing on this project until its impacts to threatened species are sufficiently understood and adequate terms and conditions for mitigating those impacts can be developed.

We appreciate the difficulties that this issue of threatened steelhead brings to this proceeding. However, given our lack of notification, the pre-existing environmental assessment, the appreciable time needed for adequate assessment, and the potential significant impacts of the project, NOAA Fisheries believes it is reasonable to delay actions on the PVWMA project.

Thank you for your consideration on this matter and willingness to work with our agency to avoid adverse impacts to Federally listed anadromous salmonids. If you have technical questions concerning this letter, please call Dr. William Hearn at 707-575-6062.

Sincerely,

for Rodney R. McInnis
Acting Regional Administrator

cc: M. Capelli, NOAA Fisheries
M. Croom, NOAA Fisheries
R. Floerke, DFG (Yountville)
N. Murray, DFG (Sacramento)
C. McNiesh, PVWMA
A. Orton-Palmer, USFWS (Ventura)
Santa Cruz County Supervisors, Chair
Monterey County Supervisors, Chair
R. Balocchi
R. Roos-Collins, Natural Heritage
S. Griffin, TU
B. Rutemoeller, Sierra Club
J. Crenshaw, CalSPA

Exhibit #

Exhibit #11

Fish Bypass Flows for Coastal Watersheds

A Review of Proposed Approaches for the State Water Resources Control Board

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Department of Landscape Architecture and Environmental Planning
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University of California Berkeley

With Technical Assistance From
John G. Williams
Bay-Delta Modeling Forum

June 12, 2000

1. Introduction

In the Russian River watershed increasing pressure to develop hillside agriculture (especially vineyards) has led to a proliferation of water rights applications for diversions from headwater streams, which support federally listed coho salmon or steelhead, or support larger streams that do. Similar conditions occur in other coastal watersheds. The State Water Resources Control Board (SWRCB) is presently wrestling with the issue of how to condition permits for water rights to protect ecological resources, a task made difficult by the lack of information on the physical and ecological functioning of these channels, and their influence on downstream channels. For example, proposed methods for determining minimum instream flows in these streams have been developed using stream gauge data - all of which are from larger channels downstream, where scale differences lead to a very different hydrology. Similarly, the need for streamside protection zones along these headwater channels is not widely recognized, because most guidance has been developed for larger channels. In any case, existing institutions are poorly suited to regulating activities that impact these streams. The State Board can decide how much water (if any) should be diverted but has limited authority to regulate land use changes that influence runoff and erosion rates. Similarly, the Department of Fish and Game can put conditions on activities within the stream itself, but has limited authority beyond the stream banks. Land-use decisions are made at the county level, with varying levels of scientific analysis and political concerns influencing decisions. The most advanced county-level ordinance in the region is the Napa County Conservation ordinance, which is now under review in part because of concerns over its effectiveness in addressing the effects of multiple headwater impacts. Moreover, there is presently no mechanism for taking cumulative effects into account. The SWRCB has proposed analyzing cumulative hydrologic changes from numerous headwater diversions at the upstream point used by anadromous fishes, but this limit is changing in many streams as human-made barriers (such as culverts) are corrected as part of watershed restoration programs.

This review is intended to provide the SWRCB with guidance regarding minor water rights applications on streams in coastal watersheds, with particular focus on the Russian River basin. Many of these streams support coho salmon or steelhead rainbow trout, which are listed as threatened under the federal Endangered Species Act (ESA). Although there is general agreement that there is little if any water available for diversion in the dry season, frequent winter flooding in the Russian River basin supports the view that water could be diverted in some winter months without harmfully affecting instream flows required by salmon, steelhead, and other public trust resources. The SWRCB staff has developed an approach that, when embodied into permit conditions, is designed to allow for a "negative declaration" under the California Environmental Quality Act (CEQA) for diversions from small coastal steams; that is, a finding that exercise of a new permit will not have a significant effect on the environment. In other words, the conditions of each permit are supposed to be strict enough so that the diversion will not have negative effect on salmon, steelhead, or other significant aquatic life, either individually or cumulatively. Such findings have been made for several water rights applications in the basin of the Navarro River (SWRCB 1998), which supports coho and steelhead, and the SWRCB staff proposes to use the same approach in the basin of the Russian River, which also supports both species (SWRCB 1997).

The approach has been controversial, however, and has been criticized by the National Marine Fisheries Service (NMFS), Trout Unlimited (TU), the California Sports Fishing Protection Alliance (CALSPA), and others. This caused the SWRCB staff to seek review of the approach by qualified experts acceptable to the various parties, and the authors of this review were selected. The SWRCB also secured the services of the Executive Director of the Bay-Delta Modeling Forum, of which the SWRCB is an institutional member, to act as staff for the review. As part of the review, the SWRCB staff conducted a workshop, on 31 January 2000, in which the SWRCB staff approach and alternatives suggested by NMFS and TU were presented. The California Department of Fish and Game, CALSPA, and engineers from two private firms who frequently represent applicants for water rights, Wagner & Bonsignore and Napa Valley Vineyard Engineering, also participated in the workshop and provided comments.

In this review, we do not recommend a definitive method for determining what flows should be left in each stream to the SWRCB staff and interested parties. Instead, we give our views on topics raised in the workshop and related issues, give suggestions for improved formulation of permit conditions instream flow standards that are well suited for adaptive management, and recommend an approach to apply within the context of adaptive management.

2. General comments on instream flow standards:

Scientific uncertainty and Adaptive Management:

The implications of uncertainty for public policy and environmental management have been a topic of discussion in the scientific literature for some time (e.g. Holling 1978), but particularly in the last decade (e.g., Ludwig et al. 1993; Hilborn and Peterman 1995; Mangel et al. 1996; Chrisentsen et al. 1996; Francis and Shotton 1997; Healey 1997). The discussions have concerned environmental management generally, and management of fisheries or fish populations in particular, and have been motivated by rampant management failure: many stocks of commercially important fish have recently collapsed (Thompson 1993; Horwood 1993), and many runs of Pacific salmon and steelhead are either extinct or in trouble (Nehlsen et al. 1991; Stanley et al. 1996; Mills et al. 1997; Brown et al. 1994; Yoshiyama et al. 2000).

Briefly stated, it is now generally recognized among professionals that management of wild living resources involves such large amounts of uncertainty that (1) management actions are experiments and should be treated as such, and (2) irreversible actions should be avoided. This point of view is embodied in the widely advocated approach of "adaptive management" (e.g., Holling 1978; Walters 1986; Volkman and McConnaha 1993; Healey and Hennessey 1994; Healey 1997, Williams 1998). In 1996, we joined others in declaring that "currently no scientifically defensible method exists for defining the instream flows needed to protect particular species of fish or ecosystems," and in calling for the application of adaptive management to the problem of setting instream flow standards (Castleberry et al. 1996), with a focus on flows below existing dams. We made three basic recommendations:

> First, conservative (i.e., protective) interim standards should be set based on whatever information is available, but with explicit recognition of its deficiencies. The standards should prescribe a reasonable annual hydrograph as well as minimum flows. Such

standards should try to satisfy the objective of conserving fishery resources, the first principle of adaptive management (Lee and Lawrence 1986).

Second, a monitoring program should be established and should be of adequate quality to permit the interim standards to serve as experiments. Active manipulation of flows, including temporary imposition of flows expected to be harmful, may be necessary for the same purpose. This element embodies the adaptive management principles that management programs should be experiments and that information should both motivate and result from management actions. Often, it also will be necessary to fund ancillary scientific work to allow more robust interpretation of monitoring results.

Third, an effective procedure must be established whereby the interim standards can be revised in light of new information. Interim commitments of water that are in practice irrevocable must be avoided.

Here, we expand on these ideas, particularly as they relate to diversions from small streams.

The fact of relevant scientific uncertainty is perhaps best illustrated by recent developments in stream ecology. The role of high flows in structuring food webs in streams like those under consideration here has been elucidated only in the past decade (Wootton et al. 1996). Understanding of the substantial ecological importance of subsurface (hyporheic) flow, which is affected by the frequency with which stream sediments are mobilized, has also developed rapidly over the same period (Jones and Mulholland 2000). Although a great deal is known about salmonids and about stream ecosystems, these examples show that we should expect more surprises, and not assume that our current understanding is sufficient to support permanent decisions regarding management of streams.[1]

In adaptive management, uncertainty is acknowledged, management actions are recognized as experiments, and developing new information is an explicit management objective that can justify actions that may be sub-optimal in terms of other objectives. Deliberate manipulation of the system is required when there is otherwise little variation in the factor of management concern. For example, an adaptive approach to evaluating flows in a regulated stream with fairly constant flows would require a deliberate change in management; it is impossible to learn much about the relation between flow and public trust benefits in a stream if the flow does not vary. In other situations, an adaptive approach may not require deliberate manipulation of the system in question. Delta outflow in the spring, for example, varies naturally much more from year to year than it could from any plausible deliberate manipulation of outflows. The key in such situations is to describe the conceptual model upon which management is based as explicitly and quantitatively as possible so that the rationale for the standards can be formulated as testable hypotheses, and to establish a monitoring program by which the hypotheses can be tested.

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[1] The great complexity of ecosystems and the practical impossibility of accurately measuring many relevant aspects of them explains the apparent paradox that scientists know a great deal about ecosystems but remain unable to make good specific predictions about how they will behave in response to small or intermediate perturbations. See Healey (1997) for a good discussion of this point.

Thus, adaptive management of instream flows may or may not require deliberate, experimental manipulation of flows, depending on the amount of variation that occurs in flows regardless of management. Generally, there will be large variation in flows within and between years in Russian River tributaries and in other California coastal streams. However, to depend on natural variation in flow for management "experiments" increases the risk that results will be confounded by other variables. For example, water quality might be better in high-flow years, so that benefits of improved water quality could be mistakenly interpreted as results of some hypothesized flow-habitat relationship. In any event, the rationale for the instream flow standards or permit conditions must be made clear, so that it can be tested against new information.

This can best be done if objectives and conditions or standards are stated in terms of explicitly biological criteria, with a method specified to convert these into hydrological terms. This allows the condition or standard to be articulated as a testable hypothesis or set of hypotheses. In the present context, for example, a winter flow standard or by-pass condition might be stated as a flow that allows enough spawning to occur to saturate the rearing capacity of the stream, stated quantitatively as enough flow to allow spawning to occur in 75% of the potential spawning habitat in the stream. To make this criterion operational it could be translated, based on some explicitly stated reasoning or evidence, as some particular value on the flow duration curve or some other parameter of the flow data. The standard or condition now involves two hypotheses, one harder to test than the other, but both at least conceptually testable. The more easily testable hypothesis would be that the selected flow criterion actually does allow for spawning in 75% of the potentially available habitat. The more difficult hypothesis would be that 75% of the potential spawning habitat will provide the desired level of biological protection, say lack of harm to listed species. The conceptual model in this case would be density-dependent effects such that spawning on 75% of the potential spawning habitat would saturate the rearing capacity of the stream, so that making more spawning habitat available would not result in greater production of juveniles or returning adults. In any event, the reasoning behind the standard or condition should be spelled out, so that is possible to specify the kind of information that would justify a change.

Under adaptive management, in other words, management decisions should *invite* change, by emphasizing uncertainty, by making clear what kind of new information would justify a change in the management action, and by requiring monitoring that can provide the relevant information. We emphasize this to clarify the difference between adaptive and traditional management, in which management actions typically are designed to be durable, and the reasoning given for the decision may be deliberately vague to further that end. Formulations such as "Careful consideration of all the evidence leads to the conclusion that a by-pass standard of X cfs best balances the competing needs for water," without further elaboration, are incompatible with adaptive management.

Similarly, the large scientific uncertainty regarding instream flows means standards or conditions must be based on explicit conceptual models and formulated as testable hypotheses. To depend on consensus of technical experts for the parties or stakeholders in a given situation, without these elements, may be convenient for decision-makers but damaging to the resource. Consensus on conceptual models and testable hypotheses would be very useful, but if the

technical experts cannot articulate their recommendations in this way, the consensus is most likely based on non-scientific considerations, and as noted by Mangel et al.(1993) this approach has often failed:

> We believe that a principal reason for the routine overexploitation of resources is that the scientific community often fails to differentiate between science and policy, that is, to separate fact and value judgements. For example, scientists are often expected to reach "consensus" amid considerable scientific uncertainty about cause and effect. Instead of telling policy makers that they cannot accurately predict the consequences of alternative management strategies, scientists allow themselves to be forced into negotiated agreement. As a result, decision makers (usually not scientists themselves) are often not fully aware of the uncertainties and cannot be help fully accountable for the consequences of their actions.
>
> The International Whaling Commission, for example, asks its Scientific Committee to recommend catch quotas. Available information is often insufficient to determine catch levels that can be sustained, and many Scientific Committee members have different views about what should be done in the face of uncertainty; some believe that, when there is uncertainty, the benefit of the doubt should be afforded to the industry while others believe that it should be afforded to the resource. Instead of reporting the uncertainty and the possible consequences of this uncertainty to the Commission, the Committee generally has sought a "scientific consensus" that represents a middle ground. In hindsight, the consequence of attempting to reach a consensus is clear: one stock after another of the world's large whales have been driven to economic and near biological extinction.

In the current context, uncertainty in estimates of flows in small, ungaged streams is a major problem. The SWRCB has tried to address this problem through development of a rainfall-runoff model for the Russian River watershed, but the accuracy of this or any other model is fundamentally constrained by the scarcity of data on rainfall and runoff, which can be highly variable spatially in coastal watersheds. We make recommendations for addressing this problem below.

Other Types of Uncertainty and Other Factors to Consider:

Experience with fisheries management has demonstrated that uncertainty regarding non-scientific factors also needs to be taken into account for effective management, and doubtless the same is true for management of diversions from streams. Most obviously, uncertainty regarding compliance with permit conditions must be taken into account,[2] and the SWRCB should avoid allocating water to uses that would suffer seriously in dry years when permit conditions would limit diversions, unless it can assure compliance with the conditions. Uncertainty regarding future diversions under riparian rights, or expansions of diversions under appropriative rights, should be taken into account in such situations. Stated differently, effective management needs to take human motivation into account (Ludwig et al. 1993). In many situations, including the approach

[2] We appreciate the frank comments by Wagner and Bonsignore and Napa Valley Vineyard Engineering on this point.

under review, uncertainty about existing diversions under riparian or pre-1914 rights will be important, as will illegal diversions. Similarly, the SWRCB needs to consider the indirect effects of water allocations on streams. For example, if a small diversion from a headwater stream makes possible a use that will be accessed through the winter by a dirt road, then sediment from the road may have a greater effect on the stream than the diversion itself. Simply depending on other agencies to control such effects puts the puts the public trust at undue risk. Effective management needs to deal with the world as it is, not as it is supposed to be, and not as it is bounded by agency jurisdictions.

Limitations on Adaptive Management for Minor Water Rights Applications:

Water rights granted for vineyard development or other capital-intensive activities are for practical purposes irrevocable and their environmental effects should be evaluated in that light. This reduces the applicability of adaptive management to the process under review. Nevertheless, adaptive management still has a role, because much of the concern about the minor water rights applications involves cumulative impacts, so that future modification of the process for evaluating individual permits, in light of new information, can still be effective. However, the practical irrevocability of such allocations of water creates a greater need for caution than would otherwise be the case.

The practicality of effective monitoring of the efficacy of conditions on minor water rights permits also limits the applicability of adaptive management in such cases. Effective monitoring is almost always expensive, and the cost per unit of water diverted will be particularly high for small diversions. It seems to us that this difficulty can best be overcome by monitoring the effectiveness of permit conditions on a sample of diversions, with some method for spreading the cost over all diversions. Requiring inadequate monitoring of all diversions would be a waste of resources.

The need to protect high flows and flow variability:

The importance of maintaining high flows and flow variability seemed to be recognized by all parties at the workshop. We agree. There has been a spate of recent articles that emphasize the importance of variation in flow in rivers for creating and maintaining aquatic and riparian habitat and ecosystems (e.g., Ligon et al. 1995, Power 1995, Reeves et al. 1995, Sparks 1995, Power et al. 1996, Stanford et al. 1996, Wootton et al. 1996, Richter et al. 1997, Nilsson et al. 1997). As stated in the abstract of Power et al. (1996):

> Responses of rivers and river ecosystems to dams are complex and varied, as they depend on local sediment supplies, geomorphic constraints, climate, dam structure and operation, and key attributes of the biota. Therefore, "one-size-fits-all" prescriptions cannot substitute for local knowledge in developing prescriptions for dam structure and operation to protect local biodiversity. *One general principle is self-evident: that biodiversity is best protected in rivers where physical regimes are the most natural. A sufficiently natural regime of flow variation is particularly crucial for river biota and food webs.* We review our research and that of others to illustrate the ecological importance of alternating periods of low and high flow, of periodic bed scour, and of floodplain inundation and dewatering. The fluctuations regulate both the life cycles of river biota and species interactions in the food webs that sustain them. Even if the focus

> of biodiversity conservation efforts is on a target species rather than whole ecosystems, a food web perspective is necessary, because populations of any species depend critically on how their resources, prey, and potential predators also respond to environmental change. ... (Emphasis added.)

Brian Richter and his colleagues at the Nature Conservancy have developed an approach to evaluating instream flows from this point of view (Richter et al. 1996, 1997, 1998), although they acknowledge that the approach only provides a "first cut" that should be implemented in the context of adaptive management. The approach involves comparing up to 33 statistics developed from observed or simulated daily flow records for "project" and "no project" conditions, to develop and "index of hydrologic alteration," or IHA. A computer program to perform the analysis is available. The approach is strictly empirical, however.

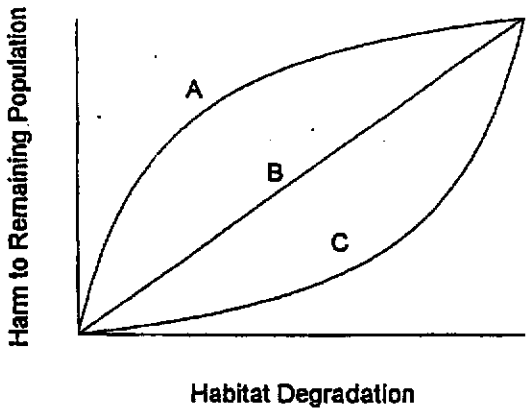
Issues of Spatial Scale:

Issues of spatial scale are important in several aspects of the problem under consideration, as emphasized by TU. As one example, flows that provide adequate depth for migration of adult salmonids or for spawning become less frequent as the drainage area decreases. As another example, the flow in a stream reflects the integrated effects of rainfall over the basin, which may be highly variable if area of the basin covers more than a few square miles, so flow in the lower reaches is less variable than flow in the smaller tributaries. Therefore, applying hydrological generalizations developed from gage data to headwater streams is perilous, since gages typically are located in the lower reaches of stream systems.

At another level, there is ordinarily a need to balance instream and consumptive uses of water.[3] This balancing needs to be conducted at an appropriate spatial scale, however, if it is to be effective. Any such balancing in Russian River tributaries, for example, must place in the balance the amount of habitat that is blocked by Warm Springs Dam or otherwise degraded. This will create equity concerns on the part of water rights applicants on less modified streams, but meeting these concerns at the expense of the remaining habitat is a recipe for environmental disaster.

The equity concern just described raises an important question: how should we regard the incremental effect of additional habitat degradation in an already degraded system? The figure below shows three conceptual alternatives: Curve A reflects the idea that if an environment is already highly degraded, then a little more damage won't hurt much. Curve B shows a linear relationship, in which the harm to remaining members of a population does not depend on the general level of degradation, while Curve C reflects the idea that a high level of degradation makes any remaining habitat even more important. Of course, these curves grossly simplify a highly complex situation, but in our experience people do tend to evaluate evidence in terms of such simple conceptual models, so it useful to make them explicit.

[3] Our impression is that where federally listed species are involved, the balancing has already been done by Cong ress, but this point may still be relevant for tributaries too small to support salmon and steelhead.



For the situation at hand, we think that Curve C is most appropriate, although it should be regarded as a rebuttable presumption. In other words, the burden should be on applicants to show that Curve C is not appropriate. One reason for this is the essentially irrevocable nature of appropriative water rights, which makes the effects of choosing the wrong curve asymmetrical. For example, if Curve A really is the correct conceptual model, then acting as if Curve C is correct and denying a permit will result in temporary economic loss, since the water could be allocated after Curve A is shown to be appropriate. On the other hand, if Curve C is correct, then the consequences of issuing permits on the assumption that Curve A is correct will be serious and cause permanent harm to the population. This kind of asymmetry of effects, together with the scientific and other types of uncertainty described above, is the basis of the "precautionary principle" for fisheries management (Cameron and Abouchar 1991; Hilborn and Peterman 1996; Gordon and Munro 1996; Richards and Maguire 1998).

Legal barriers to rational water management:

California water law is a curious patchwork that has evolved in response to changing conditions in the state. Although it is possible to understand how the law came to be as it is, the law is nevertheless ill-suited for coping with the difficult allocation problems now facing the state. To scientists such as ourselves, for example, the different legal treatment of surface water and groundwater is fundamentally irrational and seriously compromises the state's ability to deal with its water problems. This is true at the state-wide scale at which we are currently advising CALFED, and it is also true at the scale of minor tributaries of the Russian River. The Public

Trust Doctrine provides the SWRCB with a powerful tool for accommodating appropriative water rights with protection of the public trust. However, demand in an area may be supplied partly by surface water diverted under riparian rights, partly by surface water diverted under appropriative rights, partly by "small domestic" certificates,[4] and partly by pumping of groundwater that is non-jurisdictional but is hydrologically linked to the surface streams. In such cases, developing rational and equitable conditions to impose on the exercise of appropriative rights is a task that we do not envy. The SWRCB is, in effect, working with one foot and one hand tied behind its back. Especially given the presence of listed species in a basin, the inability of the state to control effectively all water use within a basin means that even greater caution should be exercised regarding water use that the SWRCB can control than might otherwise be the case.

Existing unauthorized diversions:

The presence of many unauthorized diversions, some of long standing, creates a dilemma for the SWRCB. On the one hand, effective government depends upon the consent of the governed, and taking too strong a position against people who honestly do not realize that they need a permit for their diversions is likely to be counterproductive. On the other hand, taking too weak a position invites non-compliance, and deals with the problem at the expense of the public trust. We are not confident that there is a good resolution to this dilemma, but a vigorous program to identify unauthorized diversions and bring them into the water rights process would be an important step in the right direction. If the problem is ignored it will only get worse.

3. General comments on approaches discussed:

The SWRCB staff is attempting to develop an approach that, when embodied into permit conditions, will allow for a finding that the project in question will not have a significant effect on the environment. Under the ESA, harm to listed species is by definition a significant effect, so for the Russian River basin the approach must also allow for a finding that the project will not harm coho salmon or steelhead. Given the depressed condition of the populations of salmon and steelhead in the basin and the our limited knowledge of these fish and the ecosystems that support them, a finding of "no harm" can only mean that there is an acceptably low risk of a significant effect on the environment or harm to listed species. Reasonable people can differ in their assessment of what is an acceptable risk of harm. We emphasize, however, that given the condition of the stocks, the "reasonable range" of assessments includes the view that the Russian River and its tributaries are already over-appropriated, that existing diversions should be cut back, and that no new diversions should be allowed.

Although the condition of coho and steelhead populations the Russian River basin and elsewhere in California justifies particular attention to the effects of water diversions on these species, it bears emphasizing that the need for protection does not end with anadromous fish. In regions with Mediterranean climates, much of the drainage network is composed of intermittent headwater streams that flow seasonally. These channels support a distinct biota that has received

[4] Individual small domestic diversions can adversely affect very small tributaries even when they are not abused, and we suspect that abuse is not uncommon. Small domestic diversions also raise serious concerns regarding cumulative impacts. We think § 1228 et seq. of the Water Code should be reconsidered.

little attention, but deserves protection in its own right.[5] The seasonal streams may be particularly important for the breeding by amphibians (especially frogs), which are declining worldwide.

Such channels also convey water, sediment, organisms, organic litter, and large woody debris to perennial reaches downstream. As noted in Welsh et al. (2000), at the conclusion of a discussion of the critical role of large woody debris for pool formation:

> ... In a natural stream with intact riparian forests, a large proportion of these logs would enter streams from the highest channels in the stream network ... during large storm events (Sedell et al. 1998). Because they provide large woody debris and a variety of sediment types, headwater or first-order stream channels strongly influence the type and quality of downstream fish habitat (Sedell et al. 1998). Stated succinctly, "Reaches that are themselves inhospitable to salmonids may contribute to the maintenance of salmonid populations downstream" (G. Reeves in Reid 1998).

The ecological linkages between small headwater streams and the larger streams farther down the watershed mirrors the cumulative impact problem with minor diversions. Just as small headwater streams combine to form the larger streams that support anadromous fish, so many small diversions, which individually may be inconsequential, can combine to contribute substantially to the degradation of the stream system as a whole.

In some cases seasonal streams are even used directly by anadromous fish. For example, Trush (1991) observed that steelhead trout may ascend seasonal streams during winter freshets, spawn, and descend before flows drop below the minimum level for adult passage Their eggs hatch and the alevins emerge and migrate downstream in the spring before the channel dries up. Some juvenile chinook salmon in the Sacramento drainage also use seasonal tributaries for rearing habitat, and the same may be true of steelhead and coho salmon in the coastal streams.

Although most consideration has been given to steelhead and coho adults and to flows needed for spawning, winter habitat for juveniles is a major factor limiting recruitment for coho in coastal streams in Oregon (Nickelson et al. 1992) and British Columbia (McMahon and Hartman 1989; Hartman et al. 1996). The importance of winter habitat for juveniles in California is poorly understood but it clearly deserves more attention than it has received.

Finally, It seems to us that applying a single, "one size fits all" approach to instream flow standards for Russian River tributaries and other headwater streams in coastal watersheds is ill advised. The more general the approach, the more margin for error is required to support a finding of no significant effect. At the least, a distinction should be made between diversions from perennial streams or seasonal streams that carry continuous flow for part of the rainy season in most years, on one hand, and ephemeral streams or swales that flow only during or shortly after storms on the other. We discuss these separately below.

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[5] See Gasith and Resh (1999) and Welsh et al. (2000) for recent reviews.

4. Proposed conditions on diversions from perennial or seasonal streams:

Summary of proposals:

The SWRCB staff proposed standard conditions that include three restrictions on diversions: (1) the season of diversion is restricted to December 15 to March 31; (2) the maximum rate of diversion is restricted, as determined on a case-by-case basis; and (3) diversions must allow a by-pass flow of 60% of the estimated mean annual unimpaired flow at the site. SWRCB permit terms in the Navarro watershed also include the provision that water diverted under claim of riparian rights not be used in the same area as water diverted under the permit, and we understand that this fourth constraint would apply elsewhere as well. NMFS agrees with the general form of the SWRCB staff proposal and the proposed season of diversion, but maintains that the by-pass standard should be the February median daily unimpaired flow, and that total diversions from a stream be limited to 20% of the 20% exceedence flow. TU also finds the basic form of the staff proposal and the season of diversion acceptable, but proposed that the by-pass flow be the 10% exceedence flow (90th percentile) daily unimpaired flow, that by-pass flows allow a minimum passage depth of 0.8 to 1.0 ft, and that total diversions from a stream not advance the recession of storm hydrographs to the by-pass flow by more than 0.5 to 2 days, depending on the size of the watershed. Wagner and Bonsignore and Napa Valley Vineyard Engineering also found the basic form of the staff recommendation acceptable, although impractical and overly burdensome in some specifics. At the workshop, there seemed to be convergence of opinion toward the general limit to total diversions proposed by NMFS.[6] In summary, there is agreement regarding the basic approach, but differences regarding several of the specifics of its implementation.

We are not persuaded that it is wise to issue any new permits until effective recovery programs for coho salmon and steelhead are in place, but with that caveat we also find the general form of the approach acceptable, and agree that a hydrologically-based approach is reasonable provided that the hydrological criteria are explicitly linked to biological criteria by testable hypotheses. The form of the NMFS proposal for limiting total diversions seems reasonable, although we have not evaluated the specific criterion that NMFS has proposed. Effective implementation of this approach would require knowledge of all existing legal and illegal diversions, however, for which data are largely lacking at present. We also agree with NMFS that negative declarations are inappropriate for proposals for impoundments on perennial or seasonal streams. Such impoundments are likely to have a significant effect on the environment, even if conditions requiring by-pass flows are made part of the permit. Apart from concerns regarding compliance with by-pass requirements, such impoundments will drown stream habitat that has ecological value even if it does not support fish, and will effect other stream habitat by interfering with the migration of organisms and downstream movement of sediment and organic matter as well as water. We also agree with TU that a separate minimum depth criterion may be necessary, particularly for smaller streams.

SWRCB staff proposal for by-pass standards:

The 60% mean annual flow by-pass flow proposed by the SWRCB staff is based largely several PHABSIM studies that indicate that 60% of the mean annual flow will provide 80% of "weighted usable area" (WUA) for coho and steelhead spawning. During the workshop, the SWRCB staff clarified that their proposed by-pass flow is intended to allow for substantial

[6] This approach is detailed in pp. 28-29 in NMFS (2000).

spawning, and not just to provide holding habitat between high flow events during which spawning might take place.

In form, this recommendation is close to what we think is needed. That is, there is a biological objective, and the approach is based on a conceptual model (which underlies PHABSIM) that can easily be formulated as testable hypotheses. We cannot endorse this standard, however, for several reasons, some of them raised in comments by NMFS and TU. A first reason concerns scale effects: some minimum depth is required for adult passage and spawning, but the depth provided by some fixed percentage of the mean annual flow will decrease with the watershed area. Accordingly, applying the results of studies on relatively larger streams to smaller ones is dubious. A second reason concerns the uncertainty associated with the results of any method for estimating spawning habitat, and the presumed dome-shaped relation between flow and spawning habitat in a given stream. Even if PHABSIM results involved relatively little uncertainty, small underestimates of the flow that would produce 80% of maximum spawning habitat could produce relatively large reductions in the actual spawning habitat, particularly because the flow-habitat curves tend to be steeper to the left of the selected point.[7] In other words, the SWRCB staff approach does not provide an appropriate margin for error.

More seriously, the uncertainty in the results of PHABSIM studies is very large. PHABSIM is based on the premises that habitat value of a point in a stream can be described in terms of the depth, water velocity, and the substrate, and that the area of a reach of stream with given values of depth, velocity and substrate can be estimated using hydraulic models. The descriptions are based on "preference" or "suitability" curves that vary between 0 and 1 as a function of depth, velocity, and substrate, using different curves for different life stages. The hydraulic modeling is normally done with one-dimensional models, which describe the stream in terms of a set of transects, as was the case with the studies cited. Problems with PHABSIM using one-dimensional hydraulic modeling are described by Williams (1996) and Kondolf et al. (in press, attached as an appendix), and references cited therein. Briefly, there is a good deal of uncertainty in model results at the transects, and much more uncertainty from extending results at the transects to the rest of the stream. In terms of spawning, there is a clear additional problem with the conceptual model underlying PHABSIM: salmonids select spawning sites partially in terms of "hyporheic" or subsurface flow, so depth, velocity and substrate do not adequately describe spawning habitat.

In short, we believe that the PHABSIM studies cited by the SWRCB staff report do not provide an appropriate basis for by-pass conditions or flow standards, so the 60% criterion is essentially arbitrary. This does not mean that the 60% criterion is necessarily wrong, but rather that it lacks a suitable proximate rationale against which it could be judged. It seemed to us, however, that the discussions in the workshop and in the NMFS comments (p. 16) raised serious questions about the adequacy of the 60% criterion to avoid harm to spawning by steelhead and coho salmon, especially in smaller tributaries.

Finally, as noted above, we are concerned about the uncertainty in estimates of mean annual flow (or estimates of any point on the flow-duration curve) from the streamflow simulation model, that is proposed for use as part of the SWRCB staff approach. Probably a good deal of

[7] See Figure 4.1-2 in Attachment B to SWRCB (1997) for an example.

this uncertainty is unavoidable; precipitation in mountainous areas is highly variable temporally and spatially, and gages tend to be concentrated in more populated areas at lower elevation and relief. Measurements of stream flow from gage data are more accurate than estimates of areally-averaged precipitation, but 95% confidence intervals for flow measurements at gages are probably about +/- 5%, so even with measured data there is some uncertainty. Although we are not rainfall-runoff experts and have not carefully reviewed the model, it also seems to us that uncertainty in the estimates will increase as the size of the basin under consideration decreases, so the tests of the model presented in the SWRCB's 1997 Russian River Watershed Staff Report (errors of 7.6 and 10.3%) most likely underestimate the errors that should be expected when the model is applied to smaller areas.[8]

NMFS Proposal:

The February-median flow by-pass standard proposed by NMFS is based on two considerations: that more flow (within some limit) provides more spawning habitat, on the one hand, and that the flow must be sustained for a considerable period for the spawning to be successful, on the other. NMFS finds that the February-median flow is an easily defined criterion that reasonably balances these considerations, or in other words that the median February flow approximates the flow that will maximize the habitat in which coho salmon and steelhead can successfully spawn. NMFS also assumes that maximizing the effective spawning habitat will maximize production of steelhead and coho salmon (i.e., survival of juveniles is not strongly density-dependent, at least given current population levels). These assumptions can easily be cast as hypotheses, so the NMFS proposal is consistent with the form that we recommend. The first hypothesis, that the February median flow approximates the flow that maximizes effective spawning habitat, would be much easier to test than the second.

The NMFS criterion is more conservative than the 60% of mean annual flow standard proposed by SWRCB staff, and as noted above a more conservative approach is appropriate. Given the status of salmon and steelhead in the Russian River basin, and the absence of a realistic recovery plan, it is reasonable to maintain maximum spawning habitat in tributaries that do or could support these fishes, until good evidence is developed to show that less spawning habitat is required. This is particularly appropriate for an approach that is intended to allow for use of negative declarations under CEQA,.

NMFS also proposes that the cumulative diversion at any point on a stream not exceed 20% of the "winter 20% exceedence flow," following a procedure outlined at p. 28 in their comments, for which "winter" means December 15 to March 15. As noted above, there seemed to be convergence towards this approach in discussion at the workshop, and with the caveat noted

[8] We are also concerned by the statement at the end of Section 5 in Attachment A of the Staff Report that the model results were more variable when it was used with rainfall and runoff data for the same period (e.g., 1961-1981 for Macama Creek). We are not sure we that understand this statement, but it raises questions in our minds about the model testing. We also do not understand why the model tends to shift peaks in the average weekly flow data forward in time, especially later in the year (Figures 5 and 6 in Attachment A to SWRCB 1997) but this raises more questions. It seems to us that the model is really more of an empirical model than a physically-based model, and that explicitly empirical regression models might do as well or better for the intended use.

above it seems reasonable to us, although we have not done independent analyses of the specific criterion. Presumably NMFS agrees with the SWRCB staff that the maximum rate for individual diversions should be determined on a case by case basis.

Trout Unlimited Proposal:

The proposal by Trout Unlimited (TU) is also described in terms of hydrology, although two of the three criteria proposed are explicitly linked to biology. As described in the 1/10/00 letter from Bill Trush to Jerry Johns, TU proposes that:

> (1) "No streamflow between December 15 and March 31 should be diverted below a stage height equivalent to the 10% daily average flow exceedence (p) on an unimpaired daily average flow duration curve."
>
> (2) By-pass flows should allow a minimum passage depth of 0.8 to 1.0 ft (which will be more restrictive than (1) in smaller watersheds).
>
> (3) In any stream, diversions should not advance the recession of storm hydrographs to the base flow determined (1) or (2) by more than 0.5 to 2 days, depending on the size of the watershed.

According to Trush's letter of 1/10/00, criterion 1 is "...associated with an hydraulic break in the channel's hydraulic geometry and is readily identified in the field as a morphologically distinct inner channel." This is also described as the "active channel" in the McBain and Trush commentary of 3/12/98, identifiable by "(1) the lower limit of rooted mature white alders, (2) the crest of an abrupt berm along the outer margin of bars, and (3) a bench of finer alluvium along glide and riffle margins." The commentary also summarizes observations regarding use of the active channel by steelhead from Trush's graduate research (Trush 1991). Criterion (2), regarding depth of flow, would be converted to a specific discharge by means of a relationship between depth and drainage area that Trush is developing under a contract with NMFS.

A basic difficulty with the TU proposal is that criteria (1) and (2) are based upon observations that have not been described in the peer- reviewed literature, and have not been subjected to ordinary professional scrutiny. We have reviewed materials provided to us by Trush (Trush 1991, Trush undated) and find that they would not persuade a skeptical reader that there is a morphologically distinct inner channel that is corresponds to the area occupied by the 10% exceedence flow in his study area, Elder Creek. Such an inner-channel may well exist, but the evidence for it has not yet been presented effectively. In any event, the generality of Trush's Elder Creek observations would need to be established before they would provide a reasonable basis for regulation.[9]

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[9] The active channel shelf feature identified reported by McBain and Trush (1998) and Trush (1991) has been reported from other river systems in the peer-reviewed literature. As noted in Trush (1991), Osterkamp and Hedman (1977:256) described the active channel shelf as:

> ...a short-term geomorphic feature subject to change by prevailing discharges. The upper limit is defined by a break in the relatively steep bank slope of the active channel to a more gently sloping

TU's third criterion raises an important point that should be considered before a specific total limit on diversions in the form proposed by NMFS is adopted; diversions will reduce the duration of flows greater than the by-pass standard, as well as the magnitude of such flows. With a small enough storm, a diversion could remove a flow pulse entirely, so the criterion as proposed may not be workable, but we think this point should be evaluated in some quantitative way, for example by use of the IHA software (Richter et al. 1996; 1997), as well as by visual evaluation of "with project" and "without project" hydrographs.[10]

5. Proposed Impoundments on ephemeral streams or swales:

For the reasons described above, the SWRCB staff should use caution and judgement in approving impoundments on ephemeral streams,[11] but in many situations this may be acceptable,

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surface beyond the channel edge. The break in slope normally coincides with the lower limit of permanent vegetation so that the two features, individually or in combination, define the active channel reference level.

While the features appear to be the same, the frequencies of inundation are reported to be rather different. From a study of channel geometry at 70 gauging stations on mostly intermittent or ephemeral streams in the semi-arid western US, Hedman and Osterkamp (1982:3-4) reported these relations between the active channel and flow regime:

> At most perennial and intermittent streams the active channel level is exposed between 75 and 94 percent of the time. The active-channel level of many ephemeral streams may be exposed more than 99 percent of the time. The stage corresponding to mean discharge of most perennial streams approximates that of the active-channel level ... but is lower than the active channel level of the highly ephemeral stream channels...

In the (perennial) Passage Creek drainage basin in Virginia, Hupp and Osterkamp (1986) found that the active channel shelf was inundated between 5-25% of the time, and supported a riparian-shrub forest.

Thus, while the association of the active channel feature with the 10% exceedence level in north coastal California channels proposed by Trush is plausible, results in the published literature suggest considerable variation in the percentage of time that the active channel shelf is inundated. Scale issues are important. As shown by Hupp (1986), as one goes headward along a drainage, features like the floodplain and then the active channel shelf disappear completely. Thus, the relevance of the 'active channel' in headwater streams needs to be confirmed before being adopted as a basis for establishing instream flows there. At the least, the applicability. of the return periods and exceedence levels observed on larger channels to headwater channels is questionable. As Trush (1991) pointed out, "The case study of Elder Creek main channel morphology and steelhead spawning ecology has a sample size of one. Conclusions derived from monitoring and hypothesis testing cannot be statistically extrapolated to other drainage's or to tributaries within the Elder Creek Watershed" (p. 72).

Kondolf and Williams have observed the active channel shelf feature on many coastal California streams, but in some cases it was clearly the result of deposition of debris flow material brought in by steep tributaries. It is not clear to us why such deposits should be related to any particular point on a flow-duration curve, rather than the particular conditions existing just after the debris flow.

[10] People tend to underestimate differences represented by a pair of sloping lines because the normal distance between the lines is much easier to see than the more significant vertical and horizontal distances.

[11] We recognize that the SWRCB does not have jurisdiction over impoundments that capture "diffuse surface waters."

and in some cases it may be necessary to allow storage from diversions from larger seasonal or perennial streams. We agree with the suggestion made by CDFG during the workshop that there must be a limit to the percentage of a watershed controlled by impoundments, although there remains the question from which point to calculate this percentage. Clearly, 100% of the watershed above each impoundment will be so controlled, and the percentage will decrease moving downstream from each dam, unless there is a confluence with a more heavily regulated stream. Probably there is no rigid formula that will make sense in all cases. One possible approach would be to specify the limit in terms of a percentage of the watershed of first order streams, with recognition that there will be areas, for example swales that drain directly into second or higher order streams, to which this formula would not sensibly apply. The effects of these impoundments on high flows downstream should also be taken into account in estimates of total diversions and limits on cumulative diversions.

We recommend that impoundments only be permitted under negative declarations only when "fill and spill" operation is acceptable, so that permit compliance issues are minimized.[12] More flexibility regarding the season of diversion may also be appropriate for such cases, so that the effects of different diversions can be distributed temporally.

Additionally, we recommend a requirement that impoundments be emptied annually, for two reasons. The first and most important reason is that perennial ponds provide habitat for exotic species such as bullfrogs. The danger from these exotics far outweighs any incidental or opportunistic use of such ponds by native species, including listed natives. Secondly, a requirement that ponds be emptied will greatly facilitate compliance monitoring; a pond will either be effectively empty before the allowed season of diversion, or it will not.

6. Minimum level of analysis:

Even with conservative bypass standards, field investigations will always be necessary to provide the information necessary for a Negative Declaration. More importantly, the SWRCB can learn whether its permit conditions adequately protect public trust resources only if it has information regarding current conditions to which future conditions can be compared. We recommend that one set of field investigations be used for both purposes. We have reviewed the negative declarations prepared for several Navarro River and Russian River applications, and find that the level of analysis is less than is needed. Although any rigid formula for field investigations is likely to be burdensome for some cases and inadequate for others, we think a typical field investigation probably should include the following:

Reconnaissance survey: After inspecting topographic maps and recent aerial photography,[13] SWRCB staff or DFG staff should walk the channel from the project site downstream to the confluence with a substantially larger stream (unless the diversion is directly from a stream known to be easily accessible to salmonids) to detect and evaluate unusual conditions that call for special

[12] For example, we are concerned about compliance problems with by-pass conditions such as those proposed for Application No. 29711, because it appears that inflow to the impoundment will be much less than capacity in dry years, when the need for the water will be greatest.

[13] Aerial photography is readily available from commercial sources, and applicants should be required to submit images of the project area and the affected reach of stream as part of the application.

treatment. For example, a waterfall that partially blocks fish migration may make upstream diversions even of high flows problematic, since the high flows may be needed to allow passage over the barrier. We realize that securing access may be a problem, but this burden can be placed on the applicant. We do not see how a finding of no significant impact can be made if the affected reach of stream cannot be inspected.

Photodocumentation: Channel conditions should be recorded by photographs showing both typical and unusual conditions. The photographs should be annotated using notes made during the reconnaissance or other field visits.

Discharge measurements: SWRCB or CDFG staff should measure the discharge in the stream whenever they visit a project site. Even one or a few discharge measurements can provide an important check on calculated estimates of flow. If the discharge is less than about 3/4th to 1 cfs the measurement should be make using a portable flume; if it is larger, current meters should be used. Measurements made between storms during the season of diversion will be most valuable, and if possible field visits should be scheduled to allow for them.

Channel characteristics: SWRCB staff should characterize the channel geometry near the project site and downstream. This should include sketched channel transects, with dimensions estimated using a staff or tape, measurements of slope[14], and estimates of channel roughness. These should be used to estimate stage over a range of discharges, to provide a check on the plausibility of calculated estimates of flow at the site, and to provide a baseline description of the channel to allow for future assessments.[15] If there are sites such as bridges that provide convenient sites for future measurements that can show incision or aggradation, then more care should be taken in depicting the transect accurately at these sites. Channel substrate should be described, using quantitative methods such as pebble counts (Kondolf 1997) where they are appropriate..

Vegetation: Vegetation in the project area, especially riparian vegetation, should be characterized and common species should be listed. Exposed roots or drowned trees that reflect channel incision or aggradation should be recorded, as should stands of even-age riparian trees, the elevation of flood scars on riparian trees, or other features that provide evidence regarding stream processes.

Characterization of aquatic fauna: Perennial stream should be examined at least twice, once in late summer at minimum flow and once in winter when spawning salmonids are likely to be present. Seasonal streams should be examined in late winter or early spring. The wetness or dryness of the year should be taken into account.[16] Direct sampling of fish (e.g., electrofishing) should be used if possible; at the least observations should be made of the presence or absence of

[14] Adequate measurements of slope can be with a hand level in steeper streams (say >2% slope), but an auto level should be used for streams with lower slopes; the slope should be measured over a distance of at least 10 channel widths.

[15] Problems with simple before/after comparisons, described in Schmitt and Osenberg (1996), need to be kept firmly in mind, but probably there is no practical way to avoid them in the present context.

[16] Ideally, streams should be inspected twice in both wet and dry years. As an alternative, appropriately sized streams in the same area could be inspected in a space for time substitution.

fish (species if possible), presence of redds, or other evidence of fish using the steam. Presence of amphibians (adults and larvae) should also be noted. Invertebrate communities should be characterized using CDFG's rapid bioassessment procedure or some other procedure that identifies the abundances of major aquatic taxa. It is important that careful, standardized notes be taken at each note, preferably on a special form.

The success of field investigations depends critically upon the skill, experience and attitude of the investigator. No methodology, procedures, checklists or forms to fill out can substitute for the ability to "read" streams and associated landforms. Similar skills are required to assess whether the proposed diversion as constrained by the by-pass conditions makes economic sense, or whether there will be an unacceptably large motivation to cheat. Essentially this means that to be successful, the SWRCB must be able to maintain competent staff and provide for their continuing education.

In the negative declaration, the analysis of the amount of water available at the site should be reported in enough detail (probably in an appendix) to allow others to repeat the calculations, and should describe the assumptions of the method used and how well the assumptions are met at the site in question. Put differently, in order that the assumptions of the method be testable, the method used needs to be described well enough that it can be checked against discharge measurements in the stream, should such measurements be made in the future. In any event, the main body of the study should include an assessment of the likely accuracy of the reported estimates, and field conditions should be used to check the plausibility of the estimates.[17] The analysis should also include a discussion of the availability of water during severe drought as well as of a typical dry year, since the project is most likely to have a significant effect on the environment during severe droughts, and uncertainty regarding compliance with permit conditions will also be greatest.

7. Comments on monitoring and research:

Estimates of the flows that should be expected in ungaged tributaries is a major source of uncertainty that could be reduced substantially by a well-designed monitoring and research program. Developing the design for such a program is beyond the scope of this review, and should involve knowledgeable people for agencies such as the USGS, NRCS, DWR, and county or local agencies, as well as academics. The SWRCB should take the initiative in promoting the design and implementation of such a program, and it should be willing to exercise its power to re-

[17] We are concerned about the methods used in the Navarro River basin negative declarations to estimate the amount of water available at the project sites. Without data, no method will be very accurate, so it is appropriate to use a simple method. Making reasonable estimates with such methods requires considerable skill knowledge and experience with the region in question, to guide selection of parameters for the model; simply plugging in numbers for a table can lead to gross errors. It is also important that the method not be biased. The initial studies refer to the Rational Method, which is intended to predict peak flows. It is not clear to us what method was used for estimating average annual flows. Unfortunately, such methods for predicting peak flows are intended for sizing culverts or similar applications where the harm from underestimates is much greater than the harm from overestimates, so the methods are biased high. For estimating the amount of water available for appropriation, or the amount that will be left in the stream, a bias in the opposite sense is appropriate.

open existing permits to add conditions needed for implementing the program. Future permits should include requirements for collecting and reporting precipitation and flow data, although the specific requirements should be tailored to individual cases.[18]

Since making assessments of the availability of water for proposed projects is a routine part of the SWRCB's work, however, the SWRCB should have strong in-house expertise in this area. Based on the SWRCB documents that we have reviewed, this expertise is currently lacking. Therefore, we recommend that the SWRCB create a staff position at a sufficiently high level to attract an individual with demonstrated knowledge and experience in this area. This person would also represent the SWRCB in the development of the coordinated monitoring and research program described above, and participate actively in its implementation.

As with hydrological uncertainty, research and monitoring intended to address the biological uncertainties involved in assessments of the effects of water diversions should be coordinated with other efforts, if this is possible. A better understanding of the biology of coho salmon, steelhead, and the coastal streams that support them is also needed to address important issues regarding timber harvest, for example, and this understanding could best be developed by a coordinated effort. Again, scientists from various agencies and from universities should to be involved, but the SWRCB can and should work for the creation of such a coordinated program.

Four biological topics stand out as requiring particular attention for testing the hypotheses implicit in the NMFS approach to conditioning permits and for reducing uncertainty about the environmental effects of diversions with such conditions: the use of streams by coho salmon and steelhead as spawning habitat; the nature of density-dependent mortality among juvenile salmon and steelhead; the use of streams as winter rearing habitat by these fishes, and characterization of ecosystems in seasonal or small perennial streams.

Trush's (1991) observations of steelhead spawning in Elder Creek, combined with geomorphically informed attention to channel conditions, exemplify the kind of work that is needed regarding spawning habitat. These need to be repeated in other streams, however, particularly because there is now greater awareness of the importance of hyporheic flow as an aspect of salmonid spawning habitat.

Observational studies are also needed of the use of winter rearing habitat by juvenile coho and steelhead. Studies of winter habitat use by salmonids in other areas should provide conceptual models and hypotheses to be tested in coastal California, but streams here are typically warmer in the winter and this should be taken into account. Winter habitat as been identified as a factor limiting survival of juvenile coho, so this topic overlaps with the general issue of density-dependent mortality among juvenile salmon and steelhead. This is a difficult issue but strong density-dependent mortality in the fry life stage has been demonstrated in anadromous brown trout (Elliott 1994), so the assumed lack of strong density-dependent mortality underlying the NMFS proposal needs to be examined carefully.

[18] A fee to help cover costs of the monitoring program could be substituted for data collection in some cases, especially in areas for which other data are available.

Studies of the ecosystems of seasonal and small perennial streams should be guided by the conceptual models and hypotheses that are already in the literature (e.g., Gasith and Resh (1999) and Welsh et al. (2000)), but there is also a basic need for simply characterizing the biota.

8. Summary and Recommendations

1. There is substantial uncertainty regarding the conditions needed to allow recovery of coho salmon and steelhead populations in coastal watersheds in California, and regarding the flow regime needed to maintain ecosystems in small headwater streams. There is also substantial uncertainty in estimates of the expected flow in streams at project sites, and about the actual effectiveness of mitigation measures prescribed by water right permits.

2. The historical decline and current status of coho salmon and steelhead populations, the pervasive modification of aquatic habitats in coastal watersheds in California, the unknown cumulative effects of legal and illegal diversions, and the scarcity of basic data on headwater streams are sufficient reasons to justify deferring approval of any new water rights, particularly in the Russian River watershed, until information is developed that shows that the diversions can be conditioned to avoid unacceptable risk of harm to listed species or other public trust resources.

3. If SWRCB feels obligated to approve diversions from seasonal or perennial streams using negative declarations, despite incomplete knowledge of both local and cumulative impacts of the diversions, we suggest using the NMFS approach, with the addition of a separate depth criterion for smaller streams that are used by anadromous fishes, and with consideration of the effects of diversions on the duration of high flows. In doing this, the SWRCB should confront uncertainty and pursue adaptive management by:

- Basing by-pass standards and flow requirements on clearly defined objectives;
- Using biological and hydrological criteria that can expressed as testable hypotheses;
- Requiring a monitoring program that can test the hypotheses; and
- Modifying standards in light of new information.

4. Impoundments should not be approved on seasonal or perennial streams using negative declarations. Impoundments should be approved on ephemeral streams using negative declarations only where a "fill and spill" approach is acceptable, and the impoundments should be emptied annually to control exotic species, especially bullfrogs.

5. The SWRCB should work with other state, federal and local agencies and academic institutions to promote improved hydrological and biological data collection and research to reduce the uncertainties identified above, and to test the hypotheses underlying management decisions and permit conditions. The SWRCB should develop a process whereby monitoring that is intensive enough to be effective can be focused on selected sites. The SWRCB should develop greater in-house expertise in estimating flow at the sites of proposed projects.

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Abstract

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Attachment 1
to
Fish Bypass Flows for Coastal Watersheds

A review of proposed approaches for the State Water Resources Control Board
Peter B. Moyle and G. Mathias Kondolf

Measuring and Modeling the Hydraulic Environment for Assessing Instream Flows

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Abstract

Detailed measurements of depth and velocity in natural channels, although rare, show that the velocity fields are complex and irregular even in streams with moderate gradients and gravel substrates. This complexity poses a challenge for instream flow studies, most of which use PHABSIM, a set of computer models that combine the results of hydraulic modeling, estimates of channel substrate or cover, and habitat suitability criteria to compute weighted usable area (WUA), an index of habitat. Some recent studies have replaced the transect-based one-dimensional (1-D) hydraulic modeling in PHABSIM with 2-D models that allow better definition of the depth and velocity fields in the modeled stream reach. The accuracy of the estimates as a function of channel geometry and data collection effort remains unclear, however, as does the utility of the estimates for evaluating instream flow needs. Here we review the assumptions, accuracy and precision of hydraulic modeling and of the measurements that provide input data for the models, and consider some implications of the consequent limitations of hydraulic modeling for describing fish habitat and assessing instream flows. Highly accurate hydraulic modeling seems unfeasible for streams with complex channel geometry, and in any event practical hydraulic modeling cannot resolve flow patterns at the short length scales at which fish often respond to the hydraulic environment. Information on depth, velocity, and substrate is important for assessing instream flows, but information developed from hydraulic models should be treated with great caution and is not a substitute for biological understanding.

Detailed measurements of depth and velocity in natural channels are rare, but those that do exist show that the velocity fields are complex and irregular, often with significant cross-stream components (Dietrich and Smith 1983, Petit 1987, Whiting and Dietrich 1991; Larsen 1995; Whiting 1997). This complexity in the flow patterns in natural channels poses a challenge for methods of assessing instream flows that depend upon hydraulic modeling, such as the Physical Habitat Simulation Model (PHABSIM).

PHABSIM consists of a set of computer models that combine hydraulic and biological models to evaluate the habitat value of a reach of stream for a given fish species and life stage. The weighted sum of calculated habitat values for the reach is expressed as "weighted usable area" (WUA), which is taken to represent the "living space" available for the organism; water quality and temperature are evaluated separately. PHABSIM is widely used in North America as a tool to quantify the biological effects of alternations in flow regimes or the relative habitat benefits of different flow release regimes from reservoirs (Reiser et al. 1989), and has increasingly been applied overseas as well, either directly or in modified form (Jowett 1989; Pouilly et al. 1995). PHABSIM has even been used to evaluate the instream flow needs of blue ducks (*Hymenolaimus malacorhynchos*), which forage for invertebrates in steep, boulder-bedded upland streams of New Zealand (Collier and Wakelin 1996). However, the hydraulic and biological aspects of PHABSIM have also been the subject of continuing criticism (e.g., Marthur et al. 1985; Shrivell 1986, 1994; Osborne et al. 1988; Gan and McMahon 1990; Elliott 1994; Castleberry et al. 1996; Ghanem et al. 1996; Heggenes 1996; Williams 1996; Lamouroux et al. 1998).

In this paper, we consider the adequacy of hydraulic models in general, and PHABSIM in particular, for making predictions of the depth and velocity fields in natural rivers that are useful

for assessing instream flows. We begin with data from the literature that demonstrate the complexity of the depth and velocity fields in natural steams. We then consider the sampling and measurement problems associated with developing data for modeling the flow fields in natural channels, or for describing the flow fields empirically . We next consider modeling approaches, given practical restrictions on data collection. Finally, we consider some biological aspects of the problem, and offer some recommendations. We confine ourselves to the problem of estimating the habitat value of a stream for a single species and life stage of fish, although we recognize the inadequacy of that perspective for real environmental protection. We do not consider recently reported hydrologically-based methods for assessing instream flow regimes (Richter et al. 1996, Richter et al. 1997); these appear promising, but do not explicitly link physical characteristics of channels to flows or biological habitats.

Depth and Velocity Fields in Natural Streams

The data of Whiting and Dietrich (1991) illustrate the complexity of patterns in natural channels. They took detailed measurements on Solfatara Creek, a 5-m-wide gravel bed stream draining 62 km^2 in Yellowstone National Park, Wyoming. The 20 m-long study reach was located downstream of a bend, where the creek flows over and around a mid-channel bar; the substrate is coarse sand to medium gravel, and the average channel slope is 0.001 (Figure 1). Measurements were made at about one-third bankfull stage, using an array of small current meters suspended from a portable wooden bridge, across eleven cross sections spaced 2 m apart.

Although the stream appears relatively tranquil at this discharge, the velocity field is quite complex (Figure 2), displaying large variations vertically and horizontally within a given section, as well as between closely spaced sections. The large variation in channel form and velocity

distributions from one section to the next, despite the close spacing of the sections, illustrates the spatial sampling problems inherent in any transect-based methods for evaluating instream flows. Results would vary substantially depending on the precise location of transects. Spatial sampling problems would be even more severe in steeper streams with larger substrate.

The measured velocity fields show that vertical velocity profiles often deviate substantially from the logarithmic profile commonly assumed (Figure 2), as has been noted elsewhere (e.g., Dingman 1989, Beebe 1996); in particular, the highest velocities are sometimes near the bed (e.g., cross sections 1 and 2). This implies that measurements of velocity at 0.6 depth may give only an approximation of the true column velocity. To illustrate this point, we obtained data for eight of the sections or transects shown in Figure 2 (not all data are available because of a storage media failure) and compared the vertically averaged velocity computed from measurements spaced 5 cm or less apart with the velocity at 0.6 depth (Figure 3). The velocity at 0.6 depth overestimates the vertically averaged velocity in most cases (the median difference is about +6%), but underestimates the vertically averaged velocity by almost 60% at some verticals in Section 10, where the flow deepens after passing over a mid-channel bar. In steep streams with large roughness elements, flow patterns would be even more complex. It may be possible to model the spatially averaged vertical velocity gradient in such streams (Wiberg and Smith 1991), but only if the stream is straight and the roughness elements are distributed approximately randomly, i.e., not organized into bars. These conditions are fairly restrictive, and as is often noted in discussions of instream flows, fish do not live in averages.

Details of the flow can vary in important ways even where general patterns are similar. This is illustrated in Sections 1-4, which have approximately the same shape and general lateral

distributions of velocity, with higher velocity in the deeper part of the channel. Yet, the velocity gradients are quite different in Sections 1 and 2 compared to Sections 3 and 4. At Sections 1 and 2, the vertical gradient is almost nonexistent near the outside of the bend, but then becomes very steep under the high velocity core, which is near the bottom. Such steep gradients do not occur at Sections 3 and 4. If velocity gradients are important for fish, as indicated by the literature (e.g., Jenkins 1969; Bachman 1984; Heggenes 1994, 1996), then such differences would be important, but would remain undetected without detailed measurements of velocity and bed topography.

Note that the change in channel shape with distance downstream forces significant changes in the velocity field, termed convective accelerations. This has implications for modeling, because one-dimensional (1-D) models ignore convective accelerations.

Velocity Measurement in Streams:

For each cross section or transect measured at Solfatara Creek, Whiting and Dietrich took an average of 160 point velocity measurements, each a time-average over two minutes, requiring 8-10 hours to complete. In most practical applications, it is not possible to spend 8-10 hours per transect to measure velocity. PHABSIM procedures are typically modeled after the standard procedures of the US Geological Survey for measuring velocity in discharge measurements near stream gauges, described in Rantz et al. (1982).

Velocity is measured at 20-30 stations across the channel by wading or from a cable or bridge, using a Price AA current meter or the smaller mini current meter, consisting of cups that spin around a vertical axis in response to moving water. For depths less than 0.8 m, velocity is measured at 0.6 depth (i.e., 40% of the vertical distance from the bed to the water surface), which

is assumed to reflect the mean column velocity. In deeper flow, the average of measurements at 0.8 depth and 0.2 depth is taken as reflecting the mean column velocity. The mean column velocities for each point are multiplied by the measured water depth and by the width of the vertical slice of the cross section represented by this measurement, to obtain the discharge for that vertical slice. The discharges for the individual "verticals" are summed to obtain the total discharge past the cross section.

To obtain a good measurement of flow, the hydrographer measures the stream by wading when possible, selecting the cross section with the most uniform flow conditions available on the channel, i.e., with flow lines that are parallel and that do not vary downstream. The hydrographer will often "improve the [measurement] cross section by removing rocks and debris within the section and in the reach of channel immediately upstream and downstream from the section," or by constructing "... temporary dikes to eliminate slack water...", all in an effort to transform flow conditions in the irregular natural channel into more uniform flow conditions (Rantz et al. 1982). Each measurement is rated as excellent, good, fair, or poor, with assumed error margins of 3%, 5%, 8%, or >8%, respectively, assigned based on the hydrographer's judgement (Rantz et al. 1982).

Ratings of "excellent" are uncommon in natural streams, despite the hydrographer's freedom to select the most uniform reach available and to modify channel geometry. The reaches selected for discharge measurements are probably not the preferred habitats for fish, or at least they are not typically the sites where anglers would look for fish. In essence, the hydrographer seeks the reach of channel that most closely resembles a canal. Highly irregular channels with shallow marginal areas, back eddies, still water, or boulder beds, which may be important as fish habitats,

are sites that a hydrographer would avoid for flow measurement (unless the stream offered nothing better) because the resulting measurement would be poor.

Sources of Error in Measurements

Errors in point measurement of depth are usually small. At some locations the depth of flowing water can fluctuate by several centimeters at constant discharge, but this can be detected by reasonably careful observation of the section. Errors in estimating the average depth of a vertical are most likely to be sampling errors, especially when the cross section is irregularly shaped or the substrate is coarse. These conditions should be obvious, especially when measurements are made by wading, and with reasonable care a good estimate should be possible.

Potential sources of error in velocity measurements include the inherent limits of accuracy of the meter in registering downstream current velocity, temporal variations in velocity at a point, vertical and cross sectional components of velocity, and sampling errors within each vertical. Instrument errors associated with measuring unidirectional flow with Price meters are relatively minor; in the controlled environment of a tow tank, Carter and Anderson (1963) found that Price meters register within 0.6% of the actual downstream velocity. However, these meters were in excellent condition; poorly maintained meters, or meters clogged with sediment or organic debris, would not perform so well.

Replicate discharge measurements in rivers using Price and Ott current meters (a screw-type meter) were found to differ by up to 2.8% in total discharge (Carter and Anderson 1963). Agreement between the two meters seems acceptable, although the actual differences in point velocity measurements not reported. However, PHABSIM studies often use Marsh-McBirney

current meters, which use the distribution of pressure around a rounded sensor to estimate velocity. This is conceptually attractive, and Marsh-McBirney meters can provide instantaneous or time-averaged readings of velocity. Manufacturer's specifications for the Marsh-McBirney meter state the accuracy as +/- 2% of reading, with a +/- 0.05 ft/s offset. Although one Marsh-McBirney meter performed well in initial tests by the US Geological Survey (Fulford et al. 1994), subsequent tests with a number of meters showed variable performance, under- and over-registering low velocities (Janice Fulford, US Geological Survey, pers. comm. 1998). In our experience the meters can be unstable and require frequent calibration, and after informal field comparisons with a Price current meter we are skeptical of data collected with Marsh-McBirney meters.

The vertical and cross-channel components of velocity are not well captured in the standard US Geological Survey flow measurement. The Price AA meter does not measure flow direction. Although any cross-channel flow can be accounted for using the hydrographer's estimate of the angle of approach, the existence of cross-channel flow at a vertical indicates a complex flow structure, so that one or two measurements may give a poor estimate of the spatially averaged velocity in the vertical. The Price meter is also affected by vertical velocity components in steep, turbulent channels but cannot measure them separately from the downstream components (Townsend and Blust 1960, Linsley et al. 1982). The velocities recorded in such channels may be greater than the true downstream velocities (Marchand et al. 1984). A modified Price meter that has solid cups composed of a polycarbonate polymer (The PAA meter) initially appeared to be less affected by vertical velocity components than the standard AA meter with stainless steel cups (Marchand et al. 1984), but subsequent experience has shown the polymer cups less accurate than the original stainless steel cups (R. Jarrett, U.S. Geological Survey, pers. comm. 1998).

There can be considerable temporal variation in velocity at a point in a stream, particularly one with a rough bed. The standard US Geological Survey approach is to take the velocity measurement over at least 40 seconds. Carter and Anderson (1963) took measurements continuously for an hour in 23 different rivers, at four different depths. They recorded data every 15 seconds, which allowed them to calculate the deviations of velocity measured over shorter intervals around the one-hour average (Figure 4). Although there are some problems with these data, they show that sampling errors are still significant at 40 seconds. Errors are also greater near the bed, where "focal point" velocity measurements are often made. Thus, the 40-second rule reflects a compromise between the gain in accuracy from averaging over a longer period and the cost of the additional time required. However, this compromise was developed for discharge measurements, where random errors in individual measurements tend to average out over the transect. In PHABSIM, measurements are not averaged over the transect, and it is not clear that the same compromise is appropriate. Moreover, the data are from reaches selected for discharge measurements, and greater temporal variation should be expected in reaches with more complex geometry.

Spatial sampling errors within each vertical will depend on the complexity of the flow field. In canal-like sections, the spatial sampling errors are small enough to allow good or excellent discharge measurements. In a complex flow field, however, even for a relatively tranquil stream such as that illustrated in Figures 1 and 2, the spatial sampling errors in estimating the average velocity of a vertical from one or two velocity measurements can be substantial.

Commonly, the discharge during a PHABSIM study is assumed to be known from a nearby gage, and if the total flow calculated by summing the individual PHABSIM measurements differs from the "known" discharge, the individual velocity measurements are adjusted by "velocity adjustment factors," which are percentage changes applied equally to all the measurements across the channel (Milhous et al. 1984). Although this adjustment may account for systematic errors, it does nothing to change the distribution of sampling and measurement errors across the channel.

In summary, instrument errors with well-maintained and properly used Price or Ott current meters are likely to be small, relative to temporal and spatial sampling errors. Figure 4 provides some guidance regarding temporal sampling errors. Although the figure probably underestimates the magnitude of the errors for transects with complex flow patterns, a similar decrease in the sampling error with increased measurement time can be expected. With standard methods, spatial sampling errors are probably as large or larger than temporal sampling errors. Herschy (1978) provides for a more detailed discussion of measurement errors at sites selected for discharge measurements, and gives "rules of thumb" for estimating 95% confidence intervals around measurements at such sites (Table 1). Unfortunately, there have been too few detailed studies of the flow field in natural channels to allow quantitative generalizations about measurement errors in channel reaches more typical of those to which PHABSIM is applied, rather than those selected by hydrographers for discharge measurements. For the conditions of most instream flow studies, however, we believe that the errors in estimating the average velocity of verticals by the standard methods will be large enough to affect ultimate results, so the ordinary scientific practice of estimating errors by appropriate repetitive measurements should be followed.

Modeling Flow in Natural Streams:

One-dimensional models:

One-dimensional (1-D) models typically treat the river as a series of cross sections, for each of which a stage and cross-sectionally averaged velocity are computed based on hydraulic principles, the channel form, and calculated values of stage and velocity at downstream cross sections. Probably the best-known 1-D model is HEC-2, or HEC-RAS, which is widely used for predicting flood levels. WSP, a similar 1-D gradually varied flow model, is an option for modeling stage in PHABSIM (Milhous et al. 1984).

One-dimensional models typically assume that the channel is straight, with all flow perpendicular to the cross section, and that flow is either "uniform" or "gradually varied". Uniform flow does not change in the downstream direction, and therefore has a vertical velocity profile that reflects a balance between the acceleration of gravity and the resistance of the channel bed. These conditions can occur in canals, but generally not in natural streams. "Gradually varied" flow occurs where channel topography and roughness change only slowly along the channel, so that convective accelerations can be ignored.

These are large assumptions, and while reasonable approximations of river stage are routinely obtained with these models if they are used with adequate skill and professional judgement, by definition they can provide only cross-sectionally averaged velocity. Moreover, gradually-varied flow models are commonly used for predicting flood stage during high flows. During such high flows, variations in the bed topography may be relatively less important; for example, hydrologists speak of riffles being "drowned out" at bankfull stage and higher. Whiting (1997) has shown that

convective accelerations are less important at higher flows in Solfatara Creek. Instream flow assessments, however, are typically concerned with the lower magnitude flows in which fish spend most of their time. These flows are too low to modify the bed, so they occupy a channel geometry inherited from past high flows. Downstream changes in channel geometry that are small relative to high flows may be large relative to low flows, as when low flow spills over a longitudinal bar, so that the assumption of gradually varied flow is violated, as noted by Osborne et al. (1988). As a result, a model that gives reasonable estimates of stage in a channel at high flows may fail to do so at low flows.

PHABSIM is concerned with the distribution of velocity and depth across the channel, so the hydraulic models in PHABSIM divide the cross section into vertical slices (cells) either centered on or between point measurements of velocity (much as is done in the USGS discharge measurements). The vertical cells are analyzed separately, using either a regression analysis of measurements of velocity in the cell at different stages, or a back-calculation of Manning's n from a single velocity measurement (Milhous et al. 1989). The latter approach has been properly criticized by Shirvell (1986), and more recently by Ghanem et al. (1996), who point out that the cells are no longer tied to one another through hydrodynamic principles. On this account, Ghanem et al.(1998) describe the velocity modeling in PHABSIM as "zero-dimensional". With the single measurement approach, the Manning's roughness factor is used to calculate velocity and discharge for each cell at other discharges, but the individual cell discharges are adjusted to equal the modeled flow, so the roughness factor is really a weighting factor rather than a true roughness coefficient. With the multiple measurement approach, there is a problem with obtaining the required three velocities for verticals near the bank, which may be dry at the lower measured discharges (Ghanem et al. 1996).

Errors associated with the PHABSIM approach to distributing velocity across channels were investigated by Bartz (1990), as part of a broader assessment of PHABSIM, using data from the US Fish and Wildlife Service for three streams spanning a flow range of two orders of magnitude. For each stream, he calibrated different PHABSIM hydraulic models to data at three flows, and for each vertical compared the measured and modeled velocities. The averages and standard deviations of the differences are substantial, as illustrated by data for the medium-sized stream (Figure 5): mean errors ranged from 4.6% to 12.8% and standard deviations ranged from 29.6% to 42.7%. Results for the small and large stream are similar.

Two-dimensional Models:

Two-dimensional (2-D) models are increasingly being used for instream flow studies (e.g., LeClerc et al.1995, Ghanem et al. 1996). Two-dimensional models require the simultaneous solution of a system of governing equations, typically including relationships (expressed as differential equations) for conservation of fluid mass, conservation of downstream fluid momentum, and conservation of cross-stream fluid momentum. To simplify these relationships, certain approximations are assumed, yielding the "shallow water equations". These 2-D velocity models give only vertically-integrated velocities, but show the variation in cross-stream direction as well as in the downstream direction.

These models retain the convective acceleration terms neglected by 1-D models, but require more detailed descriptions of channel geometry, and the accuracy of the modeled results depends upon the accuracy and spatial resolution of the measurements (Leclerc et al. 1995, Ghanem et al. 1996). For example, Leclerc et al. (1995) constructed a computer representation of the bed of a

large stream by measuring the bed elevation with one measurement for every 50 to 400 m^2, so their results are necessarily generalized accordingly.

However, with detailed specification of the channel bed topography and planform, more sophisticated modeling may not be necessary. One-dimensional models are not all the same, and in some settings 1-D models can be as accurate for simulating vertically integrated velocity fields as a 2-D approach. Dietrich (1987) modeled flow in Muddy Creek, Wyoming, for geomorphic purposes, with a 1-D approach that explicitly accounted for the effect of channel curvature, and predicted the distribution of velocity across the transects. Larsen (1995) applied the same 1-D approach, and compared observed velocity patterns on two gravel-and-cobble-bedded meandering rivers. He showed that, with good bed topography as input, the 1-D model performed as well as more sophisticated models. However, understanding the appropriateness and limitations of a model seems critical. For example, it is unlikely that the excellent results achieved by Dietrich (1987) and Larsen (1995) could be achieved in a straight channel with irregular bed topography, such as the reach of Solfatara Creek studied by Whiting and Dietrich (1991), for which a 2-D model that accounted for convective accelerations would be more appropriate.

Statistical Hydraulic Models

Following a suggestion by Dingman (1989), Lamouroux et al. (1995) developed an empirical model that predicts the statistical distribution of hydraulic variables (such as velocity and water depth) for reaches with intermediate and large roughness elements, for which they believe the conventional deterministic models are ineffective. The model predicts the distributions of the hydraulic variables over an entire reach based on inputs of discharge, mean width and depth, and roughness. Lamouroux et al. (1998) coupled this hydraulic model with multivariate habitat use

models to estimate the habitat value of a reach as a function of discharge. The need for validation is perhaps more obvious with such straightforwardly empirical models, which is a virtue.

Model Validation:

Models by nature involve simplifications of reality, and model predictions always involve some error. For hydraulic modeling of fish habitat, the errors can arise from measurement errors, from model errors, or from sampling errors. With the standard 1-D versions of PHABSIM, one should ask how accurately depth and velocity were measured at the selected points on the transects, how well the model predicts depth and velocity at the selected points at other discharges, how well the selected points represent the verticals or cells, and how well the selected transects represent the stream.

In practical applications, it is important that the likely errors in model predications be estimated. This is typically done by "model validation," in which model predictions are compared with measured data different from those used to develop or calibrate the model. (Oreskes et al. (1994) have pointed out that this is not really validation, but we will use this common term for the process.) Lamouroux et al. (1995) present graphical comparisons of measured and predicted velocity distributions, although they acknowledge that their procedure is not strictly correct. Aceituno and Hampton (1988) compared the distributions of point measurements of depth and velocity separately with comparable distributions from PHABSIM verticals, but did not consider their joint distributions or estimates of WUA. Unfortunately, these examples are exceptions. Typically, validation is not even discussed, although validation for PHABSIM predictions seems particularly important; PHABSIM offers users a wide variety of options that can produce a wide

range of results, so there is a danger that options may be selected consciously or unconsciously to produce a desired result (Bartz 1990; Gan and McMahon 1990).

The proper form of the validation will depend on the conceptual model underlying the PHABSIM modeling. As originally developed, the conceptual model for PHABSIM assumed that data from the transects applied half-way up or down stream to the next transect (Bovee 1982; Thomas and Bovee 1993). In other words, the stream is divided into horizontal cells, each of which is represented by measurements at one point on the transect. With this conceptual model, validation could simply involve measuring the depth, velocity and substrate at random points in the study reach at various discharges, and comparing these with the values assigned to the point by PHABSIM. It is important that the validation include the habitat variables and not just WUA, so that "correct" estimates of WUA that result from offsetting errors are revealed.

Recently, some PHABSIM users have used a different conceptual model in which transect data are treated as samples, stratified by habitat types, rather than as representing specific areas of the channel (e.g., CDFG 1991). The details of the validation would then depend on the details of the sampling scheme, but the basic process remains the same; model predictions of the joint distributions of depth, velocity, and substrate must be compared with independent data. Provided that transect sites are selected randomly, they would provide an unbiased estimate of conditions in the study reach, so that models could be validated at the transects, and the streamwise spatial sampling errors could be estimated separately using statistical methods such as bootstrapping (Williams 1996). Since the PHABSIM hydraulic models cannot be calibrated for the more turbulent areas of many streams, however, the condition of randomly located transects is difficult to meet in PHABSIM studies, and validating the model with data from randomly located points

seems more appropriate. As with any statistic developed by sampling, estimates of WUA should be reported with standard errors or confidence intervals, so that decision makers are informed of the uncertainty associated with the estimates (Castleberry et al. 1996).

Application of Models to Aquatic Habitat

Since our discussion of habitat models is in the context of their application to evaluating habitat for a particular species and life stage of fish, the most relevant question is whether such models can capture aspects of the hydraulic environment that are most important to the organism in question. In some cases, the answer is clearly no. For example, chinook salmon select spawning sites on the basis of subsurface flow, as well as depth, velocity, and substrate (Healey 1991, Vyverberg et al. 1997), so a model that does not address subsurface flow will be seriously incomplete in its evaluation of habitat for spawning chinook salmon.

More generally, we argue that fish often respond to features in their hydraulic environments such as velocity gradients over small length scales. For example, trout may hold in the flow separation zone downstream of a boulder, as described for a Pennsylvania stream by Bachman (1984, p. 9):

> Typically, foraging sites were in front of submerged rocks, or on top of but on the downward-sloping rear surface of a rock. From there the fish had an unobstructed view of oncoming drift. While a wild brown trout was in such a site, its tail beat frequency was minimal, indicating that little effort was required to maintain a stationary position even though the current only millimeters overhead was as high as 60 to 70 cm/second. Most brown trout could be found in one of several such sites

day after day, and it was not uncommon to find a fish using many of the same sites for three consecutive years.

Contrast the precise positioning of this trout in the hydraulic environment (within millimeters of a steep vertical velocity gradient) with the detail that can be resolved in hydraulic models. Even with 2-Dflow models, the resolution is scaled by flow depths (Ghanem et al. 1996), and cannot account for vertical velocity gradients. The best that can be done is to patch on some estimated average velocity gradient, and as should be evident from Figure 2, this would give only a crude approximation. Accordingly, there is a discontinuity in the spatial scale at which it seems feasible to model the hydraulic environment, and the spatial scales at which fishes often respond to it. This seems particularly true for fishes that hold near steep velocity gradients, such as near the bed of the stream, boulders, or logs.

At best, practical modeling of the hydraulic environment for determining instream flows involves estimating the distributions or joint distributions of depth and velocity over sizable areas. Where the channel conditions are sufficiently uniform that this can be done with reasonable accuracy, this information would obviously be useful for thinking about the effects of discharge on fish habitat. If such information can be developed by mapping (Collings 1972) or by an empirical approach (Lamouroux 1995) it will be similarly useful. However, values of hydraulic variables averaged over sizable areas should not be confused with the local values to which fish and other organisms often respond (Railsback 1999; Bult et al. 1999). To combine hydraulic model results, which are accurate only on a coarse scale, with habitat preference or suitability data collected on a much finer scale, raises troubling questions about meaning. PHABSIM estimates of weighted usable area result, in effect, from multiplying biological apples by hydraulic oranges.

Railsback (1999) proposes dealing with this problem of scale mismatch by developing suitability data from observations in cells with a spatial scale comparable to the resolution of the hydraulic modeling. This raises another set of problems. If the cells are small then occupancy of each cell may be affected by occupancy of adjacent cells, as wells as by hydraulic factors, and collection of enough hydraulic data for modeling any sizable length of stream will be difficult and expensive. If the cells are large, then describing the cell by a single index for depth, velocity, and index is dubious, and the biological meaning of weighted usable area is compromised.

Conclusions

Flow fields in natural channels are complex, and it is not feasible to model this complexity for any length of channel at the finer length scales to which fish often respond. We believe that a more modest approach to using hydraulic models for instream flow assessments is appropriate. In many streams, 2-D modeling may produce reasonable estimates of the amount of habitat with given combinations of depth and average velocity, and in other streams this can probably be estimated empirically. This is important information that any of us would want to use if we were charged with making decisions about instream flows, if it can be obtained without taking up too much of the available funding.

We suggest, however, that it is prudent to leave the hydraulic and biological inquiries as separate and distinct tasks, in part because this helps avoid the appearance of models providing answers, rather than aids to thought. We suspect that the best way to evaluate the importance of hydrologic conditions for a particular fish is to have a good understanding of the way that the fish uses the hydraulic environment, the kind of understanding that is developed by careful

observational studies such as Jenkins (1969), Bachman (1984), or Nielsen (1992), and especially from long-term studies such as those on Carnation Creek in British Columbia (Hartman et al. 1995), or Brows Beck in England (Elliott 1994).

Such evaluations involve use of professional judgement in considering data from hydraulic modeling or mapping, and can be criticized as subjective. However, modeling gives only an illusion of objectivity. Modeling always involves simplifying assumptions. Therefore, judgement goes into deciding just what and how to model, and good judgement requires knowledge of both the model and the thing being modeled. Models are not a substitute for knowledge and experience. Whether a model is good or bad depends upon the purpose to which it is put. For simulating depth and velocity, different models are appropriate for different kinds of channels and for different scales of resolution. However, all models have limitations. For simulating a particular reach of stream, the proper use of any model requires consideration of the statistical problems arising from sampling and measurement errors, and appropriate validation.

Acknowledgements

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Table 1: Rules of thumb from Herschy (1978) for 95% confidence intervals for hydraulic measurements, expressed as % of measured values.

Uncertainty in or from:	
current meter error	1% at 0.5 m/s, 2% at 0.25 m/s, 5% at 0.1 m/s
measurement of width	0.5%
measurement of depth	2.5%
time variation in velocity measurement	5% at 0.3 m/s, 22% at 0.1 m/s, 3 min. exposure
vertical spatial variation in velocity	7% (0.2 & 0.8 d method), 15% (0.6 d method)

Figure Legends

Figure 1. View of Solfatera Creek, looking downstream over the reach studied by Whiting and Dietrich (1991) and Whiting (1997). Note moderate gradient and apparently tranquil flow.

Figure 2: Downstream and cross-stream velocity fields at sections spaced 2 m apart in Solfatera Creek, Wyoming, reprinted from Whiting and Dietrich (1991). Isovels (lines of equal velocity) are at ten cm/s intervals; shaded areas indicate flow toward the left bank. Downstream isovels range from 0 to 70 cm/s, cross-stream isovels from 20 cm/s to the left to 30 cms to the right. The high velocity core near the bottom at Sections 1 and 2 (> 50 cm/s downstream) moves up and splits going over the bar in sections 7-10, with downstream velocity peaking at > 70cm/s in Sections 8 and 9. Velocity is highest near the right bank in Section 11 (> 60 cm/s), with a secondary maxima (> 50 cm/s) forming to the left of the bar. Water close to the right side of the bar in Section 11 is eddying upstream (< 0 cm/s). Section numbers increase in the downstream direction. See text for site description.

Figure 3. Estimates of the differences, in percentages, from estimating the vertically averaged water velocity using the velocity at 6/10s depth, and using the detailed measurements of Whiting and Dietrich (1991), for eight of the sections shown in Figure 1; the box plot summarizes the differences for all sections. Positive differences indicate that velocity at 6/10s depth is greater than the average estimated from the detailed measurements; each circle represents one vertical.

Figure 4 Standard deviations of velocity measurements averaged over different time periods, as percentages of the overall (one hour) means. Data from Carter and Anderson (1963); the anomaly in the 0.6 depth curve probably results from a typographical error.

Figure 5. Means and standard deviations of the differences between measured and modeled mean column velocities at verticals on the Williams Fork River, Colorado, for three PHABSIM hydraulic models (IFG-4, MANSQ, and WSP) calibrated at three discharges. Data from Table 4.5 in Bartz (1990).

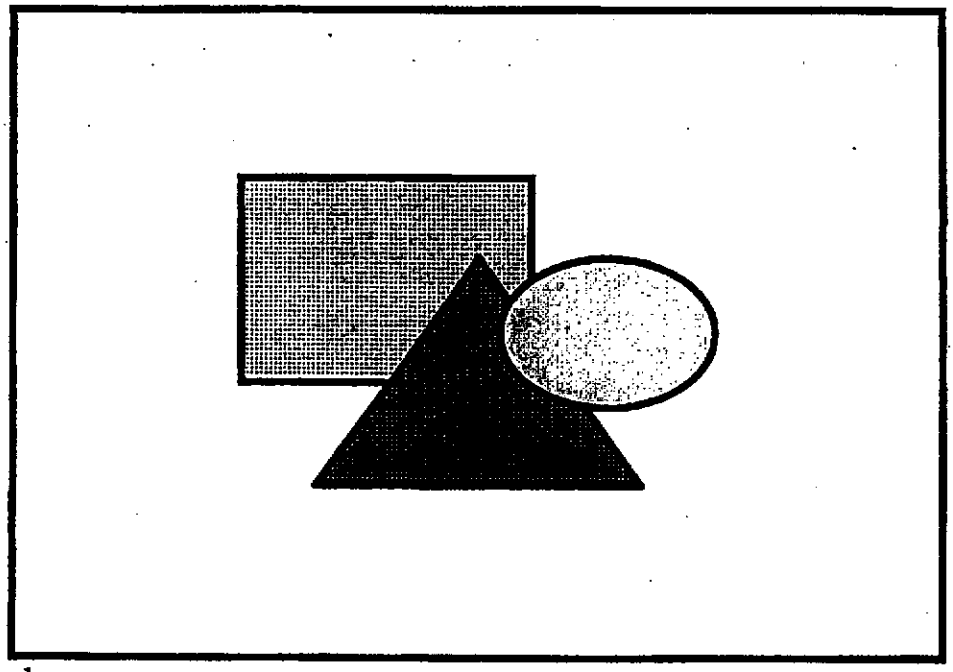
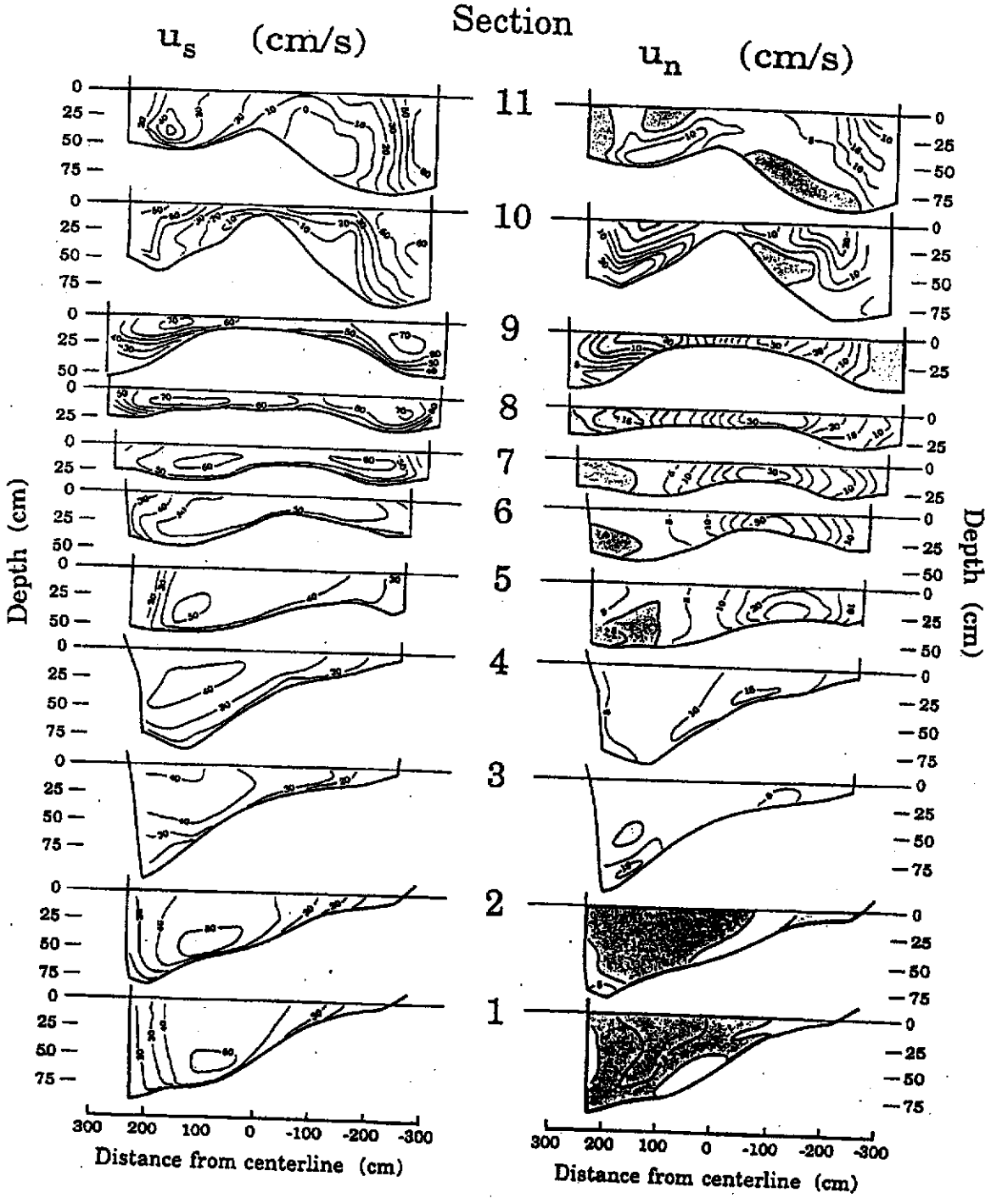


Figure 1


Section
u_s (cm/s)
u_n (cm/s)
11
10
9
8
7
6
5
4
3
2
1
Depth (cm)
Depth (cm)
0
25
50
75
-25
-50
-75
300 200 100 0 -100 -200 -300
Distance from centerline (cm)
Distance from centerline (cm)

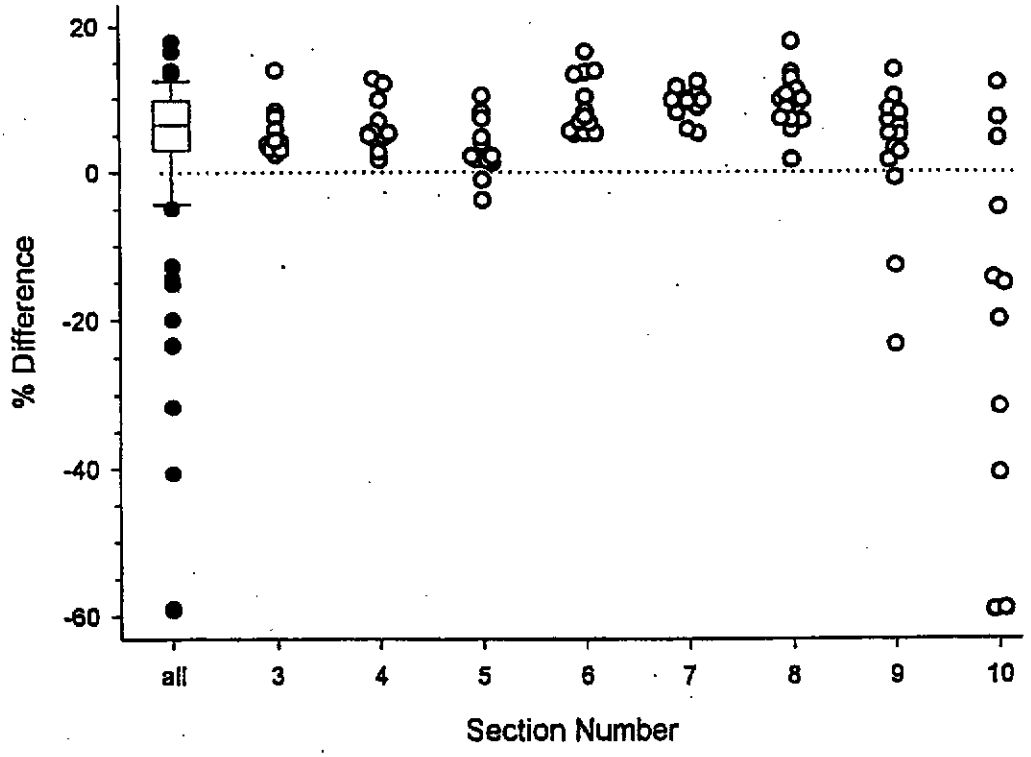
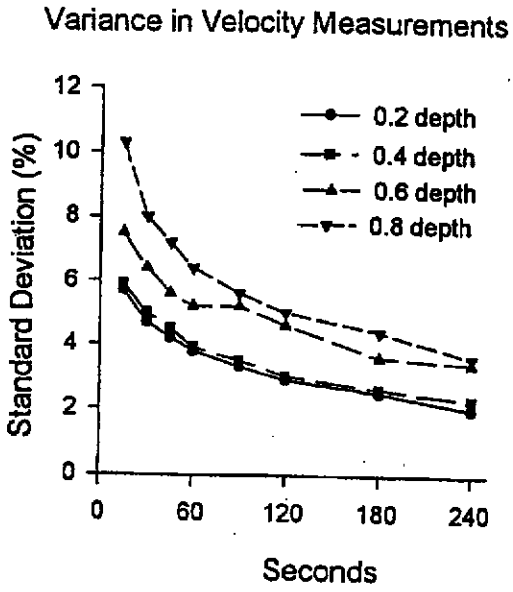


Figure 3


Variance in Velocity Measurements
Standard Deviation (%)
12
10
8
6
4
2
0
0
60
120
180
240
Seconds
0.2 depth
0.4 depth
0.6 depth
0.8 depth

Figue 4

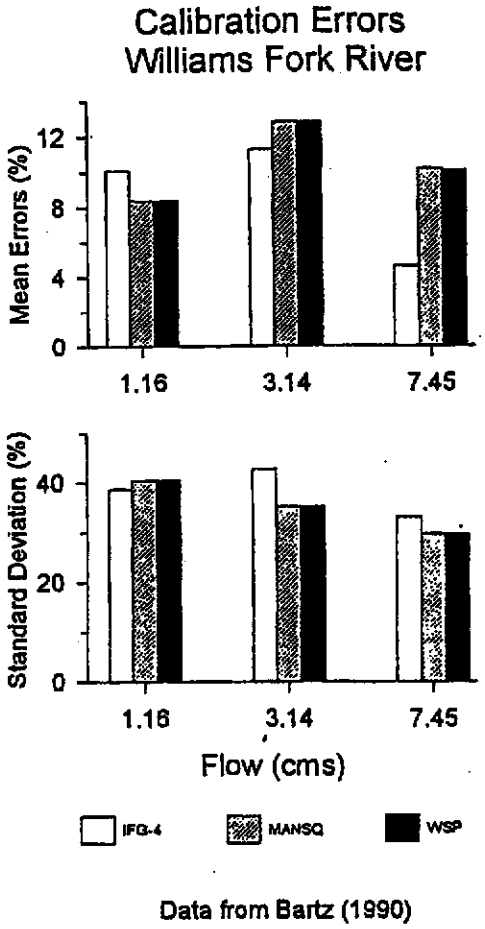

Calibration Errors
Williams Fork River
Mean Errors (%)
12
8
4
0
1.16
3.14
7.45
Standard Deviation (%)
40
20
0
1.16
3.14
7.45
Flow (cms)
IFG-4
MANSQ
WSP
Data from Bartz (1990)

Figure 5

Exhibit 2

Exhibit # 12

State Water Resources Control Board

Division of Water Rights
1001 I Street, 14th Floor • Sacramento, California 95814 • (916) 341-5300
Mailing Address: P.O. Box 2000 • Sacramento, California • 95812-2000
FAX (916) 341-5400 • Web Site Address: http://www.waterrights.ca.gov

Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

W.H

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov

CERTIFIED

Thomas and Mary Dimmick Elke
c/o Drew L. Aspegren
Napa Valley Vineyard Engineering, Inc.
176 Main Street, Suite B
St. Helena, CA 94574

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AR NO. _____
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Dear Mr. Aspegren:

APPLICATION 30718 and 31003—ELKE

The purpose of this letter is to discuss the status of Applications 30718 and 31003 for a water right permit and to describe activities that must be completed in order for the State Water Resources Control Board (SWRCB), Division of Water Rights (Division) to continue processing these applications. Currently, the Division is faced with a shortage of technical staff and a backlog of pending applications and change petitions. As a result, the Division has implemented a new policy. The applicant will now be responsible for completing most technical activities required for the Division to act on the application and issue a permit. This approach is similar to policies employed by most other government permitting agencies. A water right permit is a property right, similar to a building permit or an approved subdivision map. The water right permit attaches to the land and, in most cases, is of substantial value. Consequently, the cost of completing the major technical activities necessary to secure the permit should, appropriately, be borne by the person(s) realizing economic gain from the permit.

Background Information

On June 19, 1998, Water Right Application 30718 was submitted requesting a water right permit that would authorize storage of 30 acre-feet per annum (afa). Water would be stored in an existing onstream reservoir on Witherell Creek tributary to Anderson Creek thence the Navarro River. The proposed season of diversion is October 1 through May 31, and the purposes of use are irrigation and frost protection of 20 acres of vineyard. On January 21, 2000, application 31003 was submitted requesting direct diversion of 20 afa at a rate not to exceed 2 cfs from Witherell Creek between March 1 and May 31 for frost protection of the same place of use. The total combined amount under both applications shall not exceed 30 afa.[1,2]

[1] Contact report dated June 2, 2000 between Laura Vasquez of the Division and Thomas Elke. In files 30718 and 31003, Division of Water Rights, State Water Resources Control Board.

[2] Notice of applications to appropriate water by permit dated June 30, 2000. In files 30718 and 31003, Division of Water Rights, State Water Resources Control Board.

On June 30, 2000, the Division distributed a Notice of Applications 30718 and 31003 to interested parties. Seven protests were filed against this project; National Marine Fisheries Service (NMFS), California Department of Fish and Game (DFG), California Sportfishing Protection Alliance, Navarro Watershed Protection Association, Friends of the Navarro Watershed, Daniel Myers, and James Minton. These protests were all accepted. In response to the protests, the Applicants agreed, in part, to reduce the season of diversion to December 15 through March 31 for Application 30718 and March 1 through March 31 for Application 31003, construct a bypass facility, and install appropriate gauging and/or metering devices.[3]

The protests were not resolved and therefore, pursuant to Water Code Sections 1345-1348, the SWRCB Division of Water Rights (Division) conducted a Field Investigation on October 26, 2000. During the field investigation, NMFS and DFG staff determined that the current reservoir is an onstream impoundment of a Class 1 fish bearing stream.[4]

Potential Cumulative Impacts on Endangered Fish

The Central California Coast coho salmon (*Oncorhynchus kisutch*) was federally listed by NMFS as threatened under the Endangered Species Act (ESA) (61 FR 56138, October 31, 1996). The Central California Coast steelhead (*O. mykiss*) was federally listed by NMFS as threatened under ESA (62 FR 43938, August 18, 1997). Division staff held a series of meetings with NMFS, DFG and other interested parties to develop a method to assess potential site-specific and cumulative impacts of new water projects on anadromous fishery resources in coastal watersheds. This assessment method is described in a document entitled *Guidelines for Maintaining Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams [Draft]*, dated June 17, 2002, prepared by NMFS and DFG (copy enclosed). This document will hereinafter be referred to as the Guidelines. As described in the Guidelines, NMFS and DFG are concerned that the proposed projects in the Navarro River Watershed may have the potential to cause significant adverse impacts to anadromous fishery resources if the total October 1 through March 31 diversion demand within the stream is greater than five percent of the average unimpaired December 15 through March 31 seasonal runoff at any point downstream where fish are present. The specific locations of concern in the watershed are called the Points of Interest (POIs) and are selected by NMFS and DFG.

Request for Information

Before the Division can continue processing your application, you will need to make a specific showing that your project can be operated so as not to contribute to existing potential significant cumulative impacts on threatened coho salmon/steelhead in the Navarro River Watershed. This will require that you hire a qualified consultant to develop recommendations for specific project modifications or other actions (mitigation measures) that could be taken to prevent your project

[3] Response to protests dated September 20, 2000 from Thomas Elke. In files 30718 and 31003, Division of Water Rights, State Water Resources Control Board.

[4] Memorandum from Laurie A. Hatton to Steven Herrera dated December 18, 2000. In files 30718 and 31003, Division of Water Rights, State Water Resources Control Board.

from contributing to these significant cumulative impacts. As part of this process you must determine whether the total diversion demand in this stream, including your proposed diversion, may cause a significant adverse impact to anadromous fishery resources, and you must prepare a Water Availability Analysis/Cumulative Flow Impairment Index Report (WAA/CFII Report). An example of how the WAA/CFII Report should be formatted is enclosed. Division staff will contact NMFS and DFG to determine the appropriate POIs for the WAA/CFII analysis. The NMFS and DFG should be contacted directly if the CFII at any POI is greater than five percent, since additional hydrologic or biological analysis may be required. Please consult the Guidelines for further information on when and how these further studies should be conducted.

You should be aware that the issuance of a water right permit is a discretionary action, as defined by the California Environmental Quality Act (CEQA). CEQA requires that the SWRCB, as Lead Agency, prepare the appropriate environmental document. As the Applicant, you are responsible for all costs related to the environmental evaluation and the preparation of the CEQA document.

In view of the above discussion, we request that you advise the Division whether you intend to continue the water right permit application process. Please submit your reply in writing within 30 days of the date of this letter. If you do not respond in writing within 30 days, we will assume that you no longer want to obtain a water right permit and the Division will proceed with the cancellation of your application, in accordance with section 1276 of the California Water Code.

If you want the Division to continue processing your application, you need to clearly demonstrate that you are taking significant steps to complete the water right process. Within 60 days of the date of this letter, you need to complete and sign a Memorandum of Understanding (MOU) with the SWRCB that clearly sets forth the roles of the (1) SWRCB, (2) you, the water right applicant, and (3) your consultant (See enclosed list of environmental and engineering consultants who are familiar with the preparation of CEQA documents and the water rights process). Upon receipt of a completed and signed MOU, we will return an executed copy to you. A copy of the MOU template is attached.

Within 60 days of the date of the executed MOU, your consultant must submit a preliminary work plan that includes a description of the tasks to be performed, including the scope of the WAA/CFII analysis to be performed; the specific environmental studies to be performed; a list of permits required to construct and implement your project; and a schedule for consultation with DFG, NMFS and any local, state or federal agency from whom a permit may be required. Based on this preliminary work plan, Division staff and your consultant will then set a schedule for preparation of a final work plan and completion of tasks. The final work plan shall include detailed descriptions of, and a schedule of completion for, any biological, endangered species and archeological survey reports requested by the SWRCB, and a WAA/CFII Report as described above. It is important that the WAA/CFII Report be completed prior to starting the CEQA process, as the results could determine the scope and content of the CEQA document.

Failure to submit the above requested information by the completion date may result in cancellation of your application and possible enforcement action by the Division.

For Further Information
If you have questions regarding the Guidelines please contact:

NMFS:	Dr. Willam Hearn	Phone: (707) 575-6062 E-Mail: William.Hearn@NOAA.gov
	Dr. Stacy Li	Phone: (707) 575-6082 E-Mail: Stacy.Li@NOAA.gov
DFG:	Ms. Linda Hanson	Phone: (707) 944-5562 E-Mail: Lhanson@dfg.ca.gov

Mailing addresses for the above contact persons are given below.

If you have any questions or would like to discuss the requirements described in this letter, please contact Laurie A. Hatton in the Environmental Section at (916) 341-5336, or Julé Rizzardo in the Applications Section at (916) 341-5339.

Sincerely,

for Harry M. Schueller
Chief Deputy Director

Enclosures (4)

cc: Thomas and Mary Dimmick Elke
P.O. Box 6237
Napa, Ca 94581

Dr. William Hearn
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6528

Dr. Stacy Li
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6528

(Continued next page.)

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cc: (Continuation page.)

Ms. Linda Hanson
Department of Fish and Game, Region 3
P.O. Box 47
Yountville, CA 94599

Mr. Robert W. Floerke, Regional Manager
Department of Fish and Game, Region 3
P.O. Box 47
Yountville, CA 94599

Mr. Larry Week, Chief
Native Anadromous Fish and Watershed Branch
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Ms. Nancee Murray, Staff Counsel
Department of Fish and Game
Office of the General Counsel
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Exhibit 8

Exhibit #13

State of California

Memorandum

To: Mr. Edward C. Anton, Chief
Division of Water Rights
State Water Resources Control Board
Post Office Box 2000
Sacramento, CA 95812
Fax: (916) 341-5400

Attention Ms. Kathryn Gaffney

Date: April 25, 2003

From: Robert W. Floerke, Regional Manager *COPY - Original signed by Jim Swanson for*
Department of Fish and Game - Central Coast Region, Post Office Box 47, Yountville, California 94599

Subject: Protest of Water Application (WA) 31133 of Cakebread Properties, LLP for Diversions from Anderson Creek, Tributary to the Navarro River, Thence the Pacific Ocean in Mendocino County

The Department of Fish and Game's (DFG) interest in this application is based on its status as a responsible and trustee agency for fish and wildlife resources in California. DFG's right to protest is based on State Water Code Section 1330 and other associated provisions of law.

Basis of Protest

DFG is protesting this application because it will result in reduced stream flow during critical periods, thus likely diminishing aquatic and riparian resources in Anderson Creek, the Navarro River, and its tributaries. These streams support populations of steelhead trout (*Oncorhynchus mykiss*), coho salmon (*Oncorhynchus kisutch*), and other fish and wildlife resources. Due to dramatic declines of populations in their southern range, steelhead and coho salmon of the Navarro River basin are listed by the National Marine Fisheries Service (NOAA Fisheries) as "threatened" under the Federal Endangered Species Act (FESA). In addition, DFG has listed coho as a "candidate/recovery"[1] species. The Navarro River and its tributaries also support other designated sensitive species such as Navarro roach (*Lavinia symmetricus navarroensis*) and foothill yellow-legged frogs (*Rana boylii*). DFG is concerned that the proposed project may result in

[1] The Fish and Game Commission accepted coho salmon north of San Francisco Bay as a candidate species and subsequently determined that listing is warranted. However, pursuant to a State law providing for recovery planning, the Commission has delayed the formal "listing" until a recovery plan is prepared. Until that time, the provisions of Title 14, Section 749.1 remain in effect as they currently exist or as they are amended. However, if the Commission approves a recovery plan for coho, the provisions regulating take of the species are likely to change.

direct and cumulative adverse impacts to these valuable resources. Specifically, this diversion and the other diversions in the watershed have the potential to reduce the instream flows that are needed to provide fish passage and to maintain riparian and fishery rearing habitat within Anderson Creek and the Navarro River.

In addition, changes in land use due to construction or habitat conversion for this project may cause negative effects on terrestrial species. The application indicates that the reservoir was built in the spring of 2001 and that the vineyards have also now been planted.

Project Description

Under WA 31133, the applicant proposes to collect 49 acre-feet per annum (afa) of water to storage. The water will be diverted from Anderson Creek using an offset well at the rate of 2.9 cubic-feet per second (cfs). This water will be stored in an existing 49 acre-foot (af) offstream reservoir that is currently unpermitted and unauthorized. The proposed use for the stored water is irrigation, heat control, and frost protection of 47 acres of existing vineyard, fire protection, and recreation. The proposed season of diversion is December 15 through March 31.

DFG requests clarification of the nature of any additional sources of water required for this project. The water duty for 47 acres of vineyard irrigation, frost protection, and heat control will likely exceed the amount of stored water available from a 49 acre-foot reservoir, especially one with proposed incidental summer uses of fishing, swimming, and fire protection. Any additional water diverted outside the proposed diversion season will have additional impacts that need to be addressed during the California Environmental Quality Act (CEQA) review for this project.

Based on the information provided in the application, there are no other existing water rights being claimed for use on this 47 acres of vineyard. The application does list groundwater as an alternative source of water, but does not provide information on whether that source has been developed. In light of the sensitivity of this watershed with regard to Federal and State listed species, DFG requests clarification of the water source currently being utilized to support the vineyard and the source of the water, if any, currently being stored in the existing 49 af reservoir. If diverted water is being stored and/or used without a basis of right, DFG requests that the SWRCB rigorously pursue

the actions available to it under the State Water Code to stop any unpermitted diversions until their impacts can be adequately assessed and appropriately mitigated under CEQA. Allowing continuing diversions may artificially inflate the environmental baseline during CEQA review and thus give a false picture as to the true measure of resource impacts.

Protest Dismissal Terms

Protest dismissal terms, if adopted as enforceable conditions of the water rights permit, are intended to mitigate adverse impacts to fisheries and wildlife resources. Based on the information provided by the applicant, site-specific studies for the purpose of determining appropriate flow-related terms and conditions are needed. The study plan should include, at a minimum, the following:

1. A hydrologic study to determine if the production of the watershed is sufficient to provide the water requested without having significant adverse impacts to aquatic and riparian resources of the subject stream or downstream reaches. The study shall identify all other basis of water rights in watersheds potentially affected by the proposed diversions.

2. A specific proposal to provide minimum bypass flows for maintenance of aquatic habitat, fish, and wildlife. The starting point for determining the minimum bypass flow shall be the estimated long-term unimpaired February medial flow at the points of diversion. This proposal should also specifically address bypass flows released while the reservoirs are filling during the onset of rains each season, as well as reservoir levels remaining at the end of the irrigation season.

3. An assessment of the impacts of the proposed diversions on channel forming flows with a specific proposal to provide periodic channel maintenance and flushing flows that are representative of the natural hydrograph.

4. A plan to monitor compliance, the effectiveness of the stipulated flows, and procedures for making subsequent modifications, if necessary.

In addition to the flow-related assessment discussed above, surveys for the presence of listed plant and animal species must be conducted on the entire place of diversion (including downstream reaches affected by the diversions), place of storage, and place of use. When the results of the above-indicated studies are provided to DFG, appropriate mitigation measures and protest dismissal terms shall be determined. Depending on the outcome of these studies, dismissal terms for these diversions may include, but are not limited to:

1. Permittee shall not use more water under basis of riparian right on the place of use than permittee would have used absent the appropriation under permit.

2. Under the exercise of all bases of rights, the season of diversion shall be limited to December 15 to March 31 each year.

3. Under the exercise of all bases of rights, from April 1 to December 14, all natural flow shall be bypassed.

4. Under the exercise of all bases of rights, the diversions shall be limited to 49 afa.

5. A measure of flow shall be bypassed around the point of diversion during the allowable diversion season that will be of sufficient quantity and quality to allow upstream and downstream fish passage and maintain in good condition any aquatic resources that would exist in downstream reaches under unimpaired flows. Determination of the bypass flow can be based on site-specific biological investigations conducted in consultation with DFG and NOAA Fisheries personnel. In the absence of site-specific data, the bypass shall not be less than the estimated long-term unimpaired February median flow at the point of diversion.

6. The bypass shall be a passive system that is designed to only divert flow when the terms of the SWRCB permit will be met. Outside the diversion season and at low flows, water will automatically bypass the point of diversion.

7. DFG is opposed to any project that impedes either upstream or downstream passage of fisheries resources. Any device or contrivance which prevents, impedes, or tends to prevent or impede the passage of fish up or downstream shall not be accepted as a means to divert or store water.

8. The cumulative maximum instantaneous rate of withdrawal shall not exceed a flow rate equivalent to 15 percent of the estimated "winter 20 percent exceedence flow." The "winter 20 percent exceedence flow" is the 20 percent exceedence value of the stream's daily average flow duration curve for the period December 15 to March 31. Cumulative withdrawal rate refers to the effects of this and all other permitted or licensed projects as well as diversion under riparian rights.

9. Any water intended for recreation or fire protection must be designated as a non-consumptive use.

10. Under the exercise of any basis of right, there shall be no direct diversion for irrigation or for frost or heat control.

11. The applicant shall develop and submit for DFG approval, a mitigation plan aimed at replacing lost plant, fish, and/or wildlife resources including, but not limited to, species or habitats listed in the California Natural Diversity Database. This plan shall include a survey which quantifies losses of resources that have or will occur as a result of this project. Plans shall specify measures taken to offset impacts to resources and outline specific mitigation and monitoring programs.

12. If warranted, an erosion control plan shall be developed. This plan shall outline measures aimed at alleviating sediment delivery into the Navarro River basin. This plan shall include:

    a. Time restriction for grading operations or other project-related activities to reduce the potential for erosion and sediment delivery to Anderson Creek.

    b. Buffer zones shall be established along any riparian corridor of the affected project site. Discing or removal of existing riparian vegetation or other disruptive work shall not occur wi thin said buffer zone.

    c. Erosion control for all exposed areas susceptible to erosion including seeding, mulching, tree planting, slope contouring, and other erosion protection measures shall be included in this plan.

13. If unforeseen problems arise which are causing significant adverse impacts to fish and/or wildlife resources or as further data is accumulated for analysis, the applicant may be required to remediate the situation to the satisfaction of DFG.

14. Permittee must agree to allow access for DFG personnel to monitor compliance.

All or some of these terms may be subject to modification or cancellation should facts warranting such action come to light at a later date.

NOTICE TO APPLICANT: The applicant should be advised that a Streambed Alteration Agreement (SAA) pursuant to Fish and Game Code sections 1601-03 may be required prior to any work, includi ng water diversion, within the stream zone. This agreement process will be administered through the Central Coast Region Office in Yountville and can be initiated by contacting the Streambed Alteration Section at (707) 944-5520. Work cannot be initiated until an SAA is executed.

If you have any questions regarding our comments, please contact Ms. Linda Hanson, Environmental Scientist, at (707) 944-5562; or Mr. Carl Wilcox, Habitat Conservation Manager, at (707) 944-5525; or by writing to the DFG at the above address.

cc: Cakebread Properties, LLP
c/o Wagner & Bonsignore
Consulting Engineers
444 North Third Street
Sacramento, CA 95814

Mr. William Hearn
Mr. Stacy Li
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

eg: Department of Fish and Game
H. Branch (Legal)
C. Vouchilas (SVCSR)
L. Hanson, J. Emig (CCR)

LH/pm

Exhibit ~~D~~

Exhibit # 14

Small Domestic Use Registrations
1990-2004
Humboldt County

Application ID	Applicant	Date Filed
D029728R	Wilder	4/26/1990
D029729R	Wilder	4/26/1990
D029730R	Wilder	4/26/1990
D029741R	Allen	5/9/1990
D029833R	Paoli	10/3/1990
D030091R	Hulbard	3/25/1992
D030235R	Noel	3/17/1993
D030315R	Olson	12/9/1993
D030316R	Fitch	12/9/1993
D030317R	Floyd	12/9/1993
D030318R	Quittenton	12/9/1993
D030319R	Jacobsen	12/9/1993
D030320R	Lemieux	12/9/1993
D030321R	Odegard	12/9/1993
D030414R	Anderson	12/8/1994
D030417R	Nichols	12/14/1994
D030499R	Campbell	12/12/1995
D030571R	Brooks	9/12/1996
D030572R	Shawver	9/12/1996
D030576R	Canzoneri	9/19/1996
D030598R	Ogden	3/11/1997
D030604R	Jennings	4/4/1997
D030624R	Canclini	6/3/1997
D030640R	Roeflofs	8/21/1997
D030651R	Archer	10/10/1997
D030775R	Youngreen	9/28/1998
D030817R	Wolf	12/7/1998
D030845R	Campbell	3/17/1999
D030911R	Faulkner	6/22/1999
D030916R	Caraway	7/1/1999
D031128R	Wilson	1/16/2001
D031440R	Hinz	9/8/2003
D031441R	Hinz	8/19/2003

Small Domestic Use Registrations
1990-2004
Marin County

Application ID	Applicant	Date Filed
D030071R	Tacherra	3/3/1992
D030152R	LV Ranch	7/2/1992

Small Domestic Use Registrations
1990-2004
Mendocino County

Application ID	Applicant	Date Filed
D029713R	The Lone Rock Parternship	4/9/90
D030064R	Richter	2/26/92
D030157R	Smith	7/8/92
D030167R	Hott	7/29/92
D030183R	Gersley	10/7/92
D030185R	Keim	10/15/92
D030291R	Swallow	10/14/93
D030346R	Dress	4/7/94
D030377R	McFarland Living Trust	7/11/94
D030394R	Graham	9/7/94
D030395R	Winding	9/7/94
D030427R	Pepperwood	1/26/95
D030428R	Golden	1/27/95
D030586R	Cooke	12/24/96
D030636R	Galey	8/1/97
D030660R	Covell	11/5/97
D030668R	Spivey	12/22/97
D030689R	Carsey	3/24/98
D030704R	Peter and Collette Rothschild Trust	5/20/98
D030705R	Hackett	5/22/98
D030709R	Ronald and Gail Gester Trust	6/2/98
D030713R	Smith	6/16/98
D030714R	Busse	6/16/98
D030719R	Red Cap	6/23/98
D030723R	Kasper	7/1/98
D030742R	Love	8/6/98
D030754R	Martz	8/31/98
D030767R	Basehore	9/18/98
D030768R	Walker	9/18/98
D030773R	Hallomas Inc.	9/25/98
D030774R	Nunes	9/28/98
D030778R	Gundling	9/30/98
D030784R	Kaplan	10/9/98
D030785R	Peterman	10/9/98
D030786R	Evenson	10/9/98
D030793R	Green	10/9/98
D030795R	Copper Queen Ranch	10/15/98
D030811R	Don Pedro Ranch Corporation	11/18/98
D030819R	Tebbutt	12/7/98
D030821R	Scheidegger	12/8/98
D030822R	Medaris	12/9/98
D030841R	Squire	2/18/99
D030843R	Williams	3/17/99
D030847R	Wuerfel	3/17/99
D030850R	Colton	3/26/99
D030862R	Clark	4/13/99
D030863R	Schaeffer	4/13/99
D030865R	Browne	4/13/99
D030883R	Ornbaun	4/27/99
D030887R	Rudovsky	5/13/99
D030888R	Rancho Navarro Association	5/13/99

Small Domestic Use Registrations
1990-2004
Mendocino County

D030889R	Bradford	5/13/99
D030894R	Whittaker Family Trust	5/13/99
D030899R	Pratt	6/22/99
D030900R	Venturi	6/22/99
D030902R	Russell	6/22/99
D030903R	Imhoff	6/22/99
D030905R	Kary B. Mullis Trust	6/22/99
D030906R	Harpe	6/22/99
D030907R	Dusenberry	6/22/99
D030908R	Kobler	6/22/99
D030909R	Shanley	6/22/99
D030917R	Pinoli	7/1/99
D030918R	Pinoli	7/1/99
D030921R	Hammond	7/1/99
D030937R	Mendocino Redwood Company	9/17/99
D030938R	Segar	9/17/99
D030939R	Baker	9/17/99
D030940R	Nelson	9/17/99
D030943R	Hanelt	9/17/99
D030953R	Mendocino Lake Clubhouse	10/14/99
D030957R	Alexander	10/14/99
D030968R	Kleve C Johnson DMD & Nancy G Johnson Revoc Intervivos Trust	10/14/99
D030969R	Riddell	10/14/99
D030985R	Murphey	11/22/99
D031000R	Frederick Martin & Francis Sylvia Martin Revocable Trust	1/21/00
D031010R	Hubbert	1/21/00
D031035R	Estes	3/21/00
D031062R	Romani	6/12/00
D031082R	Abbey Foundation for the Arts	7/25/00
D031083R	Hurt	7/25/00
D031098R	Vanslett	8/30/00
D031146R	Barron	2/1/01
D031172R	Weir	3/30/01
D031211R	Weir	7/18/01
D031221R	Carley	8/23/01
D031225R	Ostler	9/13/01
D031266R	Deutschman	1/11/02
D031301R	Yggdrasil Land Foundation	2/27/02
D031321R	Marcus	5/15/02
D031327R	Walworth	5/29/02
D031330R	Eubanks	6/3/02
D031338R	Steele	6/26/02
D031356R	Klaas	9/9/02
D031376R	Riordan	12/16/02
D031380R	Henwood	12/26/02
D031410R	Marrington	4/4/03
D031411R	Widler	4/7/03
D031472R	Mergener	12/17/2003
D031473R	Injayan	12/17/2003

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D030709R	Ronald and Gail Gester Trust	6/2/98
D030713R	Smith	6/16/98
D030714R	Busse	6/16/98
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D030784R	Kaplan	10/9/98
D030785R	Peterman	10/9/98
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D030821R	Scheidegger	12/8/98
D030822R	Medaris	12/9/98
D030841R	Squire	2/18/99
D030843R	Williams	3/17/99
D030847R	Wuerfel	3/17/99
D030850R	Colton	3/26/99
D030862R	Clark	4/13/99
D030863R	Schaeffer	4/13/99
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D030888R	Rancho Navarro Association	5/13/99

Small Domestic Use Registrations
1990-2004
Mendocino County

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D030900R	Venturi	6/22/99
D030902R	Russell	6/22/99
D030903R	Imhoff	6/22/99
D030905R	Kary B. Mullis Trust	6/22/99
D030906R	Harpe	6/22/99
D030907R	Dusenberry	6/22/99
D030908R	Kobler	6/22/99
D030909R	Shanley	6/22/99
D030917R	Pinoli	7/1/99
D030918R	Pinoli	7/1/99
D030921R	Hammond	7/1/99
D030937R	Mendocino Redwood Company	9/17/99
D030938R	Segar	9/17/99
D030939R	Baker	9/17/99
D030940R	Nelson	9/17/99
D030943R	Hanelt	9/17/99
D030953R	Mendocino Lake Clubhouse	10/14/99
D030957R	Alexander	10/14/99
D030968R	Kleve C Johnson DMD & Nancy G Johnson Revoc Intervivos Trust	10/14/99
D030969R	Riddell	10/14/99
D030985R	Murphey	11/22/99
D031000R	Frederick Martin & Francis Sylvia Martin Revocable Trust	1/21/00
D031010R	Hubbert	1/21/00
D031035R	Estes	3/21/00
D031062R	Romani	6/12/00
D031082R	Abbey Foundation for the Arts	7/25/00
D031083R	Hurt	7/25/00
D031098R	Vanslett	8/30/00
D031146R	Barron	2/1/01
D031172R	Weir	3/30/01
D031211R	Weir	7/18/01
D031221R	Carley	8/23/01
D031225R	Ostler	9/13/01
D031266R	Deutschman	1/11/02
D031301R	Yggdrasil Land Foundation	2/27/02
D031321R	Marcus	5/15/02
D031327R	Walworth	5/29/02
D031330R	Eubanks	6/3/02
D031338R	Steele	6/26/02
D031356R	Klaas	9/9/02
D031376R	Riordan	12/16/02
D031380R	Henwood	12/26/02
D031410R	Marrington	4/4/03
D031411R	Widler	4/7/03
D031472R	Mergener	12/17/2003
D031473R	Injayan	12/17/2003

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Application ID	Applicant	Date Filed
D029653R	Marum	2/2/1990
D029793R	Holland	8/8/1990
D029834R	Clark	10/4/1990
D030020R	Taplin	10/22/1990
D030030R	Camp	11/4/1991
D030127R	Clos Pegase Winery	5/14/1992
D030158R	Erasmy	7/13/1992
D030307R	Lynch	11/23/1993
D030347R	Coffman	4/8/1994
D030371R	Pine Ridge Winery	6/10/1994
D030434R	Univeristy of California Natural Reserve System	3/13/1995
D030435R	Buchwald-Baerwald	3/14/1995
D030461R	Kuleto	7/13/1995
D030481R	Lamoreaux	9/12/1995
D030488R	Hazlet	10/3/1995
D030559R	Long Meadow Ranch Partners	8/22/1996
D030582R	Read	12/10/1996
D030599R	Kuleto	3/19/1997
D030628R	Cox	7/8/1997
D030665R	Burton	12/5/1997
D030669R	Dickson	12/22/1997
D030671R	Bartolucci	1/16/1998
D030733R	Rose	7/22/1998
D020764R	Borneman	9/14/1998
D030766R	Ridley	9/18/1998
D030777R	Sculatti	9/29/1998
D030809R	Lee	11/9/1998
D030864R	Huntington	4/13/1999
D030919R	Nelson	7/1/1999
D030944R	Carpenter	9/17/1999
D031009R	Van Dewark	1/21/2000
D031011R	Rhead	1/21/2000
D031012R	Schultz	1/21/2000
D031016R	Hudson	2/1/2000
D031024R	Holquist	2/29/2000
D031032R	Jones	3/21/2000
D031041R	Gospodnetich	4/13/2000
D031130R	Brooks	1/16/2001
D031188R	Provost	5/24/2001
D031214R	Peebles	7/20/2001
D031354R	Miller	7/20/2001
D031357R	Brodman	9/5/2002
D031382R	Nemerever	1/9/2003

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Application ID	Applicant	Date Filed
D029650R	Bowles	1/31/1990
D029749R	Hood	5/23/1990
D029791R	Judd	8/8/1990
D029831R	Gourley	9/24/1990
D029862R	Polesky-Lentz Partnership	11/16/1990
D030000R	Wilson	8/28/1991
D030003R	Sogin	9/4/1991
D030095R	Manning	4/7/1992
D030211R	Stoumen	1/20/1993
D030220R	Herden	2/4/1993
D030221R	Johnson	2/4/1993
D030256R	Nardone	5/12/1993
D030286R	Collins	9/28/1993
D030297R	Schwartz	10/28/1993
D030353R	Heath	4/15/1993
D030423R	Friedrichsen	1/5/1995
D030433R	Noton	3/8/1995
D030460R	Zweig	7/10/1995
D030556R	Powers	7/17/1996
D030601R	The Bishops Ranch	4/4/1997
D030712R	Gillett	6/8/1998
D030727R	Damiani	7/13/1998
D030731R	Neerhout	7/20/1998
D030732R	McDermott	7/20/1998
D030741R	Murray	8/5/1998
D030743R	Mitchell	8/6/1998
D030755R	LeStrange	8/31/1998
D030758R	Gilg	9/4/1998
D030759R	Andreoli	9/4/1998
D030760R	Hour	9/14/1998
D030765R	Lindsley	9/15/1998
D030820R	Hussey	12/7/1998
D030823R	Duerloo	12/10/1998
D030867R	Painter	4/13/1999
D030881R	John Y James and Thais Garnett James Revocable Trust	4/27/1999
D030890R	Curtis	5/13/1999
D030891R	Bulger	5/13/1999
D030898R	LaFranchi Trust	6/22/1999
D030904R	Califronia Academy of Sciences	6/22/1999
D030923R	Kresch	7/28/1999
D030924R	Ferguson	7/29/1999
D030995R	Johnson	1/21/2000
D031005R	Sloan	1/21/2000
D031111R	Ramsey	9/21/2000
D031142R	Kahn	1/30/2001
D031143R	Allied Doemcq Wines USA	1/2/2001
D031145R	Kahn	12/21/2000
D031151R	Wilson	2/22/2001
D031168R	Gladstein	3/21/2001
D031173R	Prieto	3/30/2001

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D031267R	Werbe	1/11/2002
D031316R	Brothers	4/22/2002
D031318R	Newman	5/2/2002
D031326R	Lannin	5/29/2002
D031331R	Terribilini	6/3/2002
D031332R	Palefsky	6/6/2002
D031333R	Owen	6/6/2002
D031334R	Fosberg	6/13/2002
D031375R	Ostler	12/11/2002
D031390R	McMicking	1/28/2003
D031427R	McMicking	5/20/2003
D031451R	Fosberg	10/8/2003
D031458R	Tellefsen	10/28/2003

Exhibit ~~S~~ X

Exhibit #15

Livestock Stock Pond Registrations
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Humboldt County

Application ID	Applicant	Date Filed
S013509	Stover Ranch	6/26/1990
S013510	Stover Ranch	6/26/1990
S013511	Stover Ranch	6/26/1990
S013512	Stover Ranch	6/26/1990
S013513	Stover Ranch	6/26/1990
S013514	Stover Ranch	6/26/1990
S013515	Stover Ranch	6/26/1990
S013516	Stover Ranch	6/26/1990
S013517	Stover Ranch	6/26/1990
S013518	Stover Ranch	6/26/1990
S013519	Stover Ranch	6/26/1990
S013520	Stover Ranch	6/26/1990
S013521	Stover Ranch	6/26/1990
S013522	Stover Ranch	6/26/1990
S013523	Stover Ranch	6/26/1990
S013524	Stover Ranch	6/26/1990
S013525	Stover Ranch	6/26/1990
S013526	Stover Ranch	6/26/1990
S013558	US Bureau of Land Management	3/13/1991
S013726	Viera	8/7/1991
S013727	Gray	8/12/1991
S013728	Jewett	8/19/1991
S013744	Davis	10/15/1991
S013756	Goodner	11/4/1991
S013826	Davis	9/1/1992
S013920	Odegard	3/25/1992
S014036	Filmer	7/1/1993
S014167	Brown	10/7/1993
S014314	Ruth	12/21/1994
S014391	Tubb	5/18/1995
S014446	Stevens	7/24/1995
S014447	Shawver	7/24/1995
S014763	Schamberg	1/6/1997
S014860	Frost	1/29/1998
S014962	Coates	5/12/1998
S014965	Nelson	6/9/1998
S015054	Parker	9/29/2000
S015083	Kitna	2/25/1999
S015099	Morais	7/19/1999
S015186	Lane	6/16/2001
S015215	Lattanza	2/27/2001
S015230	J W Fisher Logging	8/31/2000
S015292	Bazemore	7/23/2001
S015368	Sun Valley Floral Farms	4/2/2000
S015405	Christman	11/6/2001
S015410	Goff	4/28/2003

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1990-2004
Marin County

Application ID	Applicant	Date Filed
S013506	Lucas Valley Ranch	9/21/1990
S013720	Borello	7/22/1991
S013879	Cerini	11/30/1992
S014038	Marin Municipal Water District	7/6/1993
S014039	Marin Municipal Water District	7/6/1993
S014040	Marin Municipal Water District	7/6/1993
S014759	Martinelli	2/4/1997
S014760	Martinelli	2/4/1997
S014764	Martinelli	2/4/1997
S014981	Dierks	7/7/1998

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1990-2004
Mendocino County

Application ID	Applicant	Date Filed
S013384	Modugno	3/26/90
S013696	Valentine	6/14/91
S013701	Bair	6/13/91
S013710	Dileto et al	7/1/91
S013711	Dileto et al	7/1/91
S013718	Villarreal	7/19/91
S013719	Lovera	7/18/91
S013722	Sosa	7/18/91
S013746	Stoker	10/15/91
S013747	Sweetwater Ranch/Four Winds Farm	10/15/91
S013771	Bates & Schmitt	1/8/92
S013776	Bello	1/13/92
S013841	McFarland	9/18/92
S013939	Bennett	7/17/92
S013940	Bennett	7/17/92
S013947	Hansen	11/6/92
S013977	Solomon & Tournoour Vineyards	1/28/93
S013984	Crawford	3/8/93
S013985	Crawford	3/8/93
S014016	H&W Vineyards	6/22/93
S014129	Rosetti Brothers	10/25/93
S014150	Brady	1/10/94
S014182	Reid	6/10/94
S014234	Van Zandt	10/17/94
S014244	Crawford	7/7/94
S014292	Brucker	12/12/94
S014293	Pepperwood	12/12/94
S014313	Potter Valley Irrigation District	1/31/95
S014322	Prati	2/7/95
S014373	Grasso	4/10/95
S014374	Grasso	4/10/95
S014385	Parducci Wine Estates	4/21/95
S014395	Pronsolino	6/16/95
S014448	Thormahlen	7/28/95
S014469	Copperrider	8/21/95
S014470	Copperrider	8/21/95
S014554	Brunicardi	2/28/96
S014569	Caughey	4/21/96
S014589	De Tevis	6/28/96
S014732	Mendocino Redwood Company	5/24/96
S014749	Bartolomei	4/24/97
S014861	Frey Vineyard	1/29/98
S014862	Frey Vineyard	1/29/98
S014863	Frey Vineyard	1/29/98
S014864	Frey Vineyard	1/29/98
S014865	Frey Vineyard	1/29/98
S014866	Frey Vineyard	1/29/98
S014948	Pronsolino	3/27/98
S014949	Pronsolino	3/27/98
S014955	Redwood Empire Council	4/13/98
S014958	Nunes	4/29/98

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S014959	Nunes	4/29/98
S014985	Covell	8/21/97
S014996	Moreno & Company	8/12/98
S015014	Hallomas Inc	10/13/98
S015021	Demuth	10/13/98
S015034	Dusenberry	6/22/99
S015041	Rosetti	2/10/99
S015043	Rosetti	2/10/99
S015047	Rosetti	2/10/99
S015075	Van Bueren	1/5/00
S015076	Van Bueren	1/5/00
S015096	Meyer	5/15/98
S015097	Marks	12/7/98
S015098	Mathias	2/1/99
S015102	Martin	12/20/99
S015103	McGuiness	12/22/99
S015110	Niesen	10/26/00
S015116	Wasson	4/13/01
S015123	Panofsky	3/6/01
S015127	Whittaker	5/4/99
S015130	Wuerfel	12/4/98
S015131	Munoz	6/14/01
S015132	Seekins	3/6/00
S015147	Dominguez	10/3/01
S015149	Soper Company	2/13/01
S015183	Wentzel	1/16/02
S015184	Ashurst	1/16/02
S015199	Thomas	10/21/01
S015200	Thomas	10/21/01
S015201	Thomas	10/21/01
S015202	Thomas	10/21/01
S015203	Thomas	10/21/01
S015204	Thomas	10/21/01
S015205	Thomas	10/21/01
S015206	Thomas	10/21/01
S015207	Golden	10/21/01
S015208	Thomas	10/21/01
S015209	Gannon	10/21/01
S015210	Thomas	10/21/01
S015212	Oswald	7/22/99
S015213	Oswald	7/22/99
S015216	Thornhill Vineyard Properties	6/29/01
S015217	Thornhill Vineyard Properties	6/29/01
S015218	Thornhill Vineyard Properties	6/29/01
S015219	Nevin	8/2/01
S015228	Rogina Water Company	4/22/02
S015233	Ornbaun	4/21/99
S015235	William Charles Trust	9/11/00
S015238	Oswald	6/4/01
S015244	Edwards	2/27/01
S015289	Bergner	4/9/01
S015290	Bergner	4/9/01

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S015291	Bergner	4/9/01
S015303	Barron	7/24/00
S015306	Anderson Vineyards	4/25/00
S015313	Fetzer Vineyards	11/8/02
S015314	Fetzer Vineyards	11/8/02
S015315	Fetzer Vineyards	11/8/02
S015316	Fetzer Vineyards	11/8/02
S015317	Fetzer Vineyards	11/8/02
S015318	Fetzer Vineyards	11/8/02
S015319	Lashinksi	11/12/02
S015320	Beckstoffer Russian River Vineyards	8/1/02
S015349	Balverne Vineyards	12/27/02
S015353	Booth	3/1/01
S015362	Beckstoffer Russian River Vineyards	3/10/03
S015365	Ruddick Ranch	9/28/01
S015371	Beckstoffer Russian River Vineyards	3/11/03
S015400	Fetzer Vineyards	1/29/03
S015401	Fetzer Vineyards	1/29/03
S015402	Fetzer Vineyards	1/29/03
S015403	Fetzer Vineyards	1/28/03
S015404	Fetzer Vineyards	1/28/03
S015414	Hendricks	1/17/03
S015433	Yggdrasil Land Foundation	6/20/03
S015434	Yggdrasil Land Foundation	6/20/03
S015477	Milovina Brothers	1/14/04
S015478	Milovina Brothers	1/14/04
S015479	Milovina Brothers	1/14/04
S015480	Milovina Brothers	1/14/04
S015483	Surprise Valley Ranch	1/20/04
S015484	Surprise Valley Ranch	1/20/04

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Application ID	Applicant	Date Filed
S013386	Abruzzini	4/18/1990
S013387	Abruzzini	4/18/1990
S013497	Corrigan	9/5/1990
S013536	Fifield	10/31/1990
S013739	Camp	10/1/1991
S013748	Scurry	10/22/1991
S013828	Alneida	9/1/1992
S013952	Learned	1/12/1993
S013953	Learned	1/12/1993
S013954	Learned	1/12/1993
S013955	Learned	1/12/1993
S013988	Hienzsch	3/24/1993
S013992	Kephart	4/19/1993
S013993	York Creek Vineyards	4/1/1993
S013994	York Creek Vineyards	4/1/1993
S013995	York Creek Vineyards	4/1/1993
S013996	York Creek Vineyards	4/1/1993
S014052	Charles F. Shaw Vineyards & Winery	7/13/1993
S014115	Young	9/23/1993
S014137	Burns	11/24/1993
S014138	Burns	11/24/1993
S014151	Dollar	2/11/1994
S014160	Bennett	3/8/1994
S014161	Bennett	3/8/1994
S014164	Parady	3/11/1994
S014176	Ho	4/25/1994
S014184	Wyllie	6/29/1994
S014203	Juliana Vineyards	8/8/1994
S014233	Moore	10/11/1994
S014241	MacVeagh	10/6/1994
S014242	Smith	10/27/1994
S014243	Hudak	10/28/1994
S014252	Balyeat	11/18/1994
S014290	Marty	11/30/1994
S014294	Baerwald	12/9/1994
S014295	Baerwald	12/9/1994
S014296	Buchwald-Baerwald	12/9/1994
S014297	Neyers	12/9/1994
S014312	Van den Bogaard	1/30/1995
S014389	Linstad	5/5/1995
S014514	Pacific Union College	11/21/1995
S014740	Alluvial Vineyard	1/29/1997
S014741	Madrigal	1/29/1997
S014836	Kornell Cellars	9/23/1997
S014013	Cutler	10/13/1998
S014025	Haberger	9/11/1998
S015040	Youngson	2/22/2000
S014051	Burns	5/17/2000
S014053	Passaro	4/11/2000
S015058	Provost	9/5/2000
S015077	Van Dewark	11/19/1999

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S015078	Van Dewark	1/5/2000
S015088	Lewelling Family Trust	12/3/1999
S015119	Parker	1/24/2000
S015138	Holquist	9/29/1999
S015150	Carpenter	9/20/2002
S015231	Lynch Ranch	8/20/2001
S015232	Lynch Ranch	8/20/2001
S015248	City of Calistoga	5/8/2001
S015301	Bleechner	9/14/2000
S015308	Silverado Hills Vineyard	11/1/2002
S015356	Desimoni	1/29/2001
S015370	Scaggs	11/30/2000
S015387	Spring Mt. Vineyard	7/9/2001
S015388	Good Wine Company	7/9/2001
S015409	Swanson Vineyards	4/23/2003
S0158457	Beringer Blass Wine Estates	1/6/2004

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Application ID	Applicant	Date Filed
S013469	Warner	5/17/1990
S013484	Kreiger	8/24/1990
S013555	Boring	1/28/1991
S013563	Boyce	4/10/1991
S013709	Cervantes	5/13/1991
S013724	Hafner Vineyard	7/26/1991
S013755	Steinway	10/15/1991
S013760	Skall	12/3/1991
S013792	Bastian	3/9/1992
S013793	Bastian	3/9/1992
S013811	Klos	4/17/1992
S013813	Folger	5/29/1992
S013814	Folger	5/29/1992
S013850	Williams	10/13/1992
S013877	Chateau St. Jean	11/18/1992
S013956	C W Stuber-Stroeh Engineering Group	1/12/1993
S013957	Learned	1/12/1993
S013958	Learned	1/12/1993
S013959	Learned	1/12/1993
S013960	Learned	1/12/1993
S013961	Learned	1/12/1993
S013962	Learned	1/12/1993
S013963	Learned	1/12/1993
S013964	Learned	1/12/1993
S013965	Learned	1/12/1993
S014005	Gallo Vineyards	5/11/1993
S014006	Berkeley-Albany YMCA	5/13/1993
S014057	Ferrari-Carano Vineyards & Winery	8/4/1993
S014058	Ferrari-Carano Vineyards & Winery	8/4/1993
S014059	Ferrari-Carano Vineyards & Winery	8/4/1993
S014060	Ferrari-Carano Vineyards & Winery	8/4/1993
S014061	Ferrari-Carano Vineyards & Winery	8/4/1993
S014062	Ferrari-Carano Vineyards & Winery	8/4/1993
S014063	Ferrari-Carano Vineyards & Winery	8/4/1993
S014064	Ferrari-Carano Vineyards & Winery	8/4/1993
S014065	Ferrari-Carano Vineyards & Winery	8/4/1993
S014066	Ferrari-Carano Vineyards & Winery	8/4/1993
S014070	Silverado Premium Properties	8/10/1993
S014071	Silverado Premium Properties	8/10/1993
S014072	Silverado Premium Properties	8/10/1993
S014073	Silverado Premium Properties	8/10/1993
S014074	Silverado Premium Properties	8/10/1993
S014075	Silverado Premium Properties	8/10/1993
S014076	Silverado Premium Properties	8/10/1993
S014077	Silverado Premium Properties	8/10/1993
S014078	Silverado Premium Properties	8/10/1993
S014079	Silverado Premium Properties	8/10/1993
S014080	Silverado Premium Properties	8/10/1993
S014081	Silverado Premium Properties	8/10/1993
S014082	Silverado Premium Properties	8/10/1993
S014083	Ledbetter Farms	8/10/1993

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S014084	Ledbetter Farms	8/10/1993
S014085	Ledbetter Farms	8/10/1993
S014086	Silverado Premium Properties	8/10/1993
S014087	Silverado Premium Properties	8/10/1993
S014088	Clos Du Bois Wines	8/10/1993
S014089	Silverado Premium Properties	8/10/1993
S014090	River Bend Vineyards	8/10/1993
S014091	River Bend Vineyards	8/10/1993
S014092	River Bend Vineyards	8/10/1993
S014093	Airport Business Center	8/10/1993
S014094	Klein Foods	8/10/1993
S014095	Klein Foods	8/10/1993
S014096	UCC Vineyards Group	8/10/1993
S014097	UCC Vineyards Group	8/10/1993
S014200	Rickards	8/5/1994
S014202	Austin	6/23/1994
S014205	Evans	7/22/1994
S014230	Miller	10/4/1994
S014231	Miller	10/4/1994
S014237	City of Cloverdale	10/17/1994
S014299	Flowers	1/5/1995
S014378	Bou	2/7/1995
S014392	Wasson Vineyards	5/23/1995
S014393	Wasson Vineyards	5/23/1995
S014420	Costello	7/14/1995
S014479	Nixon	9/11/1995
S014532	Pompei	1/10/1996
S014572	Whitman	5/9/1996
S014587	Case	4/19/1997
S014748	Folger	9/22/1997
S014773	Staub	3/28/1997
S014795	Bleifuss	4/7/1997
S014796	Bleifuss	4/7/1997
S014847	Rush	11/10/1997
S014851	Horowitz	12/1/1997
S014857	Loarie	1/12/1998
S014910	Beringer Wine Estates Company	2/3/1998
S014911	Olson	2/9/1998
S014922	Olson	2/9/1998
S014923	Ferrari-Carano Vineyards & Winery	3/19/1998
S014924	Ferrari-Carano Vineyards & Winery	3/19/1998
S014925	Ferrari-Carano Vineyards & Winery	3/19/1998
S014926	Ferrari-Carano Vineyards & Winery	3/19/1998
S014927	Ferrari-Carano Vineyards & Winery	3/19/1998
S014928	Ferrari-Carano Vineyards & Winery	3/19/1998
S014929	Ferrari-Carano Vineyards & Winery	3/19/1998
S014930	Ferrari-Carano Vineyards & Winery	3/19/1998
S014931	Ferrari-Carano Vineyards & Winery	3/19/1998

Exhibit 6

Exhibit #16

Streambed Alteration Agreements
1993-2002
Mendocino County

APPLICATION ID	STREAM	APPLICANT	DATE ISSUED
0004-93	BRUSH CREEK TRIB	AT&T	03-Feb-93
0006-93	MCDOWELL CREEK	LAKEPORT, CITY	05-Jan-93
0006-94	LITTLE VALLEY CREEK	KAIJANKOSKI, ANDREW	11-Feb-94
0009-93	ACKERMAN CREEK	LOUISIANA PACIFIC	25-Jan-93
0012-93	NOYO RIVER	DOUGLAS, PAUL	08-Jan-93
0014-94	TAYLOR CREEK	C E M R	10-Jan-94
0020-93	RUSSIAN RIVER	KOHN PROPERTIES	11-Jan-93
0038-94	BIG RIVER LITTLE NF	BRODERICK, PETER	19-Jan-94
0040-93	RUSSIAN RIVER	WHITE, AL	25-Jan-93
0046-93	FORSYTHE CREEK	TODD, TIM	11-Feb-93
0051-93	SPRINGS CREEK TRIB	BEWLEY, STUART	02-Feb-93
0053-93	RUSSIAN RIVER EF	SCOTT, JIM	28-Jan-93
0063-93	CRAWFORD CREEK	PARDUCCI, W H	11-Feb-93
0074-93	ROBINSON CREEK	COOK, WALDO	07-Mar-93
0074-94	GIBSON CREEK	MAYFIELD, RICK	01-Feb-94
0077-94	POINT ARENA CREEK	POINT ARENA CITY	24-Jan-94
0089-93	TEN MILE CREEK	SLUIS, STAN	22-Mar-93
0091-93	MICHAELS CREEK	CALIF CONSERVATION CREWS	17-Feb-93
0092-93	LOW GAP CREEK	CALIF CONSERVATION CREWS	17-Feb-93
0092-94	DAUGHERTY CREEK & TRIBS	FRECHOU, BOB	10-Feb-94
0093-93	BEAR CREEK	CALIF CONSERVATION CREWS	17-Feb-93
0094-93	GARCIA RIVER	FREDRICKS, RICHARD	15-Mar-93
0097-94	GUALALA RIVER LITTLE NF	FORBES, RANDALL	10-Feb-94
0103-93	LITTLE GARCIA CREEK	HOWELL, MIKE	19-Feb-93
0103-94	NAVARRO RIVER	LOUISIANA PACIFIC	28-Mar-94
0105-93	DOTY CREEK	GUALALA RIVER SH REST GP	21-Feb-93
0114-94	RUSSIAN RIVER WB	TODD, KEN	24-Feb-94
0124-93	GUALALA RIVER	HOVLAND, PATRICK	31-Mar-93
0125-93	ROCKPILE CREEK	HOVLAND, PATRICK	31-Mar-93
0138-94	RATTLESNAKE CREEK	HOLM, HOMER	25-Apr-94
0139-94	ROBINSON CK/DRY CK/GUALALA LNF	KELLY, SCOTT	06-Apr-95
0140-94	GARCIA RIVER	FREDRICKS, RICHARD	25-May-94
0151-94	GARCIA RIVER	HIATT, WAYNE	25-Apr-94
0158-93	BIG RIVER	LARKIN, DAVID	18-Mar-93
0160-94	WAGES CREEK	MOORE, DEWEY	19-Mar-94
0164-93	TEN MILE RIVER LNF UNN TRIB	ORME, MICHAEL	06-Mar-93
0166-94	RUSSIAN RIVER EB	LAMALFA, RICHARD	20-Mar-94
0172-94	BIG RIVER & TRIBS	FRYKMAN, DAVID	01-Apr-94
0174-93	RUSSIAN RIVER	BELLOWS, FRED	08-Mar-93
0176-93	PARSONS CREEK	UNIV OF CALIF	10-Mar-93
0180-93	RUSSIAN RIVER	FORD, DAVID	07-Apr-93
0181-93	MCCLURE CREEK	BARTLOMEI, C T	11-Mar-93
0181-94	RUSSIAN RIVER	OWNSBEY, BILL	06-Apr-94
0182-93	RUSSIAN RIVER WB	THOMAS ORCHARDS	11-Mar-93
0183-93	RUSSIAN RIVER	THOMAS ORCHARDS	11-Mar-93
0184-93	FORSYTHE CREEK	KOHN PROPERTY	11-Mar-93
0185-93	RUSSIAN RIVER	PIPER, TOM	11-Mar-93
0196-93	BRUSH CREEK	CAUGHEY, LYNN	21-Apr-93
0200-93	RUSSIAN RIVER	RUDDICK, MATT	12-Mar-93
0205-94	UNNAMED STREAM	BERRY, BILL	25-Mar-94

Streambed Alteration Agreements
1993-2002
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0206-94	GRIST CREEK	ROUND VALLEY WATER DIST	25-Mar-94
0211-94	GUALALA RIVER NF	KELLY, SCOTT	25-Apr-94
0212-94	SHERWOOD CREEK/OUTLET CREEK	SEQUEIRA, CELESTE	08-Apr-94
0223-93	RUSSIAN RIVER	RUDDICK, CHRIS	13-Mar-93
0226-94	GARCIA RIVER	BEAN, RALPH	13-May-94
0227-94	NOYO RIVER NF	SCHANTZ, DAVID	07-Apr-94
0244-93	BIG RIVER	IVERSEN, RON	10-Apr-93
0246-93	UNKNOWN STREAM	BLENCOWE, CRAIG	15-Apr-93
0254-93	JOHN HIATT CREEK	MOORE, MARK	23-May-93
0255-93	COTTENEVA CREEK	MOORE, MARK	22-Apr-93
0255-94	NAVARRO RIVER	GOWAN, JIM	16-Mar-94
0256-94	GARCIA RIVER	STORNETTA, LARRY	02-Apr-94
0257-94	BRUSH CREEK	CAUGHEY, LYNN	08-Apr-94
0258-93	EEL RIVER	PETERS, ROBERT	28-Apr-93
0258-94	NAVARRO RIVER	GOWAN, DAVE	11-Apr-94
0259-94	NAVARRO RIVER	BATES, TIM	11-Apr-94
0260-94	RED MOUNTAIN CREEK	BOLDT, FARON WAYNE	24-Apr-94
0263-94	BIG RIVER SF	POOL, GRANVILLE	02-May-94
0265-93	NAVARRO RIVER	C E M R	31-Mar-93
0266-93	RUSSIAN RIVER EB	WELCH, MARK	07-Apr-93
0266-94	POINT ARENA CREEK	SOLDANI, JIM	03-Jun-94
0267-93	RUSSIAN RIVER WB	NEESE, BILL	22-Mar-93
0268-93	EEL RIVER MIDDLE FORK	ROWLAND, RICHARD	28-Apr-93
0281-94	GROSHONG GULCH	LEWICKI, FRANK	15-May-94
0282-93	TEN MILE RIVER LNF	ORME, MICHAEL	07-May-93
0282-94	BIG RIVER NF	MAXEY, DOUG	05-May-94
0283-94	SIGNAL CREEK	BURNS, JOHN JR	03-Jun-94
0284-93	ELK CREEK	TODD, BERT	08-May-93
0285-94	EEL RIVER SF	BERESFORD, RICHARD	21-Apr-94
0291-94	MULE CREEK	RIBAR, PETER	25-Apr-94
0298-94	SINGLEY CREEK	GOTT, K N	13-May-94
0299-94	TEN MILE RIVER	MALLORY, DOUGLAS	22-Apr-94
0300-93	RANCHERIA CREEK	HANELT, FREDA	30-Apr-93
0301-93	ANDERSON GULCH	WEBSTER, ROY	14-May-93
0302-93	RUSSIAN RIVER	DAUGHERTY, THOMAS	14-Apr-93
0303-93	HAYFORK CREEK	SCHANTZ, DAVID	08-May-93
0303-93	OLDS CREEK	SCHANTZ, DAVID	08-May-93
0304-93	EEL RIVER	SULLIVAN, FORREST	09-Apr-93
0304-94	RAILROAD GULCH	BISHOP, BRIAN	31-May-94
0308-93	RUSSIAN RIVER	NELSON, GREGORY	25-Apr-93
0311-93	UNKNOWN STREAM	MUNOZ, RICHARD	19-Jun-93
0319-93	RAMON CREEK NF	FRYKMAN, DAVID	05-May-93
0333-93	GARCIA RIVER	BRADY, HUGH	29-Apr-93
0337-94	FALL CREEK	MAXEY, DOUG	24-Jun-94
0338-93	FORSYTHE CREEK	MENDOCINO COUNTY WATER AG	10-May-93
0341-93	ROBINSON CREEK	GULBRANSEN, VIRGINIA	25-May-93
0343-93	ACKERMAN CREEK	RUDDICK, MATT	21-Apr-93
0346-94	NAVARRO RIVER	BROWN, MARK	18-Apr-94
0347-94	SALMON CREEK	MALLORY, DOUGLAS	09-May-94
0348-93	DEHAVEN CREEK	MALLOY, DOUG	19-Apr-93

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0348-93	REDWOOD CREEK	MALLOY, DOUG	19-Apr-93
0349-93	EEL RIVER	ZOBEL, HARRY	20-Apr-93
0351-94	WAGES CREEK NF	MALLORY, DOULGAS	16-May-94
0352-94	EEL RIVER MIDDLE FORK	ROWLAND, RICHARD	02-Jun-94
0353-94	NAVARRO RIVER	BLATTNER, ERNEST	02-Jun-94
0359-93	RUSSIAN RIVER	BRADFORD, ROBERT	01-May-93
0360-93	BEAR TRAP CREEK	HINCKLEY, JONATHAN	04-May-93
0363-93	NAVARRO RIVER	BLATTNER, ERNEST	21-May-93
0364-93	FOX GULCH	OVERFIELD, ALLEN	19-May-93
0372-93	UNKNOWN STREAM	VANDERHORST, STEVEN	05-May-93
0373-93	BLACKSMITH CREEK	FLEMING, MARK	06-May-93
0379-94	GARCIA RIVER	DRUMRIGHT, INGRID	26-May-94
0380-93	EEL RIVER SF	POOL, GRANVILLE	21-May-93
0385-94	GARCIA RIVER	STORNETTA, HENRY	26-May-94
0387-94	COLD CREEK	BAUER, DON	22-Jun-94
0390-93	MILL CREEK	HOWELL, MIKE	14-May-93
0390-93	BEAR PEN CREEK	HOWELL, MIKE	14-May-93
0390-93	GARCIA RIVER	HOWELL, MIKE	14-May-93
0390-94	BRUSH CREEK	BIAGGI, MIKE	09-May-94
0391-93	RUSSIAN RIVER	THOMAS, STEPHEN	11-May-93
0391-94	GARCIA RIVER	STORNETTA, WALT	03-May-94
0392-93	RANCHERIA CREEK	SNYDER, STEVEN	14-May-93
0394-93	MILL CREEK NF	BALLARD, ROBERT	17-May-93
0401-94	NOYO RIVER	ANDERSEN, CHARLES	13-May-94
0406-94	GARCIA RIVER	HAY, RICHARD	25-May-94
0407-94	GARCIA RIVER NF	HAY, WILLIAM	25-May-94
0408-94	GARCIA RIVER	HAY, WILLIAM	25-May-94
0411-93	BIG RIVER	FISCHER, NIEL	12-May-93
0411-93	JOHNSON CREEK	FISCHER, NIEL	12-May-93
0413-94	GUALALA RIVER	BOWER, JOHN	20-May-94
0416-93	UNKNOWN STREAM	CHECKAL, GREG	04-Jun-93
0421-94	FELIZ CREEK	MENDOCINO ENGINEERING	02-Jun-94
0428-94	DARK GULCH CREEK	C E M R	17-May-94
0434-94	WAGES CREEK	BETSWORTH, GERG	06-Jun-94
0440-94	UNKNOWN STREAM	VANDERHORST, STEVEN	22-May-94
0443-93	TEN MILE CREEK SF	OVERFIELD, ALLEN	19-May-93
0446-94	ALDER CREEK	MOYLES, FRANK	27-Jun-94
0449-94	EEL RIVER	PETERS, ROBERT	02-Jun-94
0455-93	RUSSIAN RIVER EB	SONOMA COUNTY WATER AG	20-May-93
0459-93	TOMKI CREEK	SORACE, TONY	09-Jun-93
0459-94	ALDER CREEK	STORNETTA, ASE	27-Jun-94
0461-94	GRIST/MILL CREEK	POLSLEY, RAYMOND	02-Jun-94
0462-94	MILL CREEK	ANDERSON, ERNIE	28-May-94
0463-94	MILL CREEK TRIB	RIDEOUT, AL	28-May-94
0466-93	HENSLEY CREEK	MARQUARDT, DONALD	03-Jun-93
0476-94	HULLS CREEK/WHO WHO CREEK	FLEMING, MARK	22-Jun-94
0477-94	NAVARRO RIVER	MORIN, TIMOTHY	22-Jun-94
0481-93	MILLS CREK	L D GIACOMINI INC	29-Jun-93
0483-94	EEL RIVER SB SF	MUNOZ, RICHARD	14-Jun-94
0484-94	RATTLESNAKE CREEK/EEL RIVER	BAILEY, AGNES	14-Jun-94

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0485-93	FERGUSON CREEK	CROWLEY, JOHN	09-Jul-93
0488-94	UNKNOWN STREAM	OHLSON, RON	24-Jun-94
0489-93	BUSH CREEK	MARCH, CHUCK	19-May-93
0491-94	NO NAME CRK TRIB NAVARRO RIVER	POOL, GRANVILLE	11-Jul-94
0492-94	NO NAME CRK TRIB HAEHL CREEK	POOL, GRANVILLE	08-Jun-94
0495-94	MILL CREEK	MAILLIARD, LARRY	15-Jun-94
0500-93	SHORT CREK	BAUER, DON	01-Jun-93
0503-93	RANCHERIA CREEK	GALBREATH, FRED	15-May-93
0504-93	MILL CREEK	THOMAS, STEVE	17-May-93
0505-93	RUSSIAN RIVER	REDDING, DAVID	25-May-93
0515-94	NOYO RIVER	STONE, WILLIAM	15-Jun-94
0517-94	DAVIS CREEK	LOGAN, GORDON	21-Aug-94
0518-93	GUALALA RIVER LITTLE NF	KELLY, SCOTT	28-May-93
0520-93	TEN MILE RIVER CLARK FORK	MELO, JERE	01-Jun-93
0520-94	BRUSH CREEK	FISCHER, NIEL	18-Jul-94
0526-94	TEN MILE RIVER MF & TRIBS	MALLORY, DOUGLAS	13-Jun-94
0532-93	RUSSIAN RIVER	WHITE, BRIAN JR	28-May-93
0533-94	RUSSELLBROOK CREEK	C E M R	15-Jun-94
0538-93	INDIAN CREEK & TRIBS	RIBAR, PETER	12-Jun-93
0539-94	ELK CREEK	BEAN, RALPH	22-Jun-94
0540-94	WAGES CREEK	BARBER, TERRI	16-Jun-94
0542-93	NAVARRO RIVER	WYANT, FRANK	05-May-93
0543-93	ANDERSON CREEK	ROBERTS, BRIAN	17-May-93
0544-93	IRISH CREEK	ACHER, CHARLES	23-Apr-93
0547-93	RATTLESNAKE CREEK	BAILEY, AGNES	12-Jun-93
0549-94	ALBION RIVER	CARP, WILLIAM	30-Jun-94
0559-94	ANDERSON CREEK	ROBERTS, BRIAN	01-Jun-94
0564-93	SODA CREEK	LOUISIANA PACIFIC	29-Jun-93
0565-93	RUSSIAN RIVER	PARDUCCI, W	25-Jun-93
0570-94	ROBINSON CREEK	SPANGLER, ELY	07-Jul-94
0571-94	ROBINSON CREEK	SHOCKEY, KENNETH	07-Jul-94
0572-93	BILLINGS CREEK	PORTER, DON	25-Jun-93
0572-94	DRY CREEK	MILLER, PATRICIA	07-Jul-94
0573-94	DRY CREEK	CLARK, MARK	06-Jul-94
0580-94	OUTLET CREEK	MCCRALEY, ROBERT	15-Jul-94
0583-93	LONG VALLEY CREEK	MOORE, MARK	28-Jul-93
0584-93	CAVE CREEK	MCBRIDE, GORDON	12-Jun-93
0585-94	DUTCH HENRY CREEK	HUMPHREY, JAMES	27-Jun-94
0586-94	HOLLOW TREE CREEK	HUMPHREY, JAMES	27-Jun-94
0587-94	DAUGHERTY CREEK	HUMPHREY, JAMES	27-Jun-94
0588-94	SODA CREEK	HUMPHREY, JAMES	27-Jun-94
0589-94	TURNER CREEK	HUMPHREY, JAMES	27-Jun-94
0597-93	MILL CREEK	DAVIS, JEFF	15-Jun-93
0603-94	BIG GULCH	BOWER, JOHN	11-Jul-94
0605-93	BAECHTEL CREEK	REID, GARY	15-Jun-93
0606-94	GARCIA RIVER	BELL, CRAIG	11-Jul-94
0608-94	ELK CREEK SODA FORK	MORIN, TIM	15-Aug-94
0609-93	EEL RIVER SF	KIRK, CHARLIE	15-Jun-93
0610-94	DENMARK CREEK	SPEARS, ROBERT	09-Aug-94
0616-94	RUSSIAN RIVER EB	MCFADDEN, EUGENE J.M.	06-Jul-94

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0620-93	RUSSIAN RIVER	WILLIAMS, BRUCE	18-Jun-93
0620-93	DOOLEY CREEK	WILLIAMS, BRUCE	18-Jun-93
0622-94	DUNN CREEK	GOTT, K N	11-Jul-94
0624-94	DERBY CREEK	MOHR, ALAN	29-Jul-94
0631-93	GRIST CREEK	POLSLEY, RAYMOND	14-Jul-93
0631-93	MILL CREEK	POLSLEY, RAYMOND	14-Jul-93
0632-93	BLUE WATER CREEK TRIB	VAN HOUSEN, CRAIG	08-Jul-93
0635-93	RANCHERIA CREEK	GLOECKNER, CHARLES	06-Jul-93
0644-93	CLEARBROOK CREEK	BISHOP, BRIAN	02-Jul-93
0644-93	KAISEN GULCH	BISHOP, BRIAN	02-Jul-93
0645-93	ELK CREEK	GIACOMINI, L D	21-Aug-93
0647-93	TEN MILE RIVER NF	ORME, MICHAEL	20-Jul-93
0648-94	NAVARRO RIVER TRIB	CAHN, DEBORAH	16-Aug-94
0651-93	LAKE CLEONE TRIB	CALLOWAY, ROGER	29-Jun-93
0655-94	BROADDUS CREEK TRIBS	KENT, NICHOLAS	27-Jul-94
0656-93	ELK CREEK	C E M R	25-Jun-93
0658-93	BLUE WATER HOLE CREEK	NEW GROWTH FORESTRY	07-Jul-93
0659-93	BARNWELL CREEK	NEW GROWTH FORESTRY	12-Jul-93
0660-93	BEAR CREEK	NEW GROWTH FORESTRY	03-Jun-94
0660-94	BRUSH CREEK & TRIBS	VANDERHORST, STEVEN	29-Aug-94
0661-93	INMAN CREEK	NEW GROWTH FORESTRY	03-Jun-94
0661-94	UNKNOWN STREAM	MUNOZ, RICHARD	15-Aug-94
0667-93	MORRISON CREEK	SAGEHORN, FRED & SONS INC	03-Jul-93
0668-93	RANCHERIA CREEK	COPPER QUEEN RANCH	03-Jul-93
0669-93	TEN MILE CREEK SF	WATKINS, ROBERT	04-Aug-93
0680-93	MULE CREEK SF	LIGMAN, JOE	20-Jul-93
0681-93	PALMER CREEK	PORTER, DON	15-Jul-93
0686-93	NAVARRO RIVER	HARMON, DEBORAH	22-Jul-93
0692-94	ALDER CREEK	PIPER, JEAN	19-Mar-95
0695-94	STREETER CREEK	ENBERG, KEVIN	02-Aug-94
0697-93	ALBION RIVER SF	BISHOP, BRIAN	13-Apr-94
0705-93	ROBINSON CREEK	HOSIER, MARGARET	06-Aug-93
0706-94	SOUTH TURNER CREEK	NEWTON, PETER	12-Aug-94
0709-94	SALMON CREEK	SMYTHE, TOM	18-Aug-94
0710-93	SHORT CREEK	FLEMING, MARK	08-Sep-93
0711-93	WILLIAMS CREEK	FLEMING, MARK	08-Sep-93
0712-93	HULLS CREEK	FLEMING, MARK	08-Sep-93
0720-93	WILSON CREEK	O'FERRALL, ROY	19-Jul-93
0722-94	BIG RIVER	C E M R	08-Aug-94
0725-93	RUSSIAN RIVER TRIB	WILSEY, WAYNE	25-Jul-93
0729-94	GRIST CREEK	PHILLIPS, EDWIN	29-Aug-94
0730-93	SALMON CREEK TRIB	LARKIN, DAVID	02-Aug-93
0731-93	BIG RIVER LAGUNA	ORME, MICHAEL	17-Jul-93
0737-93	RATTLESNAKE CREEK TRIB	INGRAM, DORIS	22-Jul-93
0740-94	HAEHL CREEK	MAYFIELD, TED	19-Sep-94
0745-93	EEL RIVER SF	PATRICK, MICHAEL	20-Jul-93
0745-94	FOSTER CREEK	HARWOOD, CALVEN	15-Aug-94
0748-93	TURNER CREEK	NIXSON, DAVE	16-Jul-93
0750-94	ANDERSON CREEK	GATLIN, DALE	05-Sep-94
0753-93	EEL RIVER SF	MC CRALEY, ROBERT	19-Jul-93
0753-94	ROCKPILE CREEK	HOVLAND, PATRICK	22-Aug-94
0754-93	OUTLET CREEK	MCCRALEY, ROBERT	20-Jul-93

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0755-93	SLAUGHTERHOUSE CREEK	RAY, TOM	20-Jul-93
0762-94	RUSSIAN RIVER	MC LELLAND, DOUGLAS	26-Aug-94
0769-93	GUALALA RIVER	BOWER, JOHN	19-Jul-93
0775-93	FLUME GULCH CREEK	C E M R	22-Jul-93
0775-94	KASS CREEK	GEORGIA PACIFIC CORP	18-Aug-94
0784-93	ALLEN CREEK	GALLIANI, ALICIA	13-Jun-93
0786-93	GALLOWAY CREEK	LORENZINI, KEVIN	16-May-94
0786-94	ROCKPILE CREEK	KENT, NICHOLAS	07-Sep-94
0787-94	ROBINSON CREEK	REEVES, ARLENE/MIKE	09-Sep-94
0789-94	BAECHTEL CREEK	FORD, JOHN E	07-Sep-94
0795-93	EEL RIVER & TRIBS	CLARK, JIM	11-Aug-93
0796-94	RUSSIAN RIVER	SCHLIENGER, MAX	29-Aug-94
0799-93	UNKNOWN STREAM	SMYTHE, THOMAS	04-Aug-93
0803-93	GREENWOOD CREEK	LOUISIANA PACIFIC	21-Aug-93
0814-94	CAHTO CREEK	WEBBER, WILBERT	23-Aug-94
0819-93	ALBION RIVER	SHANDEL, WILLIAM	24-Jul-93
0820-93	COLEMAN CREEK	NICOLAS, ROBERT	31-Jul-93
0820-94	HAEHL CREEK EB	HAYDEN, ROBERT	25-Aug-94
0821-93	EEL RIVER SF	FISH AND GAME DEPT	04-Aug-93
0824-94	BAECHTEL CREEK	FISH & GAME	29-Aug-94
0825-94	MILL CREEK	FISH & GAME	29-Aug-94
0832-93	COLD CREEK	LAWSON, RICHARD	27-Aug-93
0834-94	STRING CREEK MIDDLE FORK	GRAHAM, STEPHEN	06-Oct-94
0839-93	GARCIA RIVER SF	SHIVELY, RUSS	26-Aug-93
0849-94	BIG GULCH TRIB	NELSEN, PATRICIA	29-Sep-94
0851-93	ROBINSON CREEK TRIB	SHELL, DAVID	06-Jul-93
0855-94	WOODMAN CREEK	HARWOOD, CALVIN	27-Sep-94
0856-93	UNNAMED SWALE	SWALLOW, JAMES	19-Aug-93
0862-93	GRIST CREEK	PHILLIPS, EDWIN	01-Sep-93
0862-93	SHORT CREEK	PHILLIPS, EDWIN	01-Sep-93
0865-94	EEL RIVER SF	SNYDER, FRED	15-Sep-94
0866-94	EEL RIVER SF	SNYDER, FRED	15-Sep-94
0869-94	UNKNOWN STREAM	KOERNER, HARRY	15-Sep-94
0873-93	LITTLE BEAR HAVEN CREEK	MALLORY, DOUGLAS	13-Aug-93
0875-93	FELIZ CREEK	LUCCHETTI, ANTHONY	15-Aug-93
0877-94	TEN MILE RIVER	MALLORY, DOUG	07-Sep-94
0878-94	MARSH CREEK TRIB	MARTIN, CHARLES	09-Sep-94
0880-94	NAVARRO RIVER	BATES, TIM	03-Sep-94
0881-94	ANDERSON CREEK	WASSON, PHIL	03-Sep-94
0883-93	UNKNOWN STREAM	BLENCOWE, CRAIG	09-Sep-93
0883-94	DOOLEY CREEK	REED, WILLIAM	04-Sep-94
0884-93	RUSSIAN RIVER	REEDER, ROBERT	27-Aug-93
0892-93	TOWN CREEK	ANDERSON, ART	20-Aug-93
0894-93	EEL RIVER TRIB	MIHELCIC, PETE	23-Aug-93
0895-93	HAM CANYON CREEK	HINCKLEY, JONATHAN	08-Sep-93
0899-94	LITTLE RIVER	PASQUINELLI, RENE	15-Sep-94
0900-94	SALT HOLLOW CREEK TRIB	LOLONIS, ULYSSES	16-Sep-94
0905-94	GASKER SLOUGH	MOORE, MARK	24-Oct-94
0909-93	RUSSIAN RIVER WF	BURSTAD, IVAN	27-Aug-93
0912-93	ROBINSON CREEK	MOHR, ALLAN	31-Aug-93
0916-94	COLD CREEK TRIB	PARKER, ROBERT	13-Oct-94
0920-94	ALBION RIVER SF	C E M R	21-Sep-94

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0921-93	ALBION RIVER	BISHOP, BRIAN	25-Aug-93
0932-94	MCDOWELL CREEK/DOOLEY CREEK	STEPHEN, TONY	23-Sep-94
0933-93	GARCIA RIVER	FREDRICKS, RICHARD	17-Sep-93
0934-93	GARCIA RIVER	FREDRICKS, RICHARD	17-Sep-93
0935-93	GARCIA RIVER	FREDRICKS, RICHARD	17-Sep-93
0936-94	BUSH CREEK	HOLT, SAXON	26-Oct-94
0938-93	LEWIS CREEK	C E M R	25-Aug-93
0941-93	GARCIA RIVER NF	BURNS, JOHN	17-Sep-93
0942-93	GUALALA RIVER NF	HOVLAND, PATRICK	17-Sep-93
0943-93	VARIOUS STREAMS	CAMPBELL, C F	04-Apr-94
0944-94	USAL CREEK & TRIBS	MALLORY, DOUGLAS	27-Sep-94
0951-94	RANCHERIA CREEK	PRONSOLINO, GUIDO	27-Sep-94
0956-94	ALBION RIVER SF	BISHOP, BRIAN	04-Oct-94
0962-93	EEL RIVER	HIGHLAND, DAVE	31-Aug-93
0965-94	ELDRIDGE CREEK	BRUCKER, YARROW	12-Oct-94
0967-93	EEL RIVER	SULLIVAN, FORREST	08-Oct-93
0968-93	FORSYTHE CREEK	MOHR, ALLAN	31-Aug-93
0969-93	RUSSIAN RIVER	KRESS, REBECCA	27-Aug-93
0970-94	ROBINSON CREEK	MOHR, ALAN	03-Oct-94
0971-93	RUSSIAN RIVER	MENDO CO RUSSIAN RIVER	03-Sep-93
0971-94	BLOODY RUN CREEK	FISH AND GAME	04-Oct-94
0972-94	EEL RIVER	FISH AND GAME	04-Oct-94
0976-93	UNKNOWN STREAM	BUTLER, SCOTT	20-Sep-93
0976-94	BROADDUS CREEK	GRIBALDO, LOREN	12-Oct-94
0980-94	GIBSON CREEK/COLD CREEK	HARWOD, CALVIN	17-Nov-94
0984-93	NAVARRO RIVER TRIB	RAU & ASSOCIATES	02-Oct-93
0985-94	TRIPLETT GULCH	MOHR, ALAN	13-Oct-94
0988-93	ABALOBADIAH CREEK	MOORE, MARK	15-Sep-93
0991-93	BLUE WATERHOLE CREEK	SHEEHAN, HARRY	14-Oct-93
0992-93	GUALALA RIVER NF	SHEEHAN, HARRY	14-Oct-93
0997-93	NAVARRO RIVER	URDAHL, GARY	29-Sep-93
0998-93	DUTCH HENRY CREEK	LOUISIANA PACIFIC	20-Sep-93
1002-94	RANCHERIA CREEK	HINCKLEY, JONATHAN	11-Oct-94
1003-93	RANCHERIA CREEK	HANES, JOHN	20-Sep-93
1006-94	EEL RIVER SF	DUMARS, PETER	25-Oct-94
1008-94	HALE CREEK & TRIBS	CANTRELL, LAREN	13-Oct-94
1012-94	TOWN CREEK	ROUND VALLEY WATER	17-Oct-94
1013-94	BLACK BUTTE RIVER MF & TRIBS	POOL, GRANVILLE	17-Oct-94
1021-93	JACKASS CREEK	INTER/TRIBAL SINKYONE WLD	22-Sep-93
1022-93	STANLEY CREEK	CALIF CONSERVATION CORP	13-Sep-93
1025-94	ROBINSON CREEK	SHEEHAN, HARRY	01-Nov-94
1028-93	PLEASANT VALLEY CREEK	BISHOP, BRIAN	27-Sep-93
1032-93	ALBION RIVER	RAU & ASSOCIATES	19-Jul-95
1039-93	RUSSIAN RIVER WF	JOHNSON ORCHARDS INC	23-Sep-93
1040-94	BIG RIVER LITTLE NF	FORESTRY DEPT	28-Oct-94
1041-93	RUSSIAN RIVER	POOL, GRANVILLE	23-Sep-93
1042-93	ALDER CREEK	FREDRICKS, RICHARD	29-Sep-93
1043-93	GIBSON CREEK	BOLTON, ISABELLE	05-Oct-93
1043-94	YORK CREEK	COX, JACK	31-Oct-94
1047-93	WILLITS CREEK	FISHING FOUNDATION OF CA	13-Jun-94

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1048-93	BAECHTEL CREEK	FISHING FOUNDATION OF CA	20-Sep-93
1057-93	OUTLET CK, MILL CK, DAVIS CK	AYRE-JONES, BARBARA	20-Sep-93
1057-94	GARCIA RIVER	STORNETTA, WALT	10-Oct-94
1058-94	VIRGIN CREEK	SHANDEL, JOHN	03-Nov-94
1064-93	ORRS CREEK	KENNEDY, RICK	01-Oct-93
1071-93	RUSSIAN RIVER TRIB	FAIRBAIRN, WES	29-Sep-93
1072-93	CRAWFORD, DOOLAN, AUSTIN CKS	MCCARN, BILL	29-Sep-93
1075-93	RUSSIAN GULCH CREEK	BRAUDRICK, PETER	22-Sep-93
1075-94	BIG RIVER	MOORE, MARK	16-Nov-94
1082-93	BIG RIVER SF	POOL, GRANVILLE	29-Sep-93
1085-93	NAVARRO RIVER NF	PARDINI, TONY	23-Sep-93
1092-93	LONG VALLEY CREEK	HARMON, DEBORAH	23-Dec-93
1093-94	ALDER CREEK	FREDRICKS, RICHARD	17-Oct-94
1099-93	RYAN CREEK	KREMSER, WAYNE	14-Oct-93
1104-93	SMITH CREEK	THOMPSON, BUD	29-Sep-93
1105-93	LITTLE RIVER	SNYDER, ROBERT	29-Sep-93
1105-94	JUAN CREEK	C E M R	06-Dec-94
1106-94	BAECHTEL CREEK	LOGAN, GORDON	10-Jan-95
1110-93	ANDERSON CREEK	TEBBUTT, CHRISTOPHER	05-Oct-93
1122-93	ANDERSON GULCH	BISHOP, BRIAN	12-Oct-93
1124-94	MCGARVEY/BOTTOM CK/NAVARRO NF	WOOD, KEN	01-May-95
1127-93	BEAR HAVEN CREEK SF	MALLORY, DOUG	04-Oct-93
1128-94	TOWN CREEK	COVELO COMMUNITIES SERV	16-Dec-94
1132-93	DOOLEY CREEK	FERRANTI, DONALD	18-Oct-93
1135-93	UNKNOWN STREAM	KIRTLAN, ROBERT	20-Oct-93
1148-93	FELIZ CREEK	LINVILLE, TROY	15-Oct-93
1159-93	YEW CREEK	MATTOLE SALMON GROUP	04-Nov-93
1162-93	FORSYTHE CREEK	HANSON, ERNEST	14-Oct-93
1184-93	ROBINSON CREEK	MOHR, ALLAN	22-Oct-93
1194-93	RUSSIAN RIVER	FETZER VINEYARDS	26-Oct-93
1209-93	ANDERSON CREEK	HIATT, CHARLES	01-Nov-93
1214-93	BUCK ROCK CREEK	MITZEL, MIKE	18-Nov-93
1229-93	SHORT CREEK	BROWN, STAN	29-Oct-93
1230-93	TOWN CREEK	EDWARDS, GLEN	29-Oct-93
1233-93	NAVARRO RIVER	CALTRANS	22-Dec-93
1234-93	BURRIGHT CREEK TRIB EB	STRICKLER, BRUCE	05-Nov-93
1236-93	TEN MILE CREEK UNNAMED TRIB	BEWLEY, STUART	20-Jun-97
1237-93	MUD SPRINGS CREEK UNNAMED TRIB	BEWLEY, STUART	20-Jun-97
1245-93	NAVARRO RIVER & BIG RIVER	CHECKAL, GREG	25-Jan-94
1246-93	NAVARRO RIVER TRIB	POOLE, GRANVILLE	11-Nov-93
1261-93	NAVARRO RIVER SB NF UNNAM TRIB	GIMBLETT, JAMES	13-Nov-92
1267-93	RUSSIAN RIVER TRIB TO EB	KIMMEL, LILLIAN	18-Nov-93
1274-93	RUSSIAN RIVER	KENNEDY, RICK	11-Jan-94
1289-93	GARCIA RIVER	KENDALL, VERNON	17-Nov-93
1290-93	HAPPY VALLEY CREEK	SHANDEL, JOHN	17-Nov-93
1321-93	GARCIA RIVER TRIB	SHEEHAN, HARRY	10-Jan-94

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1333-93	MEYER GULCH	HERR, EUGENIA	21-Jan-94
1334-93	GARCIA RIVER	HAY, WILLIAM/BEDROCK	13-Dec-93
1339-93	HUCKLEBERRY CREEK	FISH & GAME DEPT	21-Dec-93
1340-93	COTTONEVA CREEK SF	FISH & GAME DEPT	31-Dec-93
1346-93	DOOLAN CREEK	AKERSTROM, GARY	22-Dec-93
0006-95	CASPER CREEK TRIB	DECKER, WALT	05-Jan-95
0019-95	PUDDING CREEK	CALIFORNIA WESTERNN RR	20-Jan-95
0044-95	HENSLEY CREEK	VOGT, BOB	03-Feb-95
0090-95	NAVARRO RIVER	MOORE, MARK	15-Feb-95
0095-95	RUSSIAN RIVER	THOMAS, JOHN	23-Feb-95
0096-95	RUSSIAN RIVER WB	THOMAS, JOHN	23-Feb-95
0112-95	DOOLEY CREEK	ROSETTI BROS	27-Feb-95
0118-95	RUSSIAN RIVER WB	TODD, KEN	01-Mar-95
0127-95	BEAR CREEK	SHEEHAN, HARRY	18-Apr-95
0133-95	ELK CREEK	GIACOMINI L.D. INC	03-Apr-95
0143-95	HOWARD CREEK	EDGERLY, FRANK	14-Mar-95
0146-95	EEL RIVER MF	ROWLAND, RICHARD	15-Mar-95
0154-95	SHORT CREEK	BAUER, DON	13-Mar-95
0164-95	ANDERSON CREEK	CHARLES, WILLIAM	03-Apr-95
0179-95	WAGES CREEK	WAGES CREEK PROPERTY	15-Mar-95
0188-95	RATTLESNAKE CK/EEL RIVER	MACDONALD, ROGER	02-Apr-95
0192-95	NAVARRO RIVER/S.F. ALBION	STEINBUCK, ADAM	20-Apr-95
0197-95	NOYO RIVER	ANDERSEN, CHARLES	02-Jun-95
0205-95	RUSSIAN RIVER	MENDOCINO VINEYARD CO	13-Apr-95
0206-95	RUSSIAN RIVER	MENDOCINIO VINEYARDS CO	13-Apr-95
0210-95	JUAN CREEK	CALTRANS	27-Mar-95
0232-95	UNKNOWN STREAM	LYDA, GREG	23-May-95
0233-95	NOYO RIVER TRIB	MALLORY, DOUG	03-Apr-95
0234-95	ANDERSON CREEK	WASSON, PHIL	03-Apr-95
0236-95	TOMKI CREEK	LAWLER, STEPHEN	07-Apr-95
0240-95	ALDER CREEK	FRASER, DONALD	19-Jun-95
0241-95	RUSSIAN RIVER E.B.	WELCH, MARK	13-Apr-95
0242-95	RUSSIAN RIVER	JAHNKE, GORDON	08-May-95
0258-95	RUSSIAN RIVER	FORD, MELVIN	12-Apr-95
0261-95	BIG SALMON CREEK	MALLORY, DOUG	23-May-95
0275-95	MILL CREEK	SUSAN, LEE	15-May-95
0299-95	RYAN CREEK	WHITE, ROBERT	19-Apr-95
0301-95	MILL CREEK (AKA WILLITS CK)	LOGAN, GORDON	13-Jun-95
0317-95	RUSSIAN RIVER EB	SONOMA COUNTY WATER	21-Apr-95
0319-95	MCDOWELL CREEK	MOORE, MARK	27-Apr-95
0327-95	EEL RIVER SF	ALLOR, ED	27-May-95
0330-95	TEN MILE CREEK	SLUIS, STAN	04-May-95
0351-95	TEN MILE RIVER	MALLORY, DOUG	28-Apr-95
0352-95	SLAUGHTERHOUSE CREEK	MALLORY, DOUG	28-Apr-95
0353-95	HUCKLEBERRY CREEK	FLOSI, GARY	28-Apr-95
0363-95	GREENWOOD CREEK	SCHULTZ, TOM	19-Jun-95
0373-95	LITTLE RIVER	BRAUDRICK, PETER	05-May-95
0387-95	NAVARRO RIVER	BLATTNER, ERNEST	06-Jun-95
0399-95	UNKNOWN STREAM	CLARK, JIM	09-Jun-95
0407-95	ROBINSON CREEK	WILSON, J W	05-Jun-95
0421-95	GARCIA RIVER	HAY, WILLIAM	07-Jun-95
0432-95	GUALALA RIVER	POOL, GRANVILLE	16-Jun-95

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0443-95	RANCHERIA CREEK	HANES, JOHN	12-Jun-95
0448-95	BROADDUS CREEK	HARRISON, FAYE	24-May-95
0457-95	UNKNOWN STREAM	HASCHAK, ART	24-May-94
0467-95	FELIZ CREEK	DE VINCENZI, JOHN	23-May-95
0469-95	MILL/WALKER/VALENTINE/RICE CKS	KENT, NICHOLAS	07-Jun-95
0474-95	INDIAN CREEK	LANGAGER, STEVE	20-Jun-95
0492-95	OUTLET CREEK	MCLELLAND, DOUGLAS	01-Jun-95
0498-95	EEL RIVER SO FORK	MALLORY, DOUG	30-May-95
0499-95	TEN MILE CK/ABALOBADIAH CK	MALLORY, DOUG	30-May-95
0503-95	STANSBURY CREEK	NEW GROWTH FORESTRY	01-Jun-95
0518-95	MILL,WILLITS,HALE,BAECHTEL CKS	HAYDEN, BOB	19-Jun-95
0526-95	ANDERSON CREEK	WASSON, PHIL	26-Jun-95
0527-95	NOYO RIVER NF	SCHANTZ, DAVID	07-Jul-95
0528-95	MORRISON CREEK	POOL, GRANVILLE	20-Jun-95
0532-95	WILLIAMS CREEK	BONELLI, DAVID	05-Jun-95
0544-95	FOSTER CREEK	CLARK, JIM	09-Jun-95
0551-95	HALE CREEK	CAVANAUGH, RODERICK	15-Jun-95
0552-95	GIBSON CREEK	JOSEPH, RENEE	10-Jul-95
0553-95	EEL RIVER MIDDLE FORK	CAMPBELL, JACK	16-Jul-95
0555-95	GRIST CREEK/MILL CREEK	POLSLEY, RAYMOND	07-Jul-95
0559-95	EEL RIVER SO FK	PATRICK, MICHAEL	24-Jun-95
0562-95	RANCHERIA CREEK	PRONSOLINO, GUIDO	26-Jul-95
0578-95	TEN MILE RIVER SF	WATKINS, ROBERT	07-Jul-95
0581-95	WOODMAN CREEK	HELM, HOMER	24-Jun-95
0611-95	JAMES CREEK NF	SLACK, HAL/ROBT BYERS	10-Jul-95
0614-95	HENSLEY CREEK	KRAMER, IRVING	20-Jul-95
0615-95	UNKNOWN STREAM	DENOEU, JACQUES	30-Jun-95
0625-95	CUMMINSKY CREEK/RUSSIAN RIVER	ROSATI, MARIO	12-Jul-95
0628-95	GARCIA RIVER SF	BELL, CRAIG	07-Jul-95
0629-95	SIGNAL CREEK	BELL, CRAIG	07-Jul-95
0630-95	INMAN CREEK	BELL, CRAIG	07-Jul-95
0631-95	GARCIA RIVER NF	BELL, CRAIG	07-Jul-95
0633-95	BROADDUS/BAECHTEL/HAEHL CREEKS	LOGAN, GORDON	05-Jul-95
0634-95	BROADDUS CREEK	LOGAN, GORDO	05-Jul-95
0641-95	OLSON GULCH CREEK	MONSCHKE, JACK	17-Jul-95
0647-95	EEL RIVER SF/WHITCOMB GULCH	LINKHART, DAVID	25-Jun-95
0680-95	MILL CREEK	EVANS-FREKE, STEVEN	01-Jul-95
0682-95	SHORT CREEK	POOL, GRANVILLE	26-Jul-95
0683-95	TOWN CREEK	POOL, GRANVILLE	26-Jul-95
0684-95	SHORT CREEK	POOL, GRANVILLE	26-Jul-95
0685-95	TEN MILE RIVER TRIB	HESS, ALAN	01-Aug-95
0686-95	EEL RIVER/INDIAN CREEK	HESS, ALAN	17-Jul-95
0688-95	RUSSIAN RIVER	MCLELLAND, DOUGLAS	20-Jul-95
0691-95	DAUGHERTY CREEK	FLOSI, GARY	05-Jul-95
0692-95	NAVARRO RIVER SB NF	FLOSI, GARY	05-Jul-95
0693-95	HOLLOW TREE CREEK	FLOSI, GARY	05-Jul-95

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0702-95	EEL RIVER/VAN ARSDALE FISH LAD	LEO, DON	07-Jul-95
0717-95	GIBSON CREEK/ORR CREEK	KENNEDY, RICH	21-Aug-95
0719-95	REDWOOD CREEK	C E M R	12-Jul-95
0720-95	GARCIA RIVER & TRIBS	BURNS, JOHN	14-Aug-95
0722-95	STRING CREEK	CLARK, JIM	14-Jul-95
0724-95	RANCHERIA CREEK	HOWELL, MICHAEL	17-Jul-95
0733-95	BARNWELL CREEK	NEW GROWTH FORESTRY	18-Jul-95
0734-95	BROADDUS CREEK	NEW GROWTH FORESTRY	18-Jul-95
0735-95	JACK OF HEARTS CREEK	NEW GROWTH FORESTRY	18-Jul-95
0739-95	EEL RIVER SF	SNYDER, FRED	25-Jul-95
0740-95	MILL CREEK	MAILLIARD, LARRY	03-Aug-95
0741-95	YALE CREEK/RANCHERIA CREEK	HIATT, CHARLIE	01-Sep-95
0742-95	EEL RIVER	PETERS, ROBERT	27-Jul-95
0752-95	JUMPOFF CREEK	AALFS, CHARLES	27-Jul-95
0754-95	BRUSH CREEK	HINCKLEY, JONATHAN	19-Jul-95
0756-95	BRUSH CREEK	HAYES, PAUL	05-Jul-95
0777-95	CASPAR CREEK	GREEN, JON	25-Jul-95
0787-95	BLUE WATERHOLE CREEK	NEW GROWTH FORESTRY	28-Jul-95
0790-95	MILL CREEK	SCHANTZ, DAVID	04-Aug-95
0791-95	MC COY CREEK	LANCASTER, DOYLE	21-Aug-95
0800-95	SHORT CREEK	CAMPBELL, JACK	27-Jul-95
0801-95	MURPHY CREEK	BAUER, DON	27-Jul-95
0808-95	UNKNOWN STREAM	DENEAU, JACQUES	17-Aug-95
0809-95	STRING CK, DIGGER CK, TOMKI CK	AALFS, CHARLES	27-May-96
0816-95	BAECHTEL CREEK	TWEDDELL, APRIL	04-Aug-95
0821-95	TEN MILE CREEK	ENGBER, EVAN	31-Jul-95
0824-95	DOOLEY CREEK	REED, WILLIAM	09-Jul-95
0828-95	EEL RIVER	MIHELCIC, PETE	16-Aug-95
0832-95	DRY CREEK TRIB	LAWSON, ROBERT	01-Sep-95
0850-95	MARTIN CK, NF BIG RIVER	BURNS, JOHN	16-Aug-95
0855-95	PARSONS CREEK	COLE, JOSEPHINE	05-Sep-95
0859-95	ELK PRARIE CREEK	WARNER, GREGG	01-Sep-95
0860-95	DRY CREEK (UPPER)	WARNER, GREGG	01-Sep-95
0861-95	MCGANN'S CREEK	WARNER, GREGG	01-Sep-95
0862-95	DRY CREEK (LOWER)	WARNER, GREGG	01-Sep-95
0871-95	RUSSIAN RIVER & CRAWFORD CREEK	CHAVORR, WALT	14-Aug-95
0883-95	UNKNOWN STREAM	LANGAGER, STEVE	17-Sep-95
0889-95	ALDER CREEK	HAY, BILL	05-Jul-95
0896-95	RUSSELL BROOK CREEK	C E M R	10-Aug-95
0900-95	DRY CREEK	LYDA, GREG	15-Sep-95
0917-95	LITTLE VALLEY CREEK	KAIJANKOSKI, RUTH	11-Sep-95
0935-95	DOOLEY CREEK	JONES, KENNETH	05-Sep-95
0936-95	RUSSIAN RIVER	JONES, KENNETH	05-Sep-95
0942-95	JUG HANDLE CREEK TRIB	HOBLIN, WILLIMG	29-Aug-95
0946-95	NAVARRO RIVER NB NF & TRIBS	FLOSI, GARY	17-Aug-95
0981-95	SHORT CREEK	PHILLIPS, EDWIN	26-Sep-95
0992-95	ALBION RIVER TRIB	MAHONEY, DARCIE	26-Sep-95

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0997-95	DUTCH CHARLIE CREEK	HESS, ALAN	25-Aug-95
1008-95	ROBINSON CREEK	NEW GROWTH FORESTRY	25-Aug-95
1010-95	CHARLIE CREEK	IVERSON LOGGING	25-Aug-95
1012-95	MCCLURE CREEK	BARTOLOMEI, RAY	15-Sep-95
1015-95	DOUGHERTY CREEK	LOUISIANA PACIFIC	25-Aug-95
1016-95	BAECHTER/MILL/DAVIS/OUTLET CKS	SHEA, MONROE	29-Aug-95
1018-95	TOWN CREEK	WILSON, CHRIS	01-Sep-95
1031-95	EEL RIVER	MC LELLAND, DOUGLAS	07-Sep-95
1040-95	EEL RIVER SF	CARVER, GEORGE	11-Sep-95
1042-95	RUSSIAN RIVER/PIETA CREEK	COX, JACK	21-Sep-95
1048-95	DONNELLEY CREEK	TITUS, DEAN	08-Aug-95
1066-95	TEN MILE RIVER NF	MALLORY, DOUG	06-Sep-95
1067-95	TEN MILE RIVER	MALLORY, DOUG	06-Sep-95
1074-95	ANDERSON CREEK	ROSSI, EMIL	19-Sep-95
1078-95	HENSLEY CREEK	MC GEHEE, RON	04-Oct-95
1080-95	DOYLE CREEK UNNAMED TRIB	PEMBER, LYLES	20-Sep-95
1104-95	ROBINSON CREEK	MOHR, ALAN	02-Aug-95
1115-95	WILLIAMS CREEK UNNAMED TRIB	RODERICK, WALTER	11-Sep-95
1121-95	COLD CREEK	GUNTLY, CHARLES	23-Sep-95
1137-95	TEN MILE CREEK TRIB	BAILEY, WILLIAM	14-Sep-95
1141-95	MC NASTY CREEK	POOL, GRANVILLE	14-Sep-95
1149-95	RUSSIAN RIVER	BRADFORD, ROBERT	03-Oct-95
1160-95	SKUNK CREEK DRAINAGE	SHELL, DAVID	15-Sep-95
1164-95	UNKNOWN STREAM	DELL'AQUILA, CARL	13-Oct-95
1178-95	UNKNOWN STREAM	BRUDER, J M	22-Sep-95
1188-95	NOYO RIVER	BENNEDETTI, BRUNO	20-Sep-95
1212-95	RUSSIAN RIVER	BORECKY, GEORGE	06-Oct-95
1228-95	BOB'S CREEK	LAWSON, ROBERT	02-Oct-95
1232-95	GALLOWAY CREEK	MOHR, ALAN	05-Oct-95
1237-95	RUSSIAN RIVER WB	HORN, JOE	07-Oct-95
1243-95	MILL CREEK	COHEN, BURT	02-Oct-95
1250-95	DRY CREEK UNNAMED TRIBS	CLARK, JIM	09-Oct-95
1263-95	BALD HILL CREEK	LINKHART, DAVE	29-Sep-95
1268-95	MC WINNIE CREEK	RASCHE, GARY	23-Sep-95
1269-95	ORR CREEK	POOL, MAURINE	02-Oct-95
1270-95	RUSSIAN RIVER	RUSSIAN RIVER FLOOD	02-Oct-95
1275-95	EEL RIVER UNNAMED TRIBS	HASCHAK, ART	04-Oct-95
1344-95	TEN MILE RIVER SF	PERRY, DON	24-Oct-95
1352-95	JOHNSON CREEK	QUEIROLO, LUCIANO/SILVIO	15-Oct-95
1355-95	GARCIA RIVER	STORNETTA, LARRY	26-Oct-95
1356-95	DOOLIN CREEK	DETURBILLA, JIM	19-Oct-95
1358-95	GARCIA RIVER	BELL, CRAIG/STORNETTA H	25-Oct-95
1359-95	GARCIA RIVER	BELL, CRAIG/KENDALL VERN	25-Oct-95
1412-95	BEAR HAVEN CREEK	SUTPHIN, JOE	26-Oct-95
1413-95	GREENWOOD CREEK	ACKER, CHARLIE	03-Oct-95
1414-95	ANDERSON CREEK	TITUS, DEAN	21-Oct-95
1441-95	GIBSON CREEK	MAYFIELD, RICK	03-Nov-95
1463-95	MORRISON CREEK	SAGEHORN, FRED & SON INC	09-Nov-95
1473-95	TOWN CREEK	ROUND VALLEY WATER DIST	14-Nov-95
1494-95	SODA CREEK	MOHR, ALAN	28-Nov-95

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1515-95	INDIAN CREEK WB	TITUS, DEAN	28-Nov-95
1523-95	ORR CREEK	CARPENTER, ROBERT	30-Nov-95
1558-95	CAVE CREEK	THYGESEN, DENNIS	03-Jan-96
1577-95	OWL CREEK	BOWLES, STEVE	03-Nov-95
1585-95	DOTY CREEK	GUALALA RIVER RESTORATION	27-Dec-95
0008-96	TEN MILE RIVER LITTLE NF	LINKHART, DAVID	30-Jan-96
0012-96	WILDCAT CREEK	STORNETTA, WALTER	30-Jan-96
0041-96	ANDIRON CREEK	SHANDEL, JOHN	23-Jan-96
0042-96	SORTORI CREEK	SHANDEL, JOHN	23-Jan-96
0043-96	TAYLOR CREEK	SHANDEL, JOHN	23-Jan-96
0048-96	ROBINSON CREEK	COOK, WALDO	29-Jan-96
0054-96	ELK,ALDER,INDIAN,ANDERSON CKS	ASH, TIM	20-Feb-96
0062-96	BIG RIVER SF	WILLIAMS, JAMES L	20-Feb-96
0086-96	EEL RIVER SF	BURGESS, LYLE	14-Mar-96
0092-96	DOOLEY CREEK	MOORE, MARK	12-Mar-96
0143-96	GUALALA RIVER LITTLE N.F.	KELLY, SCOTT	26-Mar-96
0151-96	MCNAB CREEK	BARRETT, THOMAS	12-Apr-96
0159-96	RUSSIAN RIVER	BELLOWS, FRED	19-Jun-96
0160-96	UNKNOWN STREAM	HASCHAK, ART	12-Apr-96
0161-96	EEL RIVER SF	MCCAULEY, DOUG	12-Apr-96
0162-96	RUSSIAN RIVER EB	LAMALFA, RICHARD	05-Apr-96
0170-96	GARCIA RIVER & TRIBS	BURNS, JOHN	10-Apr-96
0176-96	BROADDUS CREEK	ASH, TIM	09-Apr-96
0177-96	RUSSIAN RIVER	ASH, TIM	09-Apr-96
0181-96	EEL RIVER MF	ROWLAND, KEITH	18-Apr-96
0184-96	BRUSH CREEK AND SF BRUSH CREEK	LYDA, GREG	20-Apr-96
0185-96	EEL RIVER TRIB	CHINMAYA MISSION (WEST)	28-Mar-96
0157-96	RUSSIAN RIVER	BELLOWS, FRED	14-Mar-96
0190-96	RANCHERIA CREEK MEN	ORNBAUN, DUANE	25-Apr-96
0201-96	RUSSIAN RIVER UNNAMED TRIB	KENNEDY, RICH	24-Apr-96
0206-96	RUSSELL BROOK	C E M R	28-Mar-96
0207-96	YALE CREEK	HIATT, CHARLIE	25-Apr-96
0212-96	UNNAMED STREAM	PETERSON, JEFF	29-Mar-96
0213-96	TEN MILE RIVER UNN TRIB SF	PETERSON, JEFF	29-Mar-96
0214-96	MARTIN CREEK/ANDERSON GULCH	PETERSON, JEFF	29-Mar-96
0215-96	NOYO RIVER LITTLE NF	PETERSON, JEFF	29-Mar-96
0216-96	HAZEL CREEK NF	PETERSON, JEFF	29-Mar-96
0217-96	PUDDING CREEK	PETERSON, JEFF	29-Mar-96
0222-96	BEAR GULCH/NOYO RIVER NF OF SF	MALLORY, DOUGLAS	20-Feb-96
0235-96	BUNKER GULCH CK/HARE CREEK	PHILBRICK, JERRY	20-Apr-96
0259-96	NAVARRO RIVER	SHIVELY, RUSSELL	03-May-96
0260-96	ELK CREEK	SHIVELY, RUSSELL	03-May-96
0266-96	ALLEN CK/GARCIA RIVER TRIBS	GALLIANI, STEVE	03-May-96
0280-96	RANCHERIA CREEK	PRONSOLINO, GUIDO	26-Apr-96
0297-96	GARCIA RIVER	HAY, WILLIAM JR	26-Apr-96

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1993-2002
Mendocino County

0299-96	BIG RIVER UNNAMED TRIB	PETERSON, JEFF	20-Apr-96
0300-96	GARCIA RIVER UNNAMED TRIB	PETERSON, JEFF	20-Apr-96
0301-96	TWO LOG CK/BIG RI/PETERSON GUL	PETERSON, JEFF	24-Apr-96
0302-96	REDWOOD CREEK CENTER FORK	PETERSON, JEFF	24-Apr-96
0303-96	CHURCHMAN CREEK	PETERSON, JEFF	20-Apr-96
0304-96	TEN MILE RIVER MIDDLE FORK	PETERSON, JEFF	24-Apr-96
0305-96	SMITH CREEK	PETERSON, JEFF	24-Apr-96
0306-96	TEN MILE RIVER	PETERSON, JEFF	24-Apr-96
0314-96	RUSSIAN RIVER UNNAMED TRIB	KENNEDY, RICK	22-May-96
0327-96	RANCHERIA CREEK	HANES, JOHN	25-Apr-96
0329-96	MICHAELS CREEK	FLOSI, GARY	01-May-96
0330-96	DOUGHERTY CREEK	FLOSI, GARY	01-May-96
0331-96	BOND CREEK	FLOSI, GARY	07-May-96
0332-96	MILL CREEK	COLBERG, SARITA	22-May-96
0335-96	NAVARRO RIVER	PEDERSEN, CRAIG	22-May-96
0361-96	NAVARRO RIVER	BLATTNER, ERNEST	25-May-96
0364-96	RUSSIAN RIVER	FORD, MELVIN	25-May-96
0375-96	NOYO RIVER NF	DECKER, WALT	10-May-96
0394-96	MURPHY CREEK/HULLS CREEK	BRINKERHOFF, RON	06-Jun-96
0398-96	SALMON CREEK	PETERSON, JEFF	11-Jun-96
0399-96	TEN MILE RIVER NF	PETERSON, JEFF	11-Jun-96
0400-96	JESSE GULCH/GARCIA RIVER NF	PETERSON, JEFF	11-Jun-96
0401-96	KASS CREEK	PETERSON, JEFF	14-Jun-96
0402-96	TEN MILE RIVER UNNAMED TRIB	PETERSON, JEFF	11-Jun-96
0405-96	ANDERSON CREEK	WASSON, PHIL	27-Jun-96
0409-96	BIG RIVER	FRYKMAN, DAVID	05-Jun-96
0415-96	RUSSIAN RIVER	ASHURST, TOM	16-May-96
0433-96	HOLLOW TREE CREEK	WILLIAMSON, MICHAEL	11-Jun-96
0437-96	RUSSIAN RIVER	MCLELLAND, DOUG	11-Jun-96
0440-96	COOK CREEK	WOOD, KEN	05-Jun-96
0445-96	RUSSIAN RIVER EB	MOORE, MARK	11-Jun-96
0448-96	UNKNOWN STREAM	SCHANTZ, DAVID	19-Jun-96
0452-96	UNKNOWN STREAM	MON PERE, TOM	30-Aug-96
0458-96	TEN MILE RIVER NF	CEMR	28-May-96
0461-96	FELIZ CREEK	DE VINCENZI, JOHN	24-Jun-96
0468-96	SHORT CREEK	PARKER, ROBERT	27-Jun-96
0473-96	MULE CREEK	STEINBUCK, ADAM	19-Jun-96
0474-96	ALBION RIVER	STENBUCK, ADAM	19-Jun-96
0482-96	HAYWORTH CREEK	HORNER, STEVE	06-Jun-96
0508-96	NOYO RIVER	BAKER, JEAN	11-Jun-96
0517-96	EEL RIVER MAIN STEM	MCLELLAND, DOUGLAS	05-Jul-96
0518-96	EEL RIVER MIDDLE FORK	MCLELLAND, DOUGLAS	06-Jul-96
0519-96	OUTLET CREEK	MCLELLAND, DOUGLAS	05-Jul-96
0549-96	MILL CREEK	MAILLIARD, LARRY	05-Jul-96
0550-96	ALBION RIVER	BLENCOWE, CRAIG	05-Jul-96
0552-96	TOMKI CREEK	PETERS, ROBERT	09-Jul-96

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Mendocino County

0575-96	METTIC CREEK	C E M R	18-Jun-96
0576-96	SHERWOOD CREEK	STEVENS, JOHN	22-Jun-96
0581-96	LITTLE RIVER	HIROSE, DOROTHY	05-Jul-96
0584-96	TEN MILE RIVER/GULCH 24 & 25	MALLORY, DOUGLAS	27-Jun-96
0592-96	UNKNOWN STREAM	NASH, ELEANOR	14-Jul-96
0593-96	OUTLET CREEK UNNAMED TRIBS	SUSAN, LEE	05-Jul-96
0594-96	BIG RIVER NORTH FORK	FRYKMAN, DAVID	05-Jul-96
0612-96	ALBION RIVER	CARP, WILLIAM/SETO, SUM	26-Jul-96
0619-96	BIG RIVER LITTLE N.F.	EDGE, STACY/CDF	01-Nov-95
0621-96	MCNAB CREEK	FETZER, JOHN	06-Jul-96
0640-96	RUSSIAN RIVER	SCHLIENGER, MAX	06-Jul-96
0645-96	GUALALA RIVER	KELLY, SCOTT	06-Jul-96
0650-96	DOOLEY CREEK	REED, WILLIAM	11-Jul-96
0659-96	GULCH C/TRIB NOYO RIVER	VIOLETT, PAUL	12-Aug-96
0667-96	HAEHL CREEK	MORAN, LARRY	07-Aug-96
0688-96	CHERRY CREEK	STRAIT, DANIEL	16-Aug-96
0695-96	UNKNOWN STREAM	SMITH, STEPHEN	27-Jul-96
0697-96	SLAUGHTERHOUSE CREEK	STEINBUCK, ADAM	09-Aug-96
0724-96	INDIAN CK WB	C E M R	27-Jul-96
0734-96	PARLIN CREEK	BAXTER, WILLIAM	31-Jul-96
0737-96	HORSE CREEK	LITTLE, JAMES	12-Aug-96
0750-96	RUSSIAN RIVER	LOUDON, JEFFREY	09-Sep-96
0762-96	TEN MILE CREEK	SLUIS, STAN	07-Sep-96
0768-96	ANDERSON CREEK	YORK, ALLEN	07-Aug-96
0774-96	WILLIAMS CREEK	BONELLI, DAVID	21-Aug-96
0775-96	TOMKI CREEK	HAWLEY, RICK	21-Aug-96
0778-96	RANCHERIA CREEK TRIB	HIATT, CHARLES	12-Aug-96
0779-96	MILL CREEK TRIB	HIATT, CHARLES	31-Aug-96
0796-96	EEL RIVER AND TRIBS	NICOLL, SCOTT	12-Aug-96
0810-96	DUNN CREEK	SWEELEY, JOHN	28-Aug-96
0813-96	STRING CREEK	ENGBER, KEVIN	01-Sep-96
0819-96	CEDAR CREEK	MOORE, MARK	30-Aug-96
0821-96	DOOLEY CREEK	BRANHAM, JOHN	29-Aug-96
0823-96	FELIZ CREEK	ASHURST, TOM	29-Aug-96
0826-96	TEN MILE CREEK	ENGBER, EVAN	01-Sep-96
0830-96	RANCHERIA CREEK	MATHIAS, J ROBERT	29-Aug-96
0851-96	ANDERSON CREEK	BERGNER, GEORGE	20-Sep-96
0863-96	GATES CREEK	FLOSI, GARY	23-Aug-96
0864-96	NAVARRO RIVER LITTLE NF	FLOSI, GARY	23-Aug-96
0870-96	WAGES CK, N. OF WESTPORT	MC KINLEY, ED	12-Sep-96
0883-96	GRIST CREEK	BERRIEN, CURTIS	07-Sep-96
0886-96	WAGES CREEK	BAY LOU CORP	13-Sep-96
0891-96	COMMINSKY CREEK UNNAMED TRIB	NAYES, WILLIAM	09-Sep-96
0898-96	ROBINSON CREEK	NEW GROWTH FORESTRY	13-Sep-96
0903-96	FELIZ CREEK	LUCCHETTI, ANTHONY	03-Oct-96
0915-96	NORTH FORK NOYO	MALLORY, DOUGLAS	16-Sep-96
0916-96	PUDDING CREEK	MALLORY, DOUGLAS	16-Sep-96
0917-96	GIBSON CREEK AND ORR CREEK	KENNEDY, RICK	01-Oct-96

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0920-96	JUMPOFF CREEK TRIB EEL RIVER	BALDO, CHRISTOPHER	16-Sep-96
0927-96	ROBISON CREEK	TITUS, DEAN	20-Sep-96
0928-96	DONNELLY CREEK/ANDERSON CREEK	TITUS, DEAN	20-Sep-96
0932-96	GRIST AND MILL CREEK	POLSLEY, RAYMOND	02-Oct-96
0935-96	BIG RIVER SOUTH FORK	WILLIAMS, JAMES LESLIE	02-Oct-96
0931-96	GRUBB CREEK	MILLER, TERRY	23-Sep-96
0948-96	LITTLE RIVER	BRAUDRICK, PETER	07-Oct-96
0949-96	BROADDUS CREEK	MORAN, LARRY	07-Oct-96
0950-96	FORSYTHE CREEK	ALBRIGHT-FOORD INV	19-Sep-96
0965-96	RUSSIAN RIVER	BRAMHAM, JOHN C JR	19-Sep-96
0968-96	GREENWOOD CREEK	ACKER, CHARLES	07-Oct-96
0969-96	GUALALA NORTH FORK	KELLY, SCOTT	07-Oct-96
0970-96	MC DOWELL/DOOLEY	BRUTOCA, LEN JR	17-Oct-96
0983-96	GUALALA RIVER	BROWN, DAN	21-Sep-96
0984-96	RUSSIAN RIVER WEST FORK	GRIDER VINEYARDS	21-Sep-96
0985-96	REDWOOD CREEK	WESTERN TIMBER SERVICES	20-Sep-96
0986-96	BAECHTEL CREEK	FORD, JOHN	22-Sep-96
0988-96	EEL RIVER	SNYDER, ROBERT	18-Sep-96
1002-96	ROBISON CREEK	LYON, CURTIS	17-Oct-96
1010-96	PACIFIC OCEAN UNNAMED TRIB	HESS, PETE	30-Sep-96
1017-96	BAECHTEL/OUTLET/MILL CREEKS	MAC DONNELL, JASON	23-Sep-96
1018-96	BRANDON GULCH	YEE, FAYE	27-Sep-96
1019-96	NOYO RIVER N.F. OF THE S.F.	YEE, FAYE	27-Sep-96
1021-96	MC GANN CREEK	GUALALA RIVER STEELHEAD	25-Sep-96
1024-96	DOOLEY CREEK	ENGBER, EVAN	05-Oct-96
1034-96	VALLEJO GULCH	SALMON RESTORATION ASSN	27-Sep-96
1036-96	BIG RIVER NORTH FORK	SALMON TROLLERS MARKETING	27-Sep-96
1040-96	GARCIA RIVER	STORNETTA, LARRY	03-Oct-96
1047-96	PARKINSON GULCH TRIB	MOTE, TIM	02-Oct-96
1059-96	MILL CREEK	BAYLIE, LEROY	27-Sep-96
1079-96	ACKERMAN CREEK	KUNZLER, KEN	16-Oct-96
1086-96	RUSSIAN RIVER WEST FORK	JOHNSON, WILLIAM	05-Nov-96
1093-96	HOWELL CREEK	STEINMANN, CARL	08-Nov-96
1094-96	BIG RIVER	CLARK, JIM	17-Oct-96
1121-96	ALBION RIVER	STEINBUCK, ADAM	13-Nov-96
1134-96	TOM BELL CREEK	CEMR	16-Oct-96
1135-96	UNKNOWN	FETZER, DANIEL	02-Nov-96
1149-96	ANDERSON CREEK	HOPKINS, WALTER	05-Nov-96
1150-96	ROSS CREEK	FREDRICKS, RICHARD	04-Nov-96
1151-96	MOTE CREEK	FREDRICKS, RICHARD	04-Nov-96
1153-96	BROADDUS CREEK	MIHELCIC, PETE	05-Nov-96
1179-96	TEN MILE CREEK TRIBUTARY	ROSE, RON	25-Oct-96
1189-96	GETCHELL GULCH CREEK	WARNER, GREGG	05-Nov-96
1192-96	RUSSIAN RIVER UNNAMED TRIB	FORD, KEN	31-Oct-96
1198-96	PARLIN CREEK	FISH AND GAME	01-Nov-96
1201-96	MILL CREEK	BUICH, ROBERT	02-Nov-96
1232-96	TOWN CREEK	FISHER, JAMES	20-Feb-97

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1245-96	DOOLAN CREEK TRIB	MOUNTANOS, MARK	12-Dec-96
1271-96	RANCHERIC CREEK	ASH, TIM	18-Dec-96
0001-97	OUTLET CREEK	ROEDIGER, GENE	16-Jan-97
0041-97	MILL CREEK	BERRY, ED	18-Aug-97
0042-97	DEHAVEN CREEK UNKNOWN MARSH	HALE, JOAQUIN	27-Jan-97
0059-97	BIG RIVER	CROWELL, ANTHONY	05-Feb-97
0077-97	MC NAB CREEK	BARRETT, THOMAS A	12-Feb-97
0078-97	BIG RIVER	CHODER, BRUCE	14-Feb-97
0090-97	EEL RIVER SOUTH FORK	MALLORY, DOUGLAS	07-Mar-97
0100-97	RANCHERIA CREEK	HANELT, PETER G	15-Jun-97
0103-97	LITTLE JUAN CREEK	STEINBUCK, ADAM	07-Mar-97
0102-97	HOLLOW TREE CK UNNAMED TRIB	STEINBUCK, ADAM	07-Mar-97
0105-97	ANDERSON CREEK	ROSSI, EMIL	28-Mar-97
0115-97	NAVARRO RIVER NORTH FORK	BOY SCOUTS OF AMERICA	21-Feb-97
0127-97	FORSYTHE CREEK	TODD, KEN	20-Feb-97
0140-97	PUDDING CREEK	CALTRANS	01-Jul-97
0151-97	V-DITCH	FABIAN, MARK	25-Mar-97
0155-97	HOLLOW TREE CREEK TRIBUTARY	KENNEDY, CLIFTON E.	07-Mar-97
0161-97	BIG RIVER	MC MILLAN, JOHN PAUL	31-May-97
0162-97	RUSSIAN RIVER WEST BRANCH	TODD, KEN	06-Mar-97
0168-97	SHORT CREEK	RICE, JOE C.	15-Apr-97
0217-97	METTIC CREEK	CEMR	17-Mar-97
0218-97	RAMON CREEK	CEMR	17-Mar-97
0219-97	RUSSELBROOK CREEK	CEMR	17-Mar-97
0222-97	GARCIA RIVER	STORNETTA, LARRY	10-Apr-97
0246-97	DOOLEY CREEK	HIALT RANCH	24-Mar-97
0259-97	EEL RIVER SOUTH FORK	HINCKLEY, JONATHAN B	17-Apr-97
0260-97	REDWOOD CREEK	HINCKLEY, JONATHAN	16-Apr-97
0261-97	DAVIS CREEK	MC LELLAND, DOUG	07-Apr-97
0264-97	RUSSIAN RIVER	WHITE, AL	01-Apr-97
0271-97	TEN MILE CREEK	WEAVER, VICTOR C	21-Apr-97
0272-97	MIDDLE FORK EEL RIVER	ROWLAND, KEITH	17-May-97
0273-97	EEL RIVER TRIB	SCHIEFFER, CLARA	17-Apr-97
0287-97	EEL RIVER SOUTH FORK	MC CAULEY, DOUGLAS	28-Apr-97
0291-97	ROSS CREEK	GOTT, KENNETH N	02-May-97
0292-97	GARCIA RIVER UNNAMED TRIBS	GOTT, KENNETH N	01-May-97
0296-97	GARCIA NORTH FORK UNNAMED TRIB	BURNS, JOHN H JR	02-May-97
0309-97	VARIOUS	WOOD, KEN	07-May-97
0311-97	BUCKHORN CREEK	STRAESSLE, ALEX	05-May-97
0321-97	NAVARRO RIVER	PEDERSEN, CRAIG	05-May-97
0326-97	EEL RIVER SOUTH FORK	CHRISTIANSEN, STEPHEN	27-Apr-97
0341-97	DAVIS CREEK	VANDERHORST, STEVEN A	17-Apr-97
0369-97	GARCIA RIVER	STORNETTA, WALTER R	18-Apr-97
0372-97	VICHY/LTL GRIZZLY/SULPHUR CR	ASHOFF, GILBERT	19-May-97
0373-97	NAVARRO RIVER	GOWAN, JIM	14-Apr-97

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0699-97	UNNAMED STREAM	ELSBREE, ANDREW	03-Jul-97
0700-97	SPANISH CANYON CREEK	NOYD, FRANK	16-Jul-97
0701-97	MARTIN CK,JAMES CK/NE BIG RIVE	BURNS, JOHN H JR	01-Jul-97
0715-97	NAVARRO RIVER UNNAMED TRIB	HESS, MARK S.	28-Jul-97
0733-97	GARCIA CREEK	KENDALL, VERNON	14-Jul-97
0751-97	TROUT CREEK TRIBUTARIES	ELSBREE, ANDREW	27-Aug-97
0753-97	DOUGHERTY CREEK	CALIFORNIA CONSERVATION	16-Jun-97
0754-97	MCCARVEY CREEK	CALIFORNIA CONSERVATION	26-Jun-97
0756-97	TEN MILE RIVER	MALLORY, DOUGLAS	02-Jul-97
0766-97	HATHAWAY CREEK	STORNETTA, LARRY	03-Jul-97
0767-97	CAVE CREEK	RICHARD, ROBERT M.	11-Jul-97
0779-97	BEAR PEN CYN/BURGER CRK UNNAME	SANDELIN, THOMAS (TOM)	11-Jul-97
0781-97	RUSSIAN RIVER	WHITE, BRIAN & HELEN	06-Aug-97
0784-97	EEL RIVER	MIHELCIC, PETE	20-Jul-97
0786-97	GARCIA RIVER TRIBUTARY	GAYTER, CHRIS	18-Jul-97
0789-97	DOOLAN & GIBSON CREEKS	JOHNSON, WILLIAM	11-Jul-97
0790-97	UNKNOWN	HISE, THOMAS	10-Jul-97
0800-97	FELIZ CREEK	RICHARDSON, TED	22-Aug-97
0802-97	UNKNOWN STREAM, MENDOCINO CO	SWEGLE, JEAN	06-Aug-97
0821-97	RANCHERIA CREEK	MATHIAS, ROBERT	11-Jul-97
0822-97	BURNS CREEK	FARRELL, DAVID	02-Aug-97
0824-97	BRUSH CREEK	STORNETTA, WALT	09-Jul-97
0835-97	MARTIN CREEK	FARRELL, DAVID E.	02-Aug-97
0870-97	ANDERSON CREEK	WALLACE, DAVE	09-Jul-97
0873-97	RUSSIAN RIVER	CROWFOOT, JANE	22-Jul-97
0879-97	EEL RIVER MIDDLE FORK	MCLELLAND, DOUG	21-Aug-97
0892-97	COLD CREEK	GUNTLY, JIM	01-Aug-97
0921-97	LITTLE RIVER	BRAUDRICK, PETER	31-Jul-97
0948-97	SALT HOLLOW UNNAMED TRIB	AKETSTROM, GARY	01-Aug-97
0965-97	JACK OF HEARTS CREEK	BRODESSER, MARK W.	22-Aug-97
0975-97	COLD CREEK TRIBUTARY	LOUISIANA PACIFIC	15-Aug-97
0981-97	COTTENEVA CREEK UNNAMED TRIB	SOPER, JAMES	22-Aug-97
0991-97	HARE CREEK/CASPAR CREEK	MALLORY, DOUG	08-Aug-97
1006-97	NOYO RIVER UNNAMED TRIBUTARIES	BALASSI, DENNIS	19-Aug-97
1011-97	RUSSIAN RIVER	WEGNER, DONALD F	13-Aug-97
1013-97	ROBINSON CREEK	PARDINI, BOB	21-Aug-97
1014-97	RANCHERIA CREEK	BURGER, BOB	15-Aug-97
1017-97	RUSSIAN RIVER	FETZER VINEYARDS	12-Aug-97
1020-97	WAGES CREEK	MC KINLEY, ED	25-Aug-97
1034-97	GARCIA RIVER TRIB	HOWELL, MICHAEL	05-Sep-97
1045-97	MILL CREEK	WATERS, WAYNE	24-Aug-97
1060-97	RUSSIAN RIVER	COX, JACK L	19-Sep-97
1062-97	RUSSIAN RIVER E. FK UNNAMED TB	PARKER, ROBERT V	30-Oct-97
1063-97	BURRIGHT CREEK	PARKER, ROBERT V	30-Oct-97
1064-97	RUSSIAN RIVER EAST FORK	PARKER, ROBERT V	30-Oct-97

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1072-97	TEN MILE RIVER NORTH FORK	MALLORY, DOUG	18-Aug-97
1075-97	LAZY CREEK	CEMR	21-Aug-97
1095-97	GRIST & MILL CREEKS	POLSLEY, RAYMOND	18-Sep-97
1099-97	LITTLE NORTH FORK NAVARRO	CALIFORNIA CONSERV CORPS	07-Aug-97
1101-97	MARIPOSA CREEK	FREY, MATT	23-Aug-97
1110-97	WAGES CREEK	BARBER, TERRI	23-Aug-97
1118-97	CUMMINSKY CREEK & RUSSIAN RVR	ROSATI, MARIO	19-Sep-97
1129-97	WITHERAL CREEK	DENNISON, PETER	26-Aug-97
1163-97	RANCHERIA CREEK	PRONSOLINO, GUIDO A.	26-Sep-97
1171-97	OLSON GULCH CREEK	MONSCHKE, JACK	03-Oct-97
1197-97	ORRS CREEK	EIB, TERRY R.	19-Sep-97
1199-97	MILL CREEK	GRIEVE, RICHARD	09-Aug-97
1201-97	GARCIA RIVER	BOWLES, STEVE	11-Aug-97
1205-97	ALBION RIVER	CEMR	05-Sep-97
1206-97	STREETER CREEK	ENGBER, EVAN	04-Sep-97
1213-97	PETERSON CREEK	WHITELY, LANCE	16-Sep-97
1214-97	STALEY CREEK UNNAMED TRIB	VANDERHORST, STEVEN	18-Sep-97
1218-97	SCOTTS CREEK SOUTH FORK	BUREAU OF LAND MANAGEMENT	08-Sep-97
1228-97	RUSSIAN RIVER, EAST BRANCH	ANDERSON, RON	25-Sep-97
1229-97	SULPHUR CREEK	RAU, GEORGE C	25-Sep-97
1235-97	FELIZ CREEK	ASHURST, TOM	08-Sep-97
1234-97	GARCIA RIVER	DOBBINS, PETER	05-Sep-97
1232-97	BRANDON GULCH & N.FK OF S.FK	ANDERSON, MIKE	16-Sep-97
1287-97	EEL RIVER SOUTH FORK	BURGESS, LYLE	18-Sep-97
1300-97	RANCHERIA CREEK	BURGER, R. K.	22-Sep-97
1301-97	ANDERSON CREEK	MCCLURE, PAT	21-Sep-97
1340-97	MILL CREEK	GEIGER, BERNARD R	28-Sep-97
1321-97	RUSSIAN RIVER	FLIGHT RAIL CORP	15-Sep-97
1322-97	RUSSIAN RIVER WEST BRANCH	NORTHWESTERN PACIFIC RAIL	15-Sep-97
1347-97	EEL RIVER	SIMPSON, GREG	16-Sep-97
1349-97	ANDERSON CREEK	TEBBUTT, CHRIS	14-Sep-97
1350-97	ANDERSON CREEK	HIATT, WAYNE	03-Sep-97
1372-97	EEL RVR MIDDLE FK UNNAMED TRIB	GRIDER, DOUG	21-Aug-97
1373-97	EEL RVR MIDDLE FK UNNAMED TRIB	MOORE, RICHARD	09-Sep-97
1379-97	HAEHL CREEK	ADVANCED MANUFACTURING	18-Sep-97
1382-97	ROCK TREE CREEK	HEBARD, RAY	19-Sep-97
1391-97	ANDERSON CREEK	TITUS, DEAN	30-Sep-97
1394-97	MILL CREEK	LINDSEY, JIM	10-Oct-97
1396-97	HENSLEY CREEK	WELCH, MARK	22-Sep-97
1403-97	RANCHERIA CREEK	WANZER, DOUG	06-Oct-97
1406-97	ROBINSON CREEK	HATCH, STEPHEN G.	20-Sep-97
1407-97	NAVARRO RIVER UNNAMED TRIBUTAR	SEMR	24-Sep-97
1413-97	WAGES CREEK	BARBER, TERI	27-Oct-97

Streambed Alteration Agreements
1993-2002
Mendocino County

0403-98	RUSSIAN RIVER EAST BRANCH	MC FADDEN, EUGENE	07-May-98
0406-98	MILL CREEK	PARKER, R. V.	01-Jun-98
0032-98	DOOLEY CREEK	SYKES, HEIDI	01-Jul-98
0082-98	CASPER CREEK SOUTH FORK	BAXTER, WILLIAM TODD	19-Mar-98
0087-98	GARCIA RIVER & NO. FK & TRIBS.	MAXEY, DOUG	20-May-98
0599-98	DRY CREEK UNNAMED TRIB	HANSEN, STEVE	03-Aug-98
0798-98	HARE CREEK & WALTON GULCH TRIB	DUDLEY, JIM	27-Jul-98
0825-98	SPANISH CANYON CREEK	NOYD, FRANK	21-Aug-98
0826-98	GARCIA RIVER	STORNETTA, LARRY	21-Aug-98
0845-98	HOWARD CREEK	GRIGG, CHARLES & SALLY	13-Oct-98
0615-98	GARCIA RIVER	ENGBER, EVAN	22-Jul-98
0619-98	ROSEMAN CREEK TRIBUTARY	SHELLHORN, LANI	27-Jun-98
0626-98	HOWARD CRK/LAKE CLEON	MCKINNEY, JOHN	04-Dec-98
0631-98	SHORT CREEK	FISHER, JAMES	05-Aug-98
0632-98	STRING CREEK	LAWRASON, JESSE	02-Jul-98
0633-98	COTTANEVA CREEK UNNAMED TRIB	MEESE, DALE E.	01-Jun-98
0660-98	RUSSIAN RIVER	CROWFOOT, JANE	01-Jul-98
0661-98	RUSSIAN RIVER	LIGHTY, RUDY	22-Jul-98
0667-98	BEAR CREEK & TRIBS	HOVLAND, PATRICK	07-Aug-98
0676-98	MCDOWELL CREEK	MCDOWELL VALLEY VINEYARDS	02-Jul-98
0680-98	ALBION RIVER SO FORK	SWEELEY, JOHN P	23-Jul-98
0860-98	WAGES CREEK	BARBER, TERRI JOE	31-Jul-98
0872-98	NAVARRO RIVER SO BRANCH NO. FK	CCC	03-Aug-98
0876-98	WITHERELL CREEK	PARKER, R. V.	11-Sep-98
0893-98	HOWARD CREEK	PARKER, R. V.	11-Sep-98
0896-98	MOAT CREEK UNKNOWN TRIB	WATERS CONSTRUCTION INC	14-Aug-98
0914-98	ELK CREEK	CCC	07-Aug-98
0915-98	COOK CREEK	CCC	07-Aug-98
0920-98	FELIZ CREEK	DEVINCENZI, JOHN	30-Aug-98
0963-98	CONKLIN CREEK	WATERS CONSTRUCTION INC	25-Aug-98
0967-98	TEN MILE CREEK	BARSOTTI, SUSIE	13-Aug-98
0078-98	STRING CREEK	BERKOWITZ, RON	17-Feb-98
0079-98	SHORT CREEK	GEIGER, ERIK	11-Mar-98
0101-98	DAVIS CREEK UNNAMED TRIBUTARY	CA DEPT. OF FORESTRY	24-Feb-98
0115-98	ALBION RIVER	WOESSNER, JON	15-Apr-98
0141-98	ROCKPILE CREEK	RAMALEY, JOHN	31-Mar-98
0152-98	MCNAB CREEK	FETZER, JOHN	15-May-98
0156-98	ROCK CREEK	BURMESTER, DANIEL	01-Apr-98
0168-98	GARCIA RIVER	SHIVELY, RUSSELL S.	08-Oct-98
0169-98	ELK CREEK	SHIVELY, RUSSELL S.	20-Apr-98
0170-98	NAVARRO RIVER	SHIVELY, RUSSELL S.	20-Apr-98
0171-98	OUTLET CREEK	GREEN, JON	24-Jun-98
0975-98	ROBINSON CREEK UNNAMED TRIB	NUNES, GLAYDES C.	29-Aug-98
0979-98	BLACK BUTTE RIVER	BLACK BUTTE COUNTRY STORE	18-Aug-98
1034-98	RUSSIAN RIVER	FORD, MELVIN W.	29-Sep-98

Streambed Alteration Agreements
1993-2002
Mendocino County

0335-99	NOYO RIVER	FRYKMAN, DAVID	15-Apr-99
0336-99	NOYO RIVER TRIBUTARIES	FRYKMAN, DAVID	15-Apr-99
0350-99	NOYO RIVER TRIBUTARY	RICHARDS, GARY	01-Apr-99
0351-99	DAVIS CREEK	MCLELLAND, DOUG	01-Apr-99
0359-99	RUSSIAN RIVER	JAHNKE, L GORDON	26-Apr-99
0362-99	TOMKI CREEK UNNAMED TRIBS	CHECKAL, GREG	12-May-99
0363-99	TENMILE RIVER UNKNOWN CULVERT	MOLNAR, MELINDA	28-Jun-99
0365-99	THOMAS CREEK TRIBUTARIES	RICE, JOE C.	07-Apr-99
0374-99	MCCLURE CREEK	BARTOLOMEI, H. T.	14-Apr-99
0376-99	FISH ROCK GULCH	STONEMAN, CHARLL K.	28-May-99
0394-99	RATTLESNAKE & EEL RVR SF	BAILEY, AGNES J.	15-Jun-99
0403-99	NOYO RIVER TRIB	PEIRCE, LELAND	16-Apr-99
0406-99	BIG RIVER TRIBUTARIES	REMPEL, ROBBIN W.	28-Apr-99
0421-99	BEAR CREEK UNNAMED/NAVARRO NF	BRINKERHOFF, RON	10-Jul-99
0430-99	PETERSON CREEK	BROWN, STEVENSON	22-Apr-99
0432-99	INDIAN CREEK	SOLINSKY, WILLIAM D	27-Sep-99
0474-99	GRIST CREEK	FETZER, ROBERT L.	15-Jun-99
0479-99	WOLF CREEK	ROSALES, HAWK	30-Apr-99
0480-99	TEN MILE CREEK	ENGBER, EVAN	29-Apr-99
0484-99	MCDOWELL CREEK	HANSEN, STEVEN	25-May-00
0582-99	NAVARRO RIVER TRIBS	MENDOCINO REDWOOD COMPANY	04-Aug-99
0613-99	RUSSIAN RIVER CANAL EAST FORK	MCFADDEN, EUGENE F. M.	31-Aug-99
0621-99	CAMP 29 GULCH	MALLORY, DOUGLAS C.	22-Jun-99
0638-99	MILL CREEK/SHORT&GRIST CREEKS	MENDOCINO CO. TRANSPORT	22-Jun-99
0649-99	FLYNN CREEK	CCC	14-Jun-99
0650-99	ALBION RIVER SOUTH FORK	CCC	14-Jun-99
0651-99	COOK CREEK	CCC	14-Jun-99
0652-99	HOLLOW TREE CREEK	CCC	14-Jun-99
0653-99	BOND CREEK	CCC	14-Jun-99
0654-99	DAUGHERTY CREEK	CCC	14-Jun-99
0655-99	GATES CREEK	CCC	14-Jun-99
0656-99	NAVARRO RIVER SB NF	CCC	14-Jun-99
0657-99	MCCARVEY CREEK	CCC	14-Jun-99
0658-99	BOTTOM CREEK	CCC	14-Jun-99
0660-99	KAWI CREEK	SHERWOOD VALLEY RANCHERIA	15-Jun-99
0665-99	RUSSIAN RIVER	REDWOOD VALLEY C O WATER	20-Sep-99
0666-99	UNKNOWN	NELSON & SONS, INC	18-Jun-99
0699-99	ROCKTREE/TOMKI/BAKER 40 CRKS	MCKINSTRY, STEVE	03-Aug-99
0700-99	ALBION RIVER UNNAMED	PHILBRICK LOGGING INC.	13-Jul-99
0710-99	NOYO RIVER SO FORK	BURNS, JOHN H. JR	19-Jul-99
0715-99	REDWOOD CREEK	CCC	22-Jun-99
0716-99	HUCKLEBERRY CREEK	CCC	22-Jun-99
0722-99	CUMMINSKEY CREEK	NAYES, BILL	12-Jan-00
0723-99	WILLIAMS CREEK	SMYTHE, THOMAS E.	19-Jul-99
0770-99	RATTLESNAKE CREEK	LIVSEY, CHARLES	05-Oct-99
0771-99	NAVARRO RIVER	MENDOCINO REDWOOD COMPANY	13-Aug-99

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1993-2002
Mendocino County

R3-2000-0349	EEL RIVER MIDDLE FORK	PARNUM PAVING, INC.	11-Sep-00
R3-2000-0350	EEL RIVER MIDDLE FORK	PARNUM PAVING, INC.	11-Sep-00
R3-2000-0351	RUSSIAN RIVER	PARNUM PAVING, INC.	11-Sep-00
R3-2000-0285	RAMON & METTICK CREEK	SCRIVEN, JOSEPH	25-Aug-00
R3-2000-0364	RUSSIAN RIVER	HILDRETH, MIKE	02-Apr-01
R3-2000-0365	RUSSIAN RIVER	HILDRETH, MIKE	02-Apr-01
R3-2000-0366	FELIZ CREEK	RICHARDSON, DIANE	30-May-02
R3-2000-0383	ELK CREEK	ANDERSON,JOHN	01-Sep-00
R3-2000-0385	NAVARRO RIVER	WOESSNER, JON	03-Jul-00
R3-2000-0370	WAGES CREEK TRIBUTARY	MALLORY, DOUGLAS	29-Aug-00
R3-2000-0407	GARCIA RIVER	ENGBER, EVAN	29-Aug-00
R3-2000-0422	DRY CREEK	BARR, KEVIN & LINDA	04-Oct-00
R3-2000-0423	DRY CREEK	BARR, KEVIN & LINDA	01-Sep-00
R3-2000-0128	NAVARRO RIVER	HALLER, MELODY OR PAUL	30-Aug-00
R3-2000-0139	COLD CREEK	EMBREE, LISA	21-Jun-00
R3-2000-0145	ACKERMANN CREEK UNNAMED TRIB	FIDLER, MICHAEL	06-Apr-00
R3-2000-0146	RUSSIAN RIVER	FIDLER, MICHAEL	27-Sep-00
R3-2000-0187	RANCHERIA CREEK	RICE, RONALD	06-Apr-00
R3-2000-0188	RUSSIAN RIVER	BURKE, KIERAN	17-Aug-00
R3-2000-0231	JOHN SMITH CREEK TRIBUTARY	BORRAS, THEMBI	15-May-00
R3-2000-0444	HOLLOW TREE & VARIOUS CREEKS	MEESE, DALE	01-Sep-00
R3-2000-0447	GARCIA RIVER	STORNETTA, LARRY,JUDITH	20-Sep-00
R3-2000-0452	REDWOOD CREEK	RIBAR, PETER	01-Sep-00
R3-2000-0454	ORRS CREEK	SCRIVEN, JOSEPH	02-Aug-00
R3-2000-0455	COLD CREEK TRIBUTARY	JOE CINEK CONSULTING FORE	29-Aug-00
R3-2000-0456	PARDALOE CREEK	TOWN, CHRIS	30-Aug-00
R3-2000-0471	GARCIA RIVER	JACOBSZOON, RANDY	28-Jun-00
R3-2000-0475	HULLS VALLEY CREEK	SCRIVEN, JOSEPH	15-Sep-00
R3-2000-0479	HARE CREEK TRIBUTARY	HAYTER, CHRIS	29-Aug-00
R3-2000-0480	MCNAB CREEK TRIBUTARY	FETZER, JAMES	28-Aug-00
R3-2000-0507	RUSSIAN RIVER TRIBUATRIES	WALTER, RICH	08-Aug-00
R3-2000-0534	RUSSIAN RVR TRIB BORING S-120	WALTER, RICH	11-Aug-00
R3-2000-0535	RUSSIAN RVR TRIB BORING S-121	WALTER, RICH	11-Aug-00
R3-2000-0536	RUSSIAN RVR TRIB BORING S-126	WALTER, RICH	11-Aug-00
R3-2000-0537	RUSSIAN RVR TRIB BORING S-127	WALTER, RICH	11-Aug-00
R3-2000-0539	RUSSIAN RVR TRIB BORING S-164	WALTER, RICH	11-Aug-00
R3-2000-0540	RUSSIAN RVR TRIB BORING S-165	WALTER, RICH	11-Aug-00
R3-2000-0541	RUSSIAN RVR TRIB BORING S-166	WALTER, RICH	11-Aug-00
R3-2000-0542	DIRECTIONAL BORING B S-121	WALTER, RICH	11-Aug-00
R3-2000-0543	RUSSIAN RVR TRIB BORING S-173	WALTER, RICH	11-Aug-00

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1993-2002
Mendocino County

0403-98	RUSSIAN RIVER EAST BRANCH	MC FADDEN, EUGENE	07-May-98
0406-98	MILL CREEK	PARKER, R. V.	01-Jun-98
0032-98	DOOLEY CREEK	SYKES, HEIDI	01-Jul-98
0082-98	CASPER CREEK SOUTH FORK	BAXTER, WILLIAM TODD	19-Mar-98
0087-98	GARCIA RIVER & NO. FK & TRIBS.	MAXEY, DOUG	20-May-98
0599-98	DRY CREEK UNNAMED TRIB	HANSEN, STEVE	03-Aug-98
0798-98	HARE CREEK & WALTON GULCH TRIB	DUDLEY, JIM	27-Jul-98
0825-98	SPANISH CANYON CREEK	NOYD, FRANK	21-Aug-98
0826-98	GARCIA RIVER	STORNETTA, LARRY	21-Aug-98
0845-98	HOWARD CREEK	GRIGG, CHARLES & SALLY	13-Oct-98
0615-98	GARCIA RIVER	ENGBER, EVAN	22-Jul-98
0619-98	ROSEMAN CREEK TRIBUTARY	SHELLHORN, LANI	27-Jun-98
0626-98	HOWARD CRK/LAKE CLEON	MCKINNEY, JOHN	04-Dec-98
0631-98	SHORT CREEK	FISHER, JAMES	05-Aug-98
0632-98	STRING CREEK	LAWRASON, JESSE	02-Jul-98
0633-98	COTTANEVA CREEK UNNAMED TRIB	MEESE, DALE E.	01-Jun-98
0660-98	RUSSIAN RIVER	CROWFOOT, JANE	01-Jul-98
0661-98	RUSSIAN RIVER	LIGHTY, RUDY	22-Jul-98
0667-98	BEAR CREEK & TRIBS	HOVLAND, PATRICK	07-Aug-98
0676-98	MCDOWELL CREEK	MCDOWELL VALLEY VINEYARDS	02-Jul-98
0680-98	ALBION RIVER SO FORK	SWEELEY, JOHN P	23-Jul-98
0860-98	WAGES CREEK	BARBER, TERRI JOE	31-Jul-98
0872-98	NAVARRO RIVER SO BRANCH NO. FK	CCC	03-Aug-98
0876-98	WITHERELL CREEK	PARKER, R. V.	11-Sep-98
0893-98	HOWARD CREEK	PARKER, R. V.	11-Sep-98
0896-98	MOAT CREEK UNKNOWN TRIB	WATERS CONSTRUCTION INC	14-Aug-98
0914-98	ELK CREEK	CCC	07-Aug-98
0915-98	COOK CREEK	CCC	07-Aug-98
0920-98	FELIZ CREEK	DEVINCENZI, JOHN	30-Aug-98
0963-98	CONKLIN CREEK	WATERS CONSTRUCTION INC	25-Aug-98
0967-98	TEN MILE CREEK	BARSOTTI, SUSIE	13-Aug-98
0078-98	STRING CREEK	BERKOWITZ, RON	17-Feb-98
0079-98	SHORT CREEK	GEIGER, ERIK	11-Mar-98
0101-98	DAVIS CREEK UNNAMED TRIBUTARY	CA DEPT. OF FORESTRY	24-Feb-98
0115-98	ALBION RIVER	WOESSNER, JON	15-Apr-98
0141-98	ROCKPILE CREEK	RAMALEY, JOHN	31-Mar-98
0152-98	MCNAB CREEK	FETZER, JOHN	15-May-98
0156-98	ROCK CREEK	BURMESTER, DANIEL	01-Apr-98
0168-98	GARCIA RIVER	SHIVELY, RUSSELL S.	08-Oct-98
0169-98	ELK CREEK	SHIVELY, RUSSELL S.	20-Apr-98
0170-98	NAVARRO RIVER	SHIVELY, RUSSELL S.	20-Apr-98
0171-98	OUTLET CREEK	GREEN, JON	24-Jun-98
0975-98	ROBINSON CREEK UNNAMED TRIB	NUNES, GLAYDES C.	29-Aug-98
0979-98	BLACK BUTTE RIVER	BLACK BUTTE COUNTRY STORE	18-Aug-98
1034-98	RUSSIAN RIVER	FORD, MELVIN W.	29-Sep-98

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Mendocino County

1062-98	VARIOUS	PARKER, R. V.	31-Aug-98
1076-98	ROCKTREE CREEK	PUTNAM, TERRY	27-Aug-98
1086-98	RUSSIAN RIVER EAST BRANCH	MCFADDIN, DENNIS	28-Aug-98
0181-98	MILL CREEK UNNAMED TRIB	HURT, BRIAN	01-Apr-98
0197-98	RANCHERIA CREEK	HANELT, VALERIE	27-Mar-98
0198-98	SHIELDS CREEK	MENDOCINO COUNTY TRANSP.	01-May-98
0207-98	RUSSIAN RIVER UNNAMED STREAM	HANSEN, STEVE	01-Jun-98
0219-98	RUSSIAN RIVER	BRADFORD, PETER	26-Apr-98
0222-98	RANCHIERA CREEK	HANELT, PETER	21-Apr-98
0229-98	RUSSIAN RIVER	BELLOWS, FRED A.	30-Apr-98
0233-98	RUSSIAN RIVER WEST FORK	GOMES, STEVEN L.	15-May-98
1238-98	TEN MILE RIVER SOUTH FK	CEMR	17-Sep-98
1245-98	RUSSIAN GULCH CREEK	SHANNON, GARY	25-Sep-98
1261-98	RUSSIAN RIVER	HENWOOD, RICHARD	09-Oct-98
1279-98	RUSSIAN RIVER	ASHLEY, LENA	30-Sep-98
1284-98	MILL CREEK & MOORE CREEK	PETSCH, KAROL	30-Sep-98
1334-98A	CAMP CREEK	CEMR	25-Sep-98
1335-98	RUSSIAN RIVER EAST FORK	AIR, JACK	25-Sep-98
1343-98	TEN MILE RIVER/LITTLE VLY CRK	KRACKHER, GERALD	25-Sep-98
1348-98	TOWN CREEK	FISHER, JAMES	04-Oct-98
1349-98	FISH ROCK GLUCH	SYKES, HEIDI	13-Oct-98
1350-98	NORDEN GULCH	WOESSNER, JON	28-Oct-98
1351-98	ALLEN CREEK	BARBER, TERI JO	08-Oct-98
1352-98	RUSSIAN RIVER UNNAMED TRIB	HANSEN, STEVEN	10-Nov-98
1353-98	CAHTO CREEK	SILVA, JARED	28-Sep-98
1354-98	DOG TOWN CREEK	HANSEN, STEVE	01-Jan-00
0959-98	HOWARD CREEK	BARBER, TERI	12-Aug-98
0960-98	LITTLE RIVER	BARBER, TERI	12-Aug-98
1001-98	CAVE CREEK	TINDLE, RAY	19-Sep-98
1010-98	FELIZ CREEK	ASHURST, TOM	25-Aug-98
1043-98	MILL CREEK GARCIA DRAINAGE	GRASS, ALAN	28-Aug-98
1050-98	ORRS CREEK	EIB, TERRY R.	25-Sep-98
1136-98	ROBINSON CREEK	REDDING, DAVID	15-Sep-98
1140-98	WAGES CREEK	BARBER, TEN JO	15-Sep-98
1150-98	HENSLEY CREEK	FRANZ, RON	08-Sep-98
0011-98	DIGGER CREEK	PEIRCE, LELAND	06-Jan-98
0243-98	STREETER CREEK	REFORT, CLARK & DIANNE	02-Jun-98
0251-98	SODA CREEK	KENT, NICOLAS	27-Apr-98
0254-98	NAVARRO RIVER NORTH FORK	BOY SCOUTS OF AMERICA	07-Apr-98
0264-98	ROBINSON CREEK & TRIBUTARIES	HOVLUND, PATRICK	21-Apr-98
0293-98	RUSSIAN RIVER UNNAMED STREAM	MILOVINA, JAMES	06-Jun-98
0296-98	RUSSIAN RIVER UNNAMED CREEK	BERGERA, NICK	23-Apr-98
0340-98	RUSSIAN RIVER WEST BRANCH	BUTOW, DON	24-Apr-98

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1993-2002
Mendocino County

0343-98	ALBION RIVER	WOESSNER, JON	09-Jun-98
0422-98	BRUSH CREEK/ALDER CREEK	SHIVELY, RUSSELL S	17-Jul-98
0423-98	EEL RIVER SF UNNAMED STREAM	SMYTHE, TOM	01-Jun-98
1408-98	FELIZ CREEK	BRUTOCAO, STEVE	07-Dec-98
1484-98	RUSSIAN RIVER WEST FORK	GOMES, STEVEN L	21-Oct-98
1504-98	MILL CREEK	MENDOCINO COUNTY ROAD DEP	19-Oct-98
1466-98	BIG ROCK CREEK	ENGBER, EVAN	13-Oct-98
0328-98	GREENWOOD CREEK	SHIVELY, RUSSELL S.	10-Jun-98
0334-98	ALDER CREEK	HAY, BILL	23-Apr-98
0440-98	ALBION RIVER UNNAMED TRIBUTARY	TOWN, CHRIS	26-May-98
0441-98	BROADDUS CREEK	TOWN, CHRIS	26-May-98
0442-98	BROADDUS CREEK	BOZZO, JAMES	15-Jun-98
0448-98	ALDER CREEK UNNAMED TRIB	MOTL, TIM	19-Aug-98
0449-98	MILL CREEK	FORBES, RANDALL	24-Jun-98
0470-98	GIBSON, ORR, & DOOLIN CREEKS	KENNEDY, RICK	30-Aug-98
0471-98	RANCHERIA CREEK	MATHIAS, BOB	23-May-98
0477-98	BIG RIVER	WEGER INTERESTS, LTD.	05-Jun-98
0478-98	RUSSIAN RIVER	LOVIN, SKIP	27-Jul-98
0488-98	MILL CREEK	JAMISON, ALLAN E	11-Jun-98
0494-98	LAZY CREEK	CEMR	15-Jun-98
0495-98	ELK CREEK	CEMR	15-Jun-98
0496-98	BIG RIVER SO FK TRIB	BRINKERHOFF, RON	02-Jun-98
0497-98	BIG RIVER SO FK TRIB	BRINKERHOFF, RON	02-Jun-98
0510-98	GARCIA RIVER	STORNETTA, LARRY	09-Jun-98
0511-98	SPANISH CREEK	CAUGHEY, LYNN	09-Jun-98
0512-98	CEMETARY CREEK	PARDINI, DON	15-Jun-98
0513-98	BIG RIVER	BRINKERHOFF, RON	04-Jun-98
0514-98	NOYO RIVER NORTH FORK	BRINKERHOFF, RON	04-Jun-98
0515-98	CASPAR CREEK NORTH & SOUTH FK	HENRY, NORM	11-Jul-98
1166-98	MILL CREEK	EPSTEIN, RON	07-Oct-98
1167-98	MORRISON CREEK	SKADE, HENRY	20-Oct-98
1168-98	DOOLEY CREEK	REED, WILLIAM T.	28-Oct-98
1186-98	ROBINSON CREEK	MOHR, ALAN	15-Sep-98
1187-98	MILL/BAECHTEL/OUTLET CREEKS	CALIFORNIA CONSERVATION C	25-Sep-98
1188-98	OUTLET CREEK	SLOTA, DENNIS	17-Sep-98
1191-98	SODA CREEK UNKNOWN TRIB	ASHLEY, LENA	20-Sep-98
1192-98	FORSYTHE CREEK UNKNOWN TRIB	ASHLEY, LENA	20-Sep-98
1252-98	SHORT CREEK	BROWN, STAN	11-Oct-98
1303-98	MILL CREEK UNNAMED TRIB	SICULAR, DANIEL	19-Aug-99
1562-98	SULPHUR CREEK	RAU, GEORGE/RAU & ASSOC	08-Dec-98
1563-98	ACKERMAN CREEK	MENDOCINO REDWOOD COMPANY	13-Apr-99
1564-98	NAVARRO RIVER NF UNNAMED TRIB	MENDOCINO REDWOOD COMPANY	13-Apr-99
1565-98	VARIOUS CREEKS	MENDOCINO REDWOOD COMPANY	13-Mar-99
1569-98	TOWN CREEK	WILSON, CHRIS	30-Oct-98
1617-98	ROCKTREE CREEK & TRIB	MADIGAN, KERRY	09-Nov-98

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1618-98	BROADDUS CREEK	CA WESTERN RAILROAD	11-Nov-98
1628-98	KELLY GULCH	REMPEL, ROB	20-Nov-98
1217-98	STANDLEY CREEK	CEMR	16-Sep-98
1310-98	COLD CREEK	PETSCH, KAROL	24-Nov-98
1311-98	MILL CREEK	VANN, RONALD	11-Oct-98
1383-98	MC CARVEY CREEK	CCC	01-Oct-98
0358-98	EEL RIVER SOUTH FORK	STEPHENS, THOMAS N	28-May-98
0519-98	MURPHY CREEK	HOLMGREN, LARRY K.	26-Jun-98
0520-98	DOTY CREEK	DINGMAN, ROGER	14-Jun-98
0533-98	INDIAN CREEK	SOLINSKY, WILLIAM	25-Jun-98
0544-98	WAGES CREEK	STENSGARD, MARGARET	19-Jun-98
0545-98	EEL RIVER MIDDLE FORK	MCLELLAND, DOUG	15-Jul-98
0546-98	RUSSIAN RIVER	MCLELLAND, DOUG	26-Jun-98
0547-98	EEL RIVER MAIN	MCLELLAND, DOUG	06-Jul-98
0557-98	TEN MILE RIVER SF UNNAMED TRIB	MALLORY, DOUG	12-Jun-98
0563-98	WAGES CREEK	MCKINLEY, ED	24-Sep-98
0589-98	GARCIA RIVER/ALDER & BRUSH CRK	STORNETTA, WALT	18-Jun-98
0590-98	NOYO RIVER SOUTH FORK	MALLORY, DOUG	18-Jun-98
0591-98	BEAR HAVEN CREEK SO. FORK	MALLORY, DOUG	18-Jun-98
1230-98	ROCKPILE CREEK	RAMAKY, JOHN	14-Sep-98
1231-98	EEL RIVER NF TRIB	CINEK, JOE	03-Nov-98
1404-98	MALLO PASS	SHIVELY, RUSSELL S	28-Oct-98
1444-98	COTTONEVA SOUTH FORK	MEESE, DALE E	22-Oct-98
1530-98	EEL RIVER MAIN STEM	STEINER ENVIRON	23-Oct-98
1532-98	BIG ROCK CREEK	GEISLER, GENE	24-Oct-98
1536-98	RUSSIAN RIVER UNNAMED STREAM	KUWATCH, ED	03-Dec-98
1552-98	DOOLAN CREEK	WIPF, ERNEST	29-Oct-98
1554-98	SULFER CREEK	GRIFFIN, TOMMY GENE	23-Nov-98
1595-98	RUSSIAN RIVER EAST BRANCH	OVERFELDT, HANK	04-Nov-98
1604-98	RUSSIAN RIVER	SKADE, HANK	24-Nov-98
0734-98	EEL RIVER MIDDLE FK	EN TENA INC	15-Jul-98
0740-98	GUALALA, NORTH FORK	KELLY, SCOTT	10-Aug-98
0744-98	STREETES CREEK	ENGBER, EVAN	15-Jul-98
0745-98	LONG BRANCH	SMITH, LELAND J	16-Aug-98
0747-98	LONG VALLEY CREEK	MCCLELLAN, ARCHIE	29-Jul-98
0751-98	GRIST CREEK MILL CREEK	POLSLEY, RAYMOND	27-Jul-98
0760-98	GUALALA RIVER	BROWN, DANIEL E	22-Aug-98
0766-98	BRUSH CREEK/MILL CREEK	HICKLEY, JONATHAN	23-Jul-98
0767-98	MILL CREEK	HICKLEY, JONATHAN	23-Jul-98
0777-98	JACK OF HEARTS CREEK	LYDA, GREG	10-Aug-98
0784-98	HAYWORTH CREEK	FRYKMAN, DAVID	31-Jul-98
0795-98	CONN CREEK	CEMR	23-Jul-98
0796-98	MC CLURE CREEK	BARTOLOMEI, RAY	24-Jul-98
1657-98	GREENWOOD CREEK	YOUNGER, RANDY	17-Nov-98
1659-98	EEL RIVER SOUTH FORK	KRACHER, GERALD	19-Nov-98
1665-98	NOYO RIVER	TATMAN, KAREN	14-Jan-99
1668-98	RUSSIAN RIVER	DOLAN, PAUL E	09-Dec-98

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1676-98	RUSSIAN RIVER	DUTRA, FRANK	13-Jan-99
1684-98	MITCHELL CREEK	SHANDEL, NORM	12-Dec-98
1716-98	FELIZ CREEK	STEPHEN, TONY	23-Feb-99
1736-98	EEL RIVER/LK PILLSBURY--POTER	PG&E (POTTER VALLEY PROJE	22-Dec-98
0035-99	BIG RIVER	CAYLER, PAUL	09-Jan-99
0014-99	RUSSIAN RIVER WEST BRANCH	UKIAH ROD & GUN CLUB	10-Jan-99
0015-99	RUSSIAN RIVER	PIPER, TOM	13-Jan-99
0001-99	RUSSIAN RIVER	LA MALFA, RICHARD	03-Feb-99
0028-99	RUSSIAN RIVER	EMBRE, LISA	01-Feb-99
0066-99	RUSSIAN RIVER UNNAMED CREEK	PARKER, R. V.	22-Feb-99
0017-99	MILL CREEK	PARKER, R. V.	13-Jan-99
0062-99	RUSSIAN RIVER	SIMON, RICHARD	06-Oct-99
0080-99	JOHNS GULCH	MALLORY, DOUGLAS C	31-Mar-99
0189-99	SCHOOLHOUSE CREEK	LANCE, LAWRENCE & MARY	29-Apr-99
0190-99	RUSSIAN RIVER	THOMAS, JOHN	30-Apr-99
0191-99	RUSSIAN RIVER	THOMAS, JOHN	30-Apr-99
0192-99	RUSSIAN RIVER	THOMAS, JOHN	30-Apr-99
0225-99	RUSSIAN RIVER WEST FORK	JOHNSON, WILLIAM	18-Mar-99
0231-99	RUSSIAN RIVER	JOHNSON, WILLIAM	18-Mar-99
0263-99	ALBION RIVER	MACKAY, ROBERT F.	20-Apr-99
0264-99	RUSSIAN RIVER	BURKE, KIERAN C.	30-Apr-99
0265-99	RANCHERIA & YALE CREEKS	HIATT, CHARLES	13-Apr-99
0280-99	MILL CREEK	JOHNSON, WARREN A.	30-Jul-99
0281-99	DOOLEY CREEK	REED, WILLIAM T.	17-Apr-99
0297-99	RUSSIAN RIVER	JOHNSON, WILLIAM	20-May-99
0298-99	RUSSIAN RIVER WEST FORK	JOHNSON, WILLIAM	20-May-99
0299-99	RUSSIAN RIVER WEST FORK	JOHNSON, WILLIAM	20-May-99
0300-99	REDWOOD CREEK	MALLORY, DOUG	13-Apr-99
0301-99	BIG RIVER	MALLORY, DOUG	15-Apr-99
0302-99	PIERCY CREEK	MALLORY, DOUG	26-Apr-99
0303-99	CAMPBELL CREEK	MALLORY, DOUG	15-Apr-99
0304-99	INDIAN CREEK	MALLORY, DOUG	26-Apr-99
0305-99	TEN MILE LITTLE N. FK	MALLORY, DOUG	15-Apr-99
0306-99	EEL RIVER SOUTH FORK	MALLORY, DOUG	23-Apr-99
0316-99	NOYO RIVER/NEWMAN GULCH	MALLORY, DOUG	23-Apr-99
0176-99	EEL RIVER MIDDLE FORK	ROWLAND, KEITH A	20-Jul-99
0177-99	ROBINSON CREEK	KELLY, SCOTT	30-Mar-99
0178-99	ELK PRAIRIE CREEK	KELLY, SCOTT	30-Mar-99
0181-99	DOOLAN CREEK	WIPF, ERNEST	25-Mar-99
0183-99	INDIAN CREEK	HARTLIP, THOMPSON L.	23-Mar-99
0323-99	GARCIA RIVER	STORNETTA, LARRY	17-Jun-99
0324-99	RUSSIAN RIVER	NELSON, JIM D.	29-Apr-99
0330-99	ALBION RIVER	WOESSNER, JON	23-Apr-99
0331-99	ALBION RIVER	WOESSNER, JON	21-Apr-99
0332-99	TEN MILE RIVER CLARK FORK TRIB	MALLORY, DOUG	15-Apr-99
0333-99	TEN MILE RIVER CLARK FORK TRIB	MALLORY, DOUG	15-Apr-99
0334-99	NOYO RIVER	KRACHER, GERALD	23-Apr-99

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0335-99	NOYO RIVER	FRYKMAN, DAVID	15-Apr-99
0336-99	NOYO RIVER TRIBUTARIES	FRYKMAN, DAVID	15-Apr-99
0350-99	NOYO RIVER TRIBUTARY	RICHARDS, GARY	01-Apr-99
0351-99	DAVIS CREEK	MCLELLAND, DOUG	01-Apr-99
0359-99	RUSSIAN RIVER	JAHNKE, L GORDON	26-Apr-99
0362-99	TOMKI CREEK UNNAMED TRIBS	CHECKAL, GREG	12-May-99
0363-99	TENMILE RIVER UNKNOWN CULVERT	MOLNAR, MELINDA	28-Jun-99
0365-99	THOMAS CREEK TRIBUTARIES	RICE, JOE C.	07-Apr-99
0374-99	MCCLURE CREEK	BARTOLOMEI, H. T.	14-Apr-99
0376-99	FISH ROCK GULCH	STONEMAN, CHARLL K.	28-May-99
0394-99	RATTLESNAKE & EEL RVR SF	BAILEY, AGNES J.	15-Jun-99
0403-99	NOYO RIVER TRIB	PEIRCE, LELAND	16-Apr-99
0406-99	BIG RIVER TRIBUTARIES	REMPEL, ROBBIN W.	28-Apr-99
0421-99	BEAR CREEK UNNAMED/NAVARRO NF	BRINKERHOFF, RON	10-Jul-99
0430-99	PETERSON CREEK	BROWN, STEVENSON	22-Apr-99
0432-99	INDIAN CREEK	SOLINSKY, WILLIAM D	27-Sep-99
0474-99	GRIST CREEK	FETZER, ROBERT L.	15-Jun-99
0479-99	WOLF CREEK	ROSALES, HAWK	30-Apr-99
0480-99	TEN MILE CREEK	ENGBER, EVAN	29-Apr-99
0484-99	MCDOWELL CREEK	HANSEN, STEVEN	25-May-00
0582-99	NAVARRO RIVER TRIBS	MENDOCINO REDWOOD COMPANY	04-Aug-99
0613-99	RUSSIAN RIVER CANAL EAST FORK	MCFADDEN, EUGENE F. M.	31-Aug-99
0621-99	CAMP 29 GULCH	MALLORY, DOUGLAS C.	22-Jun-99
0638-99	MILL CREEK/SHORT&GRIST CREEKS	MENDOCINO CO. TRANSPORT	22-Jun-99
0649-99	FLYNN CREEK	CCC	14-Jun-99
0650-99	ALBION RIVER SOUTH FORK	CCC	14-Jun-99
0651-99	COOK CREEK	CCC	14-Jun-99
0652-99	HOLLOW TREE CREEK	CCC	14-Jun-99
0653-99	BOND CREEK	CCC	14-Jun-99
0654-99	DAUGHERTY CREEK	CCC	14-Jun-99
0655-99	GATES CREEK	CCC	14-Jun-99
0656-99	NAVARRO RIVER SB NF	CCC	14-Jun-99
0657-99	MCCARVEY CREEK	CCC	14-Jun-99
0658-99	BOTTOM CREEK	CCC	14-Jun-99
0660-99	KAWI CREEK	SHERWOOD VALLEY RANCHERIA	15-Jun-99
0665-99	RUSSIAN RIVER	REDWOOD VALLEY C O WATER	20-Sep-99
0666-99	UNKNOWN	NELSON & SONS, INC	18-Jun-99
0699-99	ROCKTREE/TOMKI/BAKER 40 CRKS	MCKINSTRY, STEVE	03-Aug-99
0700-99	ALBION RIVER UNNAMED	PHILBRICK LOGGING INC.	13-Jul-99
0710-99	NOYO RIVER SO FORK	BURNS, JOHN H. JR	19-Jul-99
0715-99	REDWOOD CREEK	CCC	22-Jun-99
0716-99	HUCKLEBERRY CREEK	CCC	22-Jun-99
0722-99	CUMMINSKEY CREEK	NAYES, BILL	12-Jan-00
0723-99	WILLIAMS CREEK	SMYTHE, THOMAS E.	19-Jul-99
0770-99	RATTLESNAKE CREEK	LIVSEY, CHARLES	05-Oct-99
0771-99	NAVARRO RIVER	MENDOCINO REDWOOD COMPANY	13-Aug-99

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0772-99	RUSSIAN RIVER UNNAMED TRIB	MENDOCINO CO TRANSPORTATI	09-Jul-99
0773-99	LONG OPENING CREEK/EEL RVR TRI	COOK, JONATHAN	29-Aug-00
0701-99	ALBION RIVER NORTH FORK	SURPRISE VALLEY RANCH	14-Sep-99
0800-99	CASPAR CREEK SO FORK	BAXTER, BILL	16-Jul-99
0802-99	NAVARRO RIVER	WHITE, ALFRED	27-Sep-00
0811-99	UNNAMED	DU VIGNEAUD, JEAN LOUIS	06-Oct-99
0812-99	SHORT CREEK	BAUER, DONALD	28-Sep-99
0813-99	RANCHERIA CREEK	MEYER FAMILY PORT	25-Sep-00
0814-99	RUSSIAN RIVER E FORK UNNAMED	RAU, GEORGE	10-Sep-99
0815-99	FELDMAN GULCH	MALLORY, DOUGLAS C	26-Jul-99
0825-99	RUSSIAN RIVER	ASH, TIM	10-Aug-99
0828-99	TEN MILE RIVER	HANSEN, STEVE	08-Sep-99
0841-99	RUSSIAN RIVER CANAL EF	MCFADDEN, EUGENE J. M.	19-Jul-99
0731-99	RUSSIAN RIVER TRIBUTARY	GORDON, DEVIN W.	
0732-99	NAVARRO RIVER UNNAMED TRIBS	CORSON, FRED P.	14-Sep-99
0751-99	PACIFIC OCEAN UNNAMED	BORRAS, THEMBI	04-Aug-99
0752-99	ANDERSON CREEK & TRIBUTARY	PRATHER, ALBERT	14-Sep-99
0829-99	GREENWOOD CREEK	ELK COUNTY WATER DIST	19-Oct-00
0838-99	STRING CREEK	FOREST, SOIL & WATER INC	23-Sep-99
0894-99	CASPER CREEK	CDF	20-Aug-99
0680-99	ACKERMAN/ORRS CREEK	CORSON, FRED P.	14-Sep-99
0975-99	BIG RIVER NORTH FORK	JACKSON DEMONSTRATION S.F	31-Aug-99
0976-99	CASPAR CREEK SOUTH FORK	JACKSON DEMONSTRATION S.F	25-Aug-99
0983-99	NAVARRO RIVER	WHITE, ALFRED	29-Oct-99
0984-99	DERBY CREEK	MAAHS, MICHAEL	26-Sep-99
0995-99	BEARPEN CREEK	E CENTER	23-Aug-99
1002-99	CAVE CREEK	DAWSON, IONE	28-Aug-00
1003-99	ANDERSON CRK TRIB	NUNES, GLADYS	26-Oct-99
1004-99	DOYLE CREEK	WOESSNER, JON	13-Oct-99
1005-99	FORSYTHE CREEK	OSTLER, JACK	19-Oct-99
1036-99	MILL CREEK	BUICH, BOB	25-Aug-00
1037-99	ROCKY CREEK	GIALDINI, ALLAN	05-Oct-99
1038-99	ANDERSON CREEK	BERGNER, GEORGE	11-Apr-00
1040-99	JUNGLE CREEK	BILBRO, CHRIS	12-Oct-99
1059-99	GRAVEYARD CREEK	WASSON-SMITH, JAN	20-Sep-99
1007-99	GUALALA RIVER	BROWN, DAN	14-Oct-99
1443-99	EEL RIVER S. F. TRIB	FULLER, DAVID	25-Jan-00
1024-99	RUSSIAN RIVER	DOLAN, PAUL	04-Oct-99
1026-99	MCNAB CREEK UNNAMED TRIB	CEAGO VINEGARDENS	12-Oct-99
1117-99	OUTLET CREEK & VARIOUS CRKS	CCC	10-Oct-99
1127-99	ASH CREEK	COPELAND, JOHN	28-Aug-00
1128-99	MILL CREEK, RED HILL GULCH	SICULAR, DAN	10-Nov-99
1130-99	GRIST CREEK	PHILLIPS, EDWIN	31-Oct-00
1131-99	CHERRY CREEK	PANZER, RODERIC	05-Oct-99
1132-99	BEAR HAVEN CREEK	MALLORY, DOUGLAS	22-Oct-99

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1133-99	MCCLURE CREEK	BARTOLOMEI, RAY	15-Jun-01
1169-99	RUSSIAN RIVER	FETZER, DANIEL	28-Aug-00
1170-99	BLUE ROCK CREEK	COOK, JOHN	26-Jul-00
1171-99	RUSSIAN RIVER WEST FORK	ENGBER, EVAN	23-Sep-99
1172-99	ROBINSON CREEK	ENGSTROM, NAOMI	20-Oct-99
1177-99	SCHOONER GULCH CREEK	THURMOND, BRYAN	23-May-00
1246-99	MILL CREEK	FISHER, JAMES	01-Sep-00
1262-99	FORSYTHE CREEK	HANSEN, STEVE	19-Jun-00
1277-99	RUSSIAN RIVER	FORD, MELVIN & DAVID	04-Oct-00
1301-99	SHORT CREEK	PROSCHOLD, TERRY	23-Aug-00
0895-99	HARE CREEK	CDF	20-Aug-99
0927-99	EEL RIVER MID FORK	KOCH, E.A.	14-Oct-99
0928-99	EEL RIVER SO FORK	KOCH, E.A.	14-Oct-99
0936-99	MILL CREEK	POLSLEY, RAYMOND	29-Sep-99
0940-99	WILLITS CREEK	WILLIAMS, PAUL	31-Aug-99
0958-99	BERRY CREEK UNNAMED STREAM	WILLIAMS, MIKE	16-Aug-00
1450-99	RUSSIAN RIVER (A)	JOHNSON, WILLIAM	30-Mar-01
1335-99	GARCIA RIVER & LEE CREEK	TUNHEIM, EDWARD	01-Sep-00
1336-99	DIGGER CREEK	GOTT, K.N.	30-May-00
1347-99	HARE CREEK TRIBUTARY	COX, LARRY	29-Nov-99
1100-99	ARENA CREEK	PATTEN, FRED	08-Jun-00
1108-99	ACKERMAN CREEK	MENDOCINO REDWOOD COMPANY	08-Oct-99
1325-99	FELIZ CREEK	MEHTONEN, PATRICK	10-Jul-01
1402-99	BEAR HAVEN CREEK	ORME, MICHAEL	26-Jul-00
1410-99	EEL RIVER MAIN FORK TRIBUTARY	LONGCRIER, JEFF	12-Jul-00
1419-99	JAMES CREEK	MATHERLY, MICHAEL	31-Aug-00
1463-99	RUSSIAN RIVER @ 1400 RUDDICK-C	FIDLER, MICHAEL	12-Apr-01
1437-99	ALBION CREEK	WOESSNER, JON	01-Sep-00
1438-99	TOMBELL CREEK	WOESSNER, JON	29-Aug-00
1385-99	HENSLEY CREEK TRIBUTARY	SMYTHE, THOMAS	21-Aug-00
1398-99	HAYWORTH CREEK NORTH FORK TRIB	FRYKMAN, DAVID	29-Aug-00
1466-99	RUSSIAN RIVER @ 1750 RUDDICK-C	FIDLER, MICHAEL	12-Apr-01
1469-99	NOYO RIVER	MALLORY, DOUGLAS	28-Jul-00
0459-99	EEL RIVER MIDDLE FORK	MCLELLAND, DOUG	15-Jul-99
0461-99	TEN MILE CREEK	SMYTHE, JOHN A.	15-Jun-99
0462-99	NAVARRO RIVER NORTH FORK	BROWN, SHARLEEN	19-Jul-99
0469-99	TEN MILE RIVER NORTH FORK	MALLORY, DOUG	29-Apr-99
0504-99	RANCHERIA CREEK	PRONSOLINO, GUIDO A.	03-Jun-99
0516-99	ACKERMAN CREEK	MENDOCINO REDWOOD COMPANY	24-Jun-99
0538-99	GARCIA RIVER	JACOBSZOON, RANDY	08-Jul-99
1454-99	FORSYTHE CREEK	COX, JACK	17-Jul-01
0549-99	DUTCH HENRY CREEK	BROOKTRAILS TOWNSHIP COMM	31-Aug-99
0561-99	RUSSIAN RIVER	MILLVIEW COUNTY WATER DIS	22-Jul-99
0565-99	BELL SPRINGS & JEWETT ROCK	MOTL, TIM	29-Jun-99
1464-99	RUSSIAN RIVER @ 1500 VICHY	FIDLER, MICHAEL	12-Apr-01

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1465-99	RUSSIAN RIVER @ 550 REDEMEYER	FIDLER, MICHAEL	12-Apr-01
R3-2000-0075	NAVARRO RIVER UNNAMED TRIB	MADRIGAL, JESS	01-Mar-00
R3-2000-0031	PETERSON CREEK	BROWN, STEVENSON	15-Jun-00
R3-2000-0039	RAILROAD GULCH TRIBUTARY	METZ, TIMOTHY	30-Aug-00
R3-2000-0052	MOTE CREEK	MORRIS, RANDY	06-Apr-00
R3-2000-0053	ALBION RIVER TRIBUTARY	WOESSNER, JON	29-Aug-00
R3-2000-0065	ROBINSON CREEK	KELLY, SCOTT	01-Mar-00
R3-2000-0070	DRY CREEK	KELLY, SCOTT	01-Mar-00
R3-2000-0071	NORTH FORK #1	KELLY, SCOTT	01-Mar-00
R3-2000-0072	GUALALA RIVER NORTH FORK	KELLY, SCOTT	01-Mar-00
R3-2000-0073	GUALALA RIVER NORTH FORK #2	KELLY, SCOTT	07-Aug-00
R3-2000-0111	MINNIE CREEK	CHRIST, DARWIN	30-Aug-00
R3-2000-0112	TEN MILE RIVER	MORIN, TIM	29-Aug-00
R3-2000-0119	ALDER CREEK TRIBUTARY	SHIVELY, RUSS	29-Aug-00
R3-2000-0225	TEN MILE CREEK SOUTH FORK	MALLORY, DOUGLAS	01-Sep-00
R3-2000-0258	GUALALA RIVER NF TRIB	KELLY, SCOTT	09-May-00
R3-2000-0263	MILL CREEK	LUCCHETTI, WALTER	08-Sep-00
R3-2000-0264	ALBION RIVER TRIBUTARY	SWANSON, GARY	29-Aug-00
R3-2000-0269	BIG RIVER	MALLORY, DOUGLAS	01-Sep-00
R3-2000-0287	BRIDGE ATTACH (PA TO ROBBINS)	CATE, MISTY	22-Aug-00
R3-2000-0288	TRENCH A (PA TO ROBBINS)	CATE, MISTY	18-Sep-00
R3-2000-0289	BORE A (PA TO ROBBINS)	CATE, MISTY	07-Aug-00
R3-2000-0290	TEN MILE CREEK TRIBUTARY	MCKEE, ROB	01-Sep-00
R3-2000-0291	ALLEN CREEK, OLSEN GULCH +1	GALLIANI, ALICIA	30-Aug-00
R3-2000-0292	TRENCH B (PA TO SACRAMENTO)	CATE, MISTY	07-Sep-00
R3-2000-0293	BRIDGE EXTENSION (PA TO SAC)	CATE, MISTY	22-Aug-00
R3-2000-0294	RUSSIAN RIVER TRIBS (BORE A)	CATE, MISTY	18-Aug-00
R3-2000-0319	GREENWOOD CREEK	ANDERSON, JOHN	29-Aug-00
R3-2000-0333	GUALALA LITTLE NORTH FORK	KELLY, SCOTT	01-Sep-00
R3-2000-0295	PERENNIAL/SEASONAL DRAINAGES	CATE, MISTY	12-Oct-00
R3-2000-0296	PERENNIAL/SEASONAL DRAINAGES	CATE, MISTY	02-Oct-00
R3-2000-0299	PERENNIAL/SEASONAL DRAINAGES	CATE, MISTY	21-Sep-00
R3-2000-0300	PERENNIAL/SEASONAL DRAINAGES	CATE, MISTY	12-Oct-00
R3-2000-0301	RUSSIAN RIVER	RUDDICK, CHRIS	16-Apr-01
R3-2000-0302	HOWELL CREEK	RUDDICK, CHRIS	11-Sep-00
R3-2000-0332	PERRY GULCH	HOWELL, MICHAEL	29-Aug-00
R3-2000-0345	TEN MILE CREEK - GRAVEL	WEAVER, VIC	11-Aug-00
R3-2000-0346	MILL CREEK	NORTH COAST REDWOODS DIST	11-Sep-00
R3-2000-0347	RUSSIAN RIVER	WHITE, BRIAN J.	30-Oct-00

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R3-2000-0349	EEL RIVER MIDDLE FORK	PARNUM PAVING, INC.	11-Sep-00
R3-2000-0350	EEL RIVER MIDDLE FORK	PARNUM PAVING, INC.	11-Sep-00
R3-2000-0351	RUSSIAN RIVER	PARNUM PAVING, INC.	11-Sep-00
R3-2000-0285	RAMON & METTICK CREEK	SCRIVEN, JOSEPH	25-Aug-00
R3-2000-0364	RUSSIAN RIVER	HILDRETH, MIKE	02-Apr-01
R3-2000-0365	RUSSIAN RIVER	HILDRETH, MIKE	02-Apr-01
R3-2000-0366	FELIZ CREEK	RICHARDSON, DIANE	30-May-02
R3-2000-0383	ELK CREEK	ANDERSON,JOHN	01-Sep-00
R3-2000-0385	NAVARRO RIVER	WOESSNER, JON	03-Jul-00
R3-2000-0370	WAGES CREEK TRIBUTARY	MALLORY, DOUGLAS	29-Aug-00
R3-2000-0407	GARCIA RIVER	ENGBER, EVAN	29-Aug-00
R3-2000-0422	DRY CREEK	BARR, KEVIN & LINDA	04-Oct-00
R3-2000-0423	DRY CREEK	BARR, KEVIN & LINDA	01-Sep-00
R3-2000-0128	NAVARRO RIVER	HALLER, MELODY OR PAUL	30-Aug-00
R3-2000-0139	COLD CREEK	EMBREE, LISA	21-Jun-00
R3-2000-0145	ACKERMANN CREEK UNNAMED TRIB	FIDLER, MICHAEL	06-Apr-00
R3-2000-0146	RUSSIAN RIVER	FIDLER, MICHAEL	27-Sep-00
R3-2000-0187	RANCHERIA CREEK	RICE, RONALD	06-Apr-00
R3-2000-0188	RUSSIAN RIVER	BURKE, KIERAN	17-Aug-00
R3-2000-0231	JOHN SMITH CREEK TRIBUTARY	BORRAS, THEMBI	15-May-00
R3-2000-0444	HOLLOW TREE & VARIOUS CREEKS	MEESE, DALE	01-Sep-00
R3-2000-0447	GARCIA RIVER	STORNETTA, LARRY,JUDITH	20-Sep-00
R3-2000-0452	REDWOOD CREEK	RIBAR, PETER	01-Sep-00
R3-2000-0454	ORRS CREEK	SCRIVEN, JOSEPH	02-Aug-00
R3-2000-0455	COLD CREEK TRIBUTARY	JOE CINEK CONSULTING FORE	29-Aug-00
R3-2000-0456	PARDALOE CREEK	TOWN, CHRIS	30-Aug-00
R3-2000-0471	GARCIA RIVER	JACOBSZOON, RANDY	28-Jun-00
R3-2000-0475	HULLS VALLEY CREEK	SCRIVEN, JOSEPH	15-Sep-00
R3-2000-0479	HARE CREEK TRIBUTARY	HAYTER, CHRIS	29-Aug-00
R3-2000-0480	MCNAB CREEK TRIBUTARY	FETZER, JAMES	28-Aug-00
R3-2000-0507	RUSSIAN RIVER TRIBUATRIES	WALTER, RICH	08-Aug-00
R3-2000-0534	RUSSIAN RVR TRIB BORING S-120	WALTER, RICH	11-Aug-00
R3-2000-0535	RUSSIAN RVR TRIB BORING S-121	WALTER, RICH	11-Aug-00
R3-2000-0536	RUSSIAN RVR TRIB BORING S-126	WALTER, RICH	11-Aug-00
R3-2000-0537	RUSSIAN RVR TRIB BORING S-127	WALTER, RICH	11-Aug-00
R3-2000-0539	RUSSIAN RVR TRIB BORING S-164	WALTER, RICH	11-Aug-00
R3-2000-0540	RUSSIAN RVR TRIB BORING S-165	WALTER, RICH	11-Aug-00
R3-2000-0541	RUSSIAN RVR TRIB BORING S-166	WALTER, RICH	11-Aug-00
R3-2000-0542	DIRECTIONAL BORING B S-121	WALTER, RICH	11-Aug-00
R3-2000-0543	RUSSIAN RVR TRIB BORING S-173	WALTER, RICH	11-Aug-00

Streambed Alteration Agreements
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R3-2000-0544	RUSSIAN RVR TRIB BORING S-174A	WALTER, RICH	11-Aug-00
R3-2000-0545	RUSSIAN RVR TRIB BORING S-179	WALTER, RICH	11-Aug-00
R3-2000-0546	RUSSIAN RVR TRIB BORING S-208	WALTER, RICH	11-Aug-00
R3-2000-0547	RUSSIAN RVR TRIB BORING S-224	WALTER, RICH	11-Aug-00
R3-2000-0548	BRUSH CREEK TRIB BORING S-238	WALTER, RICH	11-Aug-00
R3-2000-0551	BRUSH CREEK TRIB BORING S-239	WALTER, RICH	11-Aug-00
R3-2000-0555	TRENCHING A	WALTER, RICH	28-Jul-00
R3-2000-0564	RANCHERIA CREEK UNNAMED TRIB	WALTER, RICH	08-Aug-00
R3-2000-0487	BUSHNELL & BURRIGHT CREEKS	STRICKLER, BRUCE	29-Aug-00
R3-2000-0495	CASING/CONDUIT	WALTER, RICH	26-May-00
R3-2000-0496	CONSTRUCTION TRAFFIC	WALTER, RICH	11-Aug-00
R3-2000-0497	BRUSH CREEK TRIBUTARY (S-236)	WALTER, RICH	11-Aug-00
R3-2000-0568	OTHER CULVERT CROSSINGS	WALTER, RICH	27-Jun-00
R3-2000-0576	INDIAN CREEK	SOLINSKY, WILLIAM	01-Sep-00
R3-2000-0578	RUSSIAN RIVER	MILOVINA, MICHAEL	02-Apr-01
R3-2000-0579	NAVARRO & RANCHERIA	HALLER, PAUL	14-Jun-00
R3-2000-0580	BIG RIVER SOUTH FORK	BORRAS, THEMBI	29-Aug-00
R3-2000-0581	RUSSIAN RIVER	BARRETT, TOM	15-Sep-00
R3-2000-0582	REDWOOD CREEK - 271	COVELLA, MARK	23-Aug-00
R3-2000-0583	HUCKLEBERRY CREEK - 271	COVELLA, MARK	23-Aug-00
R3-2000-0584	FLYNN CREEK - 271	COVELLA, MARK	23-Aug-00
R3-2000-0585	NAVARRO RIVER SB NO.- 271	COVELLA, MARK	23-Aug-00
R3-2000-0607	JAMES CREEK NF TRIB	BAXTER, BILL	01-Sep-00
R3-2000-0631	BIG RIVER SOUTH FORK TRIBUTARY	HAYTER, CHRIS	29-Aug-00
R3-2000-0632	PUDDING CREEK TRIBUTARY	TADLOCK, MICHAEL	01-Sep-00
R3-2000-0635	LITTLE NORTH FORK	WOESSNER, JON	01-Sep-00
R3-2000-0644	MILL CREEK	POLSEY, RAMOND	15-Sep-00
R3-2000-0649	SALT SPRING CREEK (BORE B/S-1)	LORENZINI, KEVIN	08-Aug-00
R3-2000-0650	ASH CREEK (BORE B/S-4)	LORENZINI, KEVIN	08-Aug-00
R3-2000-0654	ASH CRK UNNAMED TRIBS(S-2)	LORENZINI, KEVIN	11-Aug-00
R3-2000-0655	ASH CRK UNNAMED TRIBS(S-3)	LORENZINI, KEVIN	11-Aug-00
R3-2000-0657	OTHER CULVERT CROSSINGS	LORENZINI, KEVIN	27-Jun-00
R3-2000-0662	GARCIA RIVER TRIB CROSSING 1&2	ROGERS, ROBERT	29-Aug-00
R3-2000-0676	MULE CREEK TRIBUTARIES	MALLORY, DOUGLAS	29-Aug-00
R3-2000-0680	GARCIA RIVER SOUTH FORK	TROUT UNLIMITED	28-Jun-00
R3-2000-0684	DOAN, TOWN, BIG ROCK, GRIST CR	KEITH'S MEAT MARKET	29-Aug-00
R3-2000-0685	ANDERSON CREEK	ELKE, THOMAS	11-Oct-00

Streambed Alteration Agreements
1993-2002
Mendocino County

R3-2000-0686	RUSSIAN RIVER NORTH FORK TRIB	CORDIS, DAVID	12-Jul-00
R3-2000-0694	BIG RIVER TRIBUTARY	MALLORY, DOUGLAS	29-Aug-00
R3-2000-0699	BIG RIVER TRIBUTARY	ROACH, GARY	23-Aug-00
R3-2000-0700	COVINGTON GULCH & HARE CREEK	ROACH, GARY	21-Aug-00
R3-2000-0701	ACKERMAN CREEK - 271	MENDOCINO REDWOOD COMPANY	31-Aug-00
R3-2000-0703	BIG RIVER SOUTH FORK	COOK, JON	01-Sep-00
R3-2000-0704	YORK CREEK	RICE, RONALD	28-Aug-00
R3-2000-0724	FORSYTHE CREEK - 271	ENGBER, EVAN	31-Aug-00
R3-2000-0734	RUSSIAN RIVER	JOHNSON, WILLIAM	11-Apr-01
R3-2000-0735	RUSSIAN RIVER WEST FORK	JOHNSON, WILLIAM	11-Apr-01
R3-2000-0736	ALBION RIVER	WOESSNER, JON	28-Aug-00
R3-2000-0739	RUSSIAN RIVER	ASH, TIM	23-Aug-00
R3-2000-0740	ORRS CREEK	ASH, TIM	01-Sep-00
R3-2000-0741	BRIDGES CREEK	ASH, TIM	31-Jul-01
R3-2000-0742	EEL RIVER, SOUTH FORK	ASH, TIM	31-Aug-00
R3-2000-0746	SMITH GULCH, LITTLE GULCH & TR	MENDOCINO REDWOOD COMPANY	29-Aug-00
R3-2000-0748	UNNAMED TRIBUTARIES	KOCH, ANN	01-Sep-00
R3-2000-0751	FISH ROCK CREEK	HENDERSON, MIKE\	11-Aug-00
R3-2000-0782	NOYO RIVER TRIBUTARIES	RIBAR, PETER	29-Aug-00
R3-2000-0783	DAVIS CREEK TRIBUTARY	LONGCRIER, JEFF	29-Aug-00
R3-2000-0784	HORSE & RANCHERIA TRIBUTARIES	HINCKLEY, JONATHAN	01-Sep-00
R3-2000-0785	ROSS CREEK TRIBUTARY	TUNHEIM, EDWARD	29-Aug-00
R3-2000-0786	WATERSHED MORRISON CREEK TRIB	WADDINGTON, DAYLE & DAN	30-May-01
R3-2000-0819	BLUE WATERHOLE CREEK	MENDOCINO COUNTY	06-Sep-00
R3-2000-0820	MCNAB CREEK - 271	SCRIVEN, JOSEPH	06-Sep-00
R3-2000-0821	ROBINSON CREEK	ONACREST PROPERTIES	04-Jan-01
R3-2000-0877	BORE B (PA TO ROBBINS)	WILLIAMS COMMUNICATIONS	18-Sep-00
R3-2000-0879	RUSSIAN RIVER D/R-UKIAH-16	WILLIAMS COMMUNICATIONS	24-Sep-00
R3-2000-0880	GARCIA/RANCHERIA/RUSSIAN RVR T	WILLIAMS COMMUNICATIONS	18-Sep-00
R3-2000-0881	TRENCH B (PA TO SACRAMENTO)	WILLIAMS COMMUNICATIONS	18-Sep-00
R3-2000-0882	BORE B	WILLIAMS COMMUNICATIONS	24-Jul-00
R3-2000-0938	ANDERSON & FARRER CREEKS & TRI	MADRIGAL VINEYARD MANAGEM	16-Nov-00
R3-2000-0939	COTTONEVA & HOLLOW TREE CREEK	HANSEN, STEVE	16-Feb-01
R3-2000-0940	GUALALA RIVER	MENDOCINO COUNTY TRANSPOR	18-Sep-00
R3-2000-0942	GUALALA RIVER	MENDOCINO COUNTY TRANSPOR	18-Sep-00
R3-2000-0976	LOW GAP CREEK TRIBUTARY	COOMBS TREE FARMS	29-Aug-00
R3-2000-0977	PACIFIC OCEAN UNNAMED TRIB	PARKS & RECREATION DEPART	18-Sep-00
R3-2000-0981	RUSSIAN RIVER	BURKE, KIERAN C.	24-Oct-00
R3-2000-0995	RUSSIAN RIVER, MAIN STERN	OMAN, RON & MARY	25-Oct-00
R3-2000-1003	INDIAN CREEK & NORTH FORK TRIB	ALAN MOHR & ASSOCIATES, I	29-Aug-00
R3-2000-1012	MILL CREEK	BARBER, TERI JO	05-Oct-00

Streambed Alteration Agreements
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R3-2000-1018	DUTCH CHARLIE, REDWOOD & S FRK	DA ROSA, ERIC	29-Aug-00
R3-2000-1019	VARIOUS CULVERT CROSSINGS	WILLIAMS COMMUNICATIONS	24-Jul-00
R3-2000-1028	ROBINSON CREEK	MENDOCINO COUNTY	06-Sep-00
R3-2000-1036	TEN MILE RIVER, NORTH FORK	BALLARD, ROBERT	03-Nov-00
R3-2000-1042	RUSSIAN RIVER	FETZER, JOHN	25-Sep-00
R3-2000-1050	WAGES CREEK	MARGLER, LARRY	17-Oct-00
R3-2000-1055	EDWARDS CREEK (S-125X)	LORENZINI, KEVIN	11-Aug-00
R3-2000-1056	RUSSIAN RVR TRIB BOR(S-226C&D)	LORENZINI, KEVIN	11-Aug-00
R3-2000-1057	UNNAMED POND	LINDHOLME PROPERTIES LTD.	22-Sep-00
R3-2000-1058	NOYO RIVER UNNAMED TRIBUTARIES	MENDES, EDDIE	11-Dec-00
R3-2000-1061	ELK CREEK	ANDERSEN, JOHN	03-Nov-00
R3-2000-1071	ALBION RIVER NORTH FORK	DERIDDER, WILLIAM	27-Nov-00
R3-2000-1076	WAGES CREEK & UNNAMED TRIBS	VANDERHORST, STEVEN	03-Nov-00
R3-2000-1081	RUSSIAN RIVER TRIBUTARY	FETZER, JOHN	28-Sep-00
R3-2000-1103	PIETA CREEK	BURMESTER, DANIEL	15-Feb-01
R3-2000-1109	GARCIA RIVER TRIBUTARY	SHIVELY, RUSS	30-Nov-00
R3-2000-1115	TOMKI CREEK	MAYES, JANETTE	02-Nov-00
R3-2000-1122	ROBINSON CREEK SOUTH BRANCH	FOREST, SOIL & WATER	19-Jul-01
R3-2000-1138	RUSSIAN RIVER	MENDOCINO COUNTY RUSSIAN	17-Apr-01
R3-2000-1149	HAYWORTH CREEK & MINOR TRIBUTA	MENDOCINO REDWOOD COMPANY	09-Nov-00
R3-2000-1150	BIG GULCH, GULCH 15	VANDERHORST, STEVEN A.	20-Nov-00
R3-2000-1155	BAECHTEL CREEK	HASCHAK, ART	01-Jul-02
R3-2000-1164	SULFUR CREEK (ET AL.)	ASHOFF, GILBERT	05-Sep-01
R3-2000-1174	BEAR TRAP CREEK - 271	MERRILL, TOM	28-Aug-00
R3-2000-1175	HORSE CREEK - 271	MERRILL, TOM	21-Aug-00
R3-2000-1176	DOOLEY CREEK - 271	BIO-ENGINEERING INSTITUTE	01-Sep-00
R3-2000-1184	BIG RIVER TRIBUTARY	PARKS & RECREATION	23-Apr-01
R3-2000-1185	ROCK CREEK	BAREILLES, KEN	13-Sep-00
R3-2000-1209	CULVERT	WILLIAMS COMMUNICATIONS	21-Sep-00
R3-2000-1211	HOWARD CREEK TRIBUTARY	BUEREN, THAD	21-Nov-00
R3-2000-1213	ANDERSON CREEK	KUIMELIS, MICHAEL	02-Nov-00
R3-2000-1229	TEN MILE RIVER NORTH FORK	MALLORY, DOUGLAS	26-Jun-01
R3-2000-1232	PACIFIC OCEAN UNNAMED TRIBUTAR	UNSOELD, GEORGE	27-Oct-00
R3-2000-1236	BIG RIVER TRIBUTARY	KAMB, BUD	03-Oct-00
R3-2000-1237	SALT HOLLOW CREEK TRIBUTARY	LOLONIS, GREG	05-Oct-01
R3-2000-1247	ORRS CREEK	WIPF CONSTRUCTION	27-Sep-00
R3-2000-1275	BUSCH CREEK	PIELASZCZYK, ADAM	05-Apr-02
R3-2000-1279	SHORT CREEK	PROSCHOLD, TERRY	21-Feb-02
R3-2000-1290	BIG RIVER MAIN STEM TRIBUTARY	HAYTER, CHRIS	28-Nov-00
R3-2000-1314	PACIFIC OCEAN TRIBUTARY	ROGERS, ROBERT	07-Aug-01
R3-2000-1324	RUSSIAN GULCH CREEK	MCKINNEY, JOHN	28-Feb-01
R3-2000-1335	FORSYTHE CREEK	DUTRA, FRANK	12-Apr-02

Streambed Alteration Agreements
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R3-2000-1337	GREENWOOD CREEK TRIBUTARY	SHIVELY, RUSS	03-Apr-01
R3-2000-1342	THOMAS CREEK	LONGERIER, JEFF	07-Feb-01
R3-2000-1351	TWO LOG CRK & NORTH FORK	MENDOCINO REDWOOD COMPANY	30-Jan-01
R3-2000-1356	BIG RIVER	MENDOCINO REDWOOD COMPANY	01-May-02
R3-2000-1393	RUSSIAN RIVER TRIB CULVERT	LENCZOWSKI, HUBERT	07-Aug-01
R3-2000-1402	NOYO RIVER NORTH FORK	FRYKMAN, DAVID	02-Mar-01
R3-2000-1412	RUSSIAN RIVER	FLIGHT RAIL CORPORATION	10-Sep-01
R3-2000-0780B	CRAWFORD CREEK & RUSSIAN RIVER	MILOVINA, JOHN & JAMES	05-Jun-02

Exhibit

Exhibit # 17

COUNTY OF MENDOCINO
DEPARTMENT OF PLANNING AND BUILDING SERVICES
501 LOW GAP ROAD · ROOM 1440 · UKIAH · CALIFORNIA · 95482

RAYMOND HALL, DIRECTOR
Telephone 707-463-428
FAX 707-463-570
pbs@co.mendocino.ca.u
www.co.mendocino.ca.us/planning

August 16, 2000

Fred & Alberta Zmarzly
PO Box 7581
Santa Rosa Ca 95402

SUBJECT: PROPOSED POND LOCATED AT: 4617 Rd 110., Hopland

Dear Mr. & Mrs. Zmarzly:

On August 10, 2000, Building Inspector, Guy Parry conducted a Special Inspection at the above address. The purpose of the inspection was to document his observations regarding the location, height of dam, area in water capacity, terrain and setbacks to property lines and structures of the proposed pond.

I have reviewed Mr. Parry's documentation and have approved your proposed pond as grading in an isolated, self-contained area and that there is no danger to private or public property as long as the work is done according to the information provided by you to Mr. Parry at the time of inspection.

This exemption is only from Mendocino County Planning & Building Services grading permit process and does not exempt you from any other Federal/State laws or local ordinance regarding the taking, extracting, capturing, pumping or storage of water

If you have any questions, please feel free to call Monday through Friday from 8:00am to 5:00pm.

Sincerely,

Chris Warrick
Chief Building Inspector

CW/tlh

MENDOCINO COUNTY PLANNING & BUILDING SERVICES
POND EXEMPTION APPLICATION

Project location: 4617 ROAD 110, HOPLAND, CA **Project A/P #:** 047-100-39

Owners name: FRED & ALBERTA ZMARZLY **Phone:** 544-5776 OR 744-1848

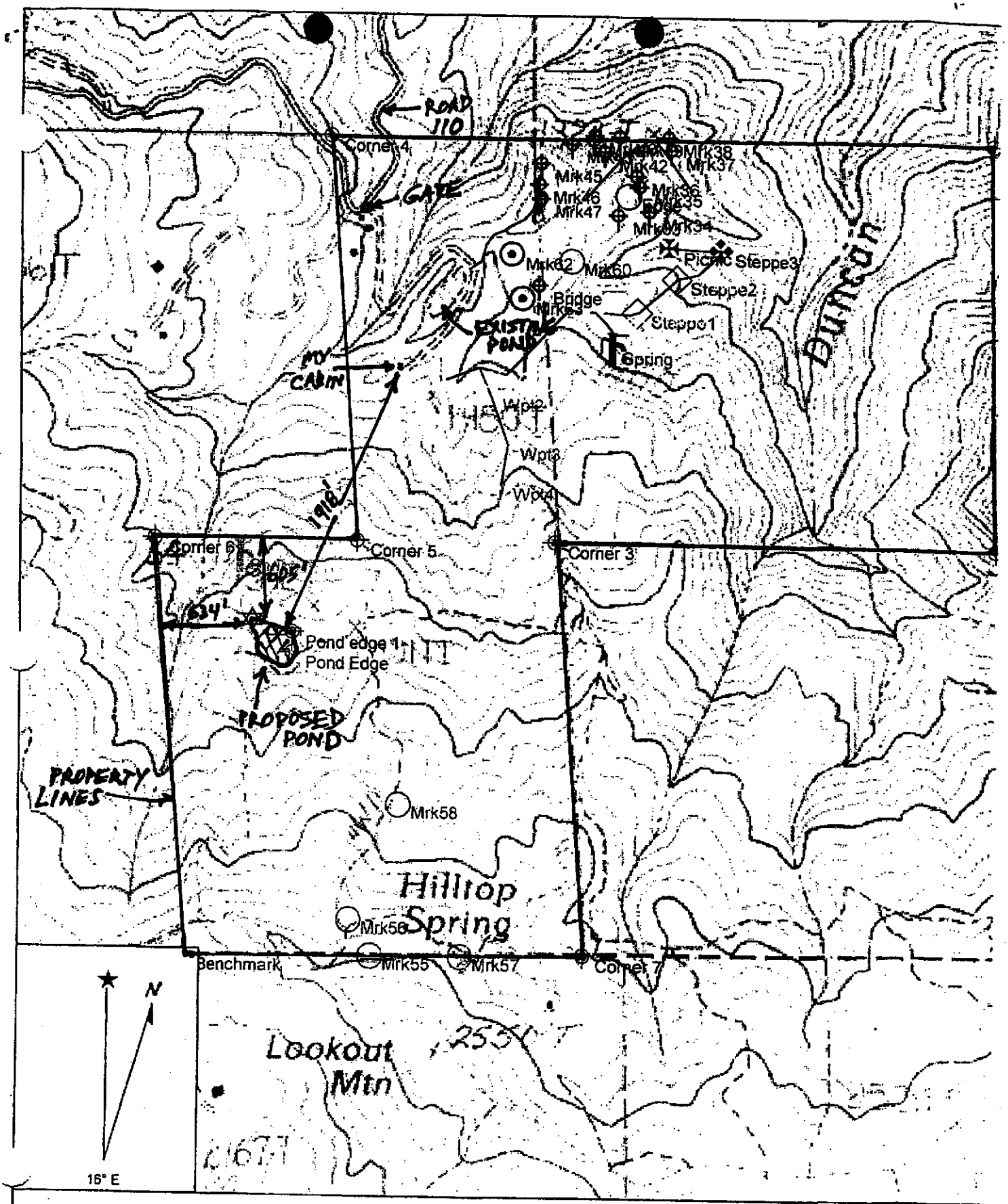
Mailing address: P.O. BOX 7581
SANTA ROSA, CA 95407

Description of Project: AG EXEMPT POND

To be filled out by the Owner		For County use only: VERIFIED	UNABLE TO CONFIRM
POND LOCATION Distance (in feet) from:			
A) Property lines	605' & 634'	✓	
B) Private roads	557'	✓	
C) County roads	2764'	✓	
D) Structures	1918'	✓	
SIZE OF POND			
A) Length	245'	✓	
B) Width	250'	✓	
C) Depth	8'		✓
D) Capacity (in acre ft)	APPROX. 10 ac-FT.		✓
POND CONSTRUCTION			
A) Pit pond	N/A		
B) Berm containment	N/A		
C) Dam (height to spillway and over flow size)	24'	✓	
D) Gradient of interior & exterior slopes	2½ TO 1		✓
E) Method of filling pond with water	RAIN	✓	
F) How much material (in cubic yards) will be moved to construct pond	APPROX. 5000 YDS^3		✓
8 ½" x 11" PLOT PLAN ATTACHED? (Showing the above information) Yes ☒ No ☐			
Comments:			
Is the pond existing? ☐ Proposed? ☒			

I certify the above to be true and accurate and that I will allow the Mendocino County Building Inspector to conduct a site inspection of the proposed/existing pond location.

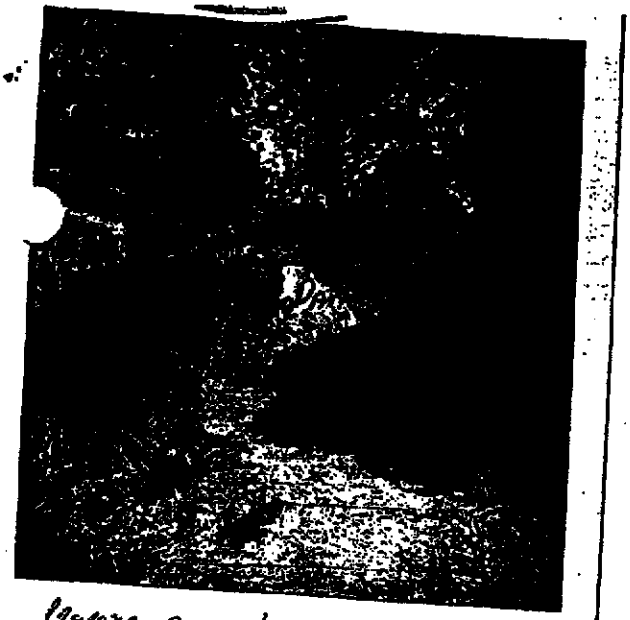
Owners Signature: Fred Zmarzly Date: 8/8/00



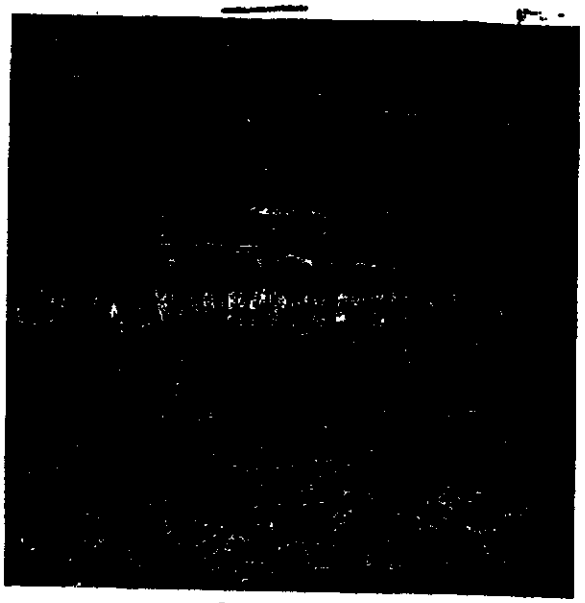
Name: YORKVILLE
Date: 8/8/100
Scale: 1 inch equals 800 feet

Location: 038° 56' 27.8" N 123° 09' 30.9" W

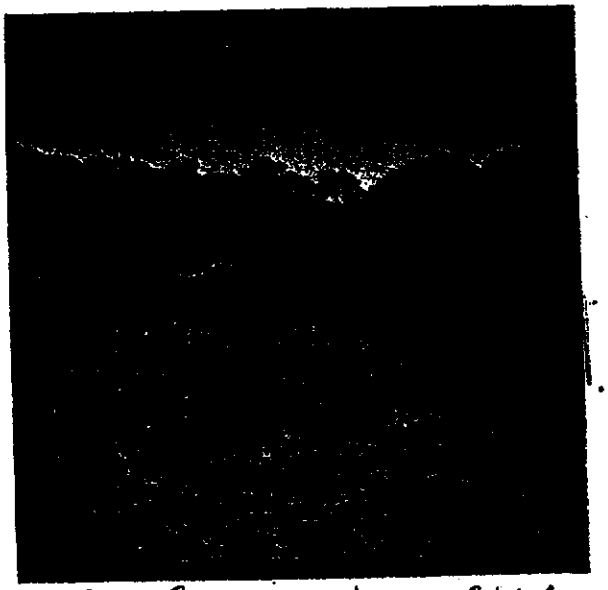
APN 047-100-39



Proposed Dam Location 8-10 CO Pkwy
4617 Rd 110 Hwy



Approximately Proposed Dam 8-10 CO Pkwy
4617 Rd 110 Hwy



4617 Rd 110 Hwy. 81 Pkwy
Approximately

working copy

TYPE OR PRINT
IN BLACK INK
(For instructions, see booklet: "How to File an Application to Appropriate Water in California")

APPLICATION NO. _____
(leave blank)

California Environmental Protection Agency

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
www.waterrights.ca.gov

APPLICATION TO APPROPRIATE WATER

SECTION A: NOTICE INFORMATION

1. APPLICANT/AGENT

a.

	APPLICANT	ASSIGNED AGENT (if any)
Name	Kenneth L. Kahn & Cheryl W.	Wagner & Bonsignore, CCE
	Kahn Trust	
Mailing Address	75 Spring Lane	444 North Third St. #325
City, State & Zip	Tiburon, CA 94920	Sacramento, CA 95814
Telephone	(415) 435-1946	(916) 441-6850
Fax		(916) 448-3866
E-mail		ryans@wagner-engrs.com

2. OWNERSHIP INFORMATION (Please check type of ownership.)

☒ Sole Owner
☐ Limited Partnership*
☐ Corporation
☐ Limited Liability Company (LLC)
☐ Business Trust
☐ Joint Venture
☐ General Partnership*
☐ Husband/Wife Co-Ownership
☐ Other _____

*Please provide a copy of your partnership agreement.

3. PROJECT DESCRIPTION (Provide a detailed description of your project, including, but not limited to, type of construction activity, area to be graded or excavated, and how the water will be used.)

See Attachment

☒ *For continuation, see Attachment No.* 1

4. PURPOSE OF USE, DIVERSION/STORAGE AMOUNT AND SEASON

a. PURPOSE OF USE (irrigation, domestic, etc.)	DIRECT DIVERSION				STORAGE		
	AMOUNT		SEASON OF DIVERSION		AMOUNT	SEASON OF COLLECTION	
	Rate (cfs or gpd)*	Acre-feet per year	Beginning date (month & day)	Ending date (month & day)	Acre-feet per year	Beginning date (month & day)	Ending date (month & day)
Irrigation, Fire Protection,					35	11/1	6/1
Incidental Recreation							

☐ *See Attachment No.* ___

* If rate is less than 0.025 cubic feet per second (cfs), use gallons per day (gpd).

b. Total combined amount taken by direct diversion and storage during any one year will be 35 acre-feet.
c. Reservoir storage is: ☐ onstream ☒ offstream ☐ underground (If underground storage, attach Form APP-UGSTOR.)
d. County in which diversion is located: Sonoma County in which water will be used: Sonoma
e. Assessor's Parcel Number(s): 118-100-51

5. SOURCES AND POINTS OF DIVERSION/REDIVERSION

a. Sources and Points of Diversion (POD)/Points of Rediversion (PORD):

☒ POD / ☐ PORD #1 : Unnamed Stream tributary to Unnamed Stream
thence Russian River
☐ POD / ☐ PORD #___ : _____ tributary to _____
thence _____
☐ POD / ☐ PORD #___ : _____ tributary to _____
thence _____
☐ POD / ☐ PORD #___ : _____ tributary to _____
thence _____

☐ *See Attachment No.* ___

b. State Planar and Public Land Survey Coordinate Description:

POD/ PORD #	CALIFORNIA COORDINATES (NAD 27)	ZONE	POINT IS WITHIN (40-acre subdivision)	SECTION	TOWN -SHIP	RANGE	BASE AND MERIDIAN
1	N 391,300 E 1,726,050	2	SE ¼ of SW ¼	3	10N	10W	MD
Offstream A			SE ¼ of SW ¼ NE NW	10	10N	10W	MD
			¼ of ¼				
			¼ of ¼				

☐ *See Attachment No.* ___

c. Name of the post office most often used by those living near the proposed point(s) of diversion:
Geyserville

6. WATER AVAILABILITY

a. Have you attached a water availability analysis for this project? ☒ YES ☐ NO
If NO, provide sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation:

☒ *See Attachment No.* 2

b. Is your project located on a stream system declared to be fully appropriated by the State Water Resources Control Board during your proposed season of diversion? ☐ YES ☒ NO

c. In an average year, does the stream dry up at any point downstream of your project? ☒ YES ☐ NO If YES, during which months? ☐ Jan ☐ Feb ☐ Mar ☐ Apr ☒ May ☒ Jun ☒ Jul ☒ Aug ☒ Sep ☐ Oct ☐ Nov ☐ Dec

d. What alternate sources of water are available if a portion of your requested diversion season must be excluded because water is not available for appropriation? (e.g., percolating groundwater, purchased water, etc.)
Groundwater Wells

☐ *See Attachment No.* ___

7. PLACE OF USE

USE IS WITHIN (40-acre subdivision)	SECTION* Projected	TOWNSHIP	RANGE	BASE & MERIDIAN	IF IRRIGATED	
					Acres	Presently cultivated?
SE ¼ of SW ¼	3	10N	10W	MD	13	☒ YES ☐ NO
SW ¼ of SE ¼	3	10N	10W	MD	5	☒ YES ☐ NO
NW ¼ of NW ¼	10	10N	10W	MD	2	☒ YES ☐ NO
NE ¼ of NW ¼	10	10N	10W	MD	22	☒ YES ☐ NO
NW ¼ of NE ¼	10	10N	10W	MD	4	☒ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
¼ of ¼						☐ YES ☐ NO
				Total:	46	

*Please indicate if section is projected with a "(P)" following the section number.

☐ *See Attachment No.* ___

8. PROJECT SCHEDULE

a. Project is:

☐ proposed. Year construction will begin: _____

☒ partially complete. Extent of completion: Vineyard on valley floor and offstream reservoir are built. The point of diversion on the unnamed stream is proposed.

☐ complete. Year completed: _____

b. Year of first use: Reservoir Built 1982 Year water will be used to the full extent intended: 5 yrs after issuance of Permit

SECTION B: MISCELLANEOUS DIVERSION INFORMATION

1. JUSTIFICATION OF AMOUNTS REQUESTED

a. ☐ IRRIGATION: Maximum area to be irrigated in any one year: 46 acres.

CROP	ACRES	METHOD OF IRRIGATION (sprinklers, flooding, etc.)	WATER USE (Acre-feet/Yr.)	SEASON OF WATER USE	
				Beginning date (month & day)	Ending date (month & day)
Vineyard	46	Drip	35	5/1	9/30

☐ *See Attachment No.* ___

b. ☐ DOMESTIC: Number of residences to be served: _____ Separately owned? ☐ YES ☐ NO
Number of people to be served: _____ Estimated daily use per person is: _____ gallons per day
Area of domestic lawns and gardens: _____ square feet
Incidental domestic uses: _____
(dust control area, number and kind of domestic animals, etc.)

c. ☐ STOCKWATERING: Kind of stock: _____ Maximum number: _____
Describe type of operation: _____
(feedlot, dairy, range, etc.)

d. ☒ RECREATIONAL: Type of recreation: ☒ Fishing ☒ Swimming ☐ Boating ☐ Other Incidental

e. ☐ MUNICIPAL:

POPULATION List for 5-year periods until use is completed		MAXIMUM MONTH		ANNUAL USE		
Period	Population	Average daily use (gallons per capita)	Rate of diversion (cfs)	Average daily use (gallons per capita)	Acre-foot (per capita)	Total (acre-feet)
Present						

☐ *See Attachment No.* ___

Month of maximum use during year: _____ Month of minimum use during year: _____

f. ☐ HEAT CONTROL: Area to be heat controlled: _____ net acres
Type of crops protected: _____
Rate at which water is applied to use: _____ gpm per acre
Heat protection season will begin _____ (month & day) and end _____ (month & day).

g. ☐ FROST PROTECTION: Area to be frost protected: _____ net acres
Type of crops protected: _____
Rate at which water is applied to use: _____ gpm per acre
The frost protection season will begin _____ (month & day) and end _____ (month & day).

h. ☐ INDUSTRIAL: Type of industry: _____
Basis for determination of amount of water needed: _____

i. ☐ MINING: Name of the claim: _____ ☐ Patented ☐ Unpatented
Nature of the mine: _____ Mineral(s) to be mined: _____
Type of milling or processing: _____
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B. & M.

j. ☐ POWER: Total head to be utilized: _____ feet
Maximum flow through the penstock: _____ cfs
Maximum theoretical horsepower capable of being generated by the works (cfs x fall ÷ 8.8): _____
Electrical capacity (hp x 0.746 x efficiency): _____ kilowatts at: _____% efficiency
After use, the water will be discharged into _____ (watercourse)
in _____ ¼ of _____ ¼ of Section _____, T _____, R _____, _____B. & M. FERC No.: _____

k. ☐ FISH AND WILDLIFE PRESERVATION AND/OR ENHANCEMENT: List specific species and habitat type that will be preserved or enhanced in Item 7a of Section C.

l. ☒ OTHER: Describe use: Incidental Fire Protection
Basis for determination of amount of water needed: _____

2. DIVERSION AND DISTRIBUTION METHOD

a. Diversion will be by gravity by means of: _____
(dam, pipe in unobstructed channel, pipe through dam, siphon, weir, gate, etc.)

b. Diversion will be by pumping from: Offset Well
(sump, offset well, channel, reservoir, etc)

Pump discharge rate: 1 ☒ cfs or ☐ gpd Horsepower: 15 Pump Efficiency: _____

c. Conduit from diversion point to first lateral or to offstream storage reservoir:

CONDUIT (pipe or channel)	MATERIAL (type of pipe or channel lining; indicate if pipe is buried or not)	CROSS-SECTION (pipe diameter, or ditch depth and top and bottom width) (inches or feet)	LENGTH (feet)	TOTAL LIFT OR FALL		CAPACITY (cfs, gpd or gpm)
				feet	+ or -	
Pipe	PVC	6"	500	20	+	1 cfs

☐ *See Attachment No.* ___

d. Storage reservoirs: (For underground storage, complete and attach form APP-UGSTOR)

RESERVOIR NAME OR NUMBER	DAM				RESERVOIR		
	Vertical height from downstream toe of slope to spillway level (feet	Construction material	Length (feet)	Freeboard: dam height above spillway crest (feet)	Surface area when full (acres)	Capacity (acre-feet)	Maximum water depth (feet)
Offstream 1	15	Earth	850	2	1.5	35	22

☐ *See Attachment No.* ___

e. Outlet pipe: Complete for storage reservoirs having a capacity of 10 acre-feet or more.

RESERVOIR NAME OR NUMBER	OUTLET PIPE				
	Diameter (inches)	Length (feet)	Fall: vertical distance between entrance and exit of outlet pipe (feet)	Head: vertical distance from spillway to entrance of outlet pipe (feet)	Dead Storage: storage below entrance of outlet pipe (acre-feet)
Reservoir is offstream. Dewatering will be accomplished by pumping.					

☐ *See Attachment No.* ___

f. If water will be stored and the reservoir is not at the point of diversion, the maximum rate of diversion to offstream storage will be 1 cfs. Diversion to offstream storage will be made by: ☒ Pumping ☐ Gravity

3. CONSERVATION AND MONITORING

a. What methods will you use to conserve water? Explain. Drip Irrigation

b. How will you monitor your diversion to be sure you are within the limits of your water right and you are not wasting water? ☐ Weir ☒ Meter ☐ Periodic sampling ☐ Other (describe) _____

4. RIGHT OF ACCESS

a. Does the applicant own all the land where the water will be diverted, transported and used? ☒ YES ☐ NO
If NO, I ☐ do ☐ do not have a recorded easement or written authorization allowing me access.

b. List the names and mailing addresses of all affected landowners and state what steps are being taken to obtain access: _____

☐ *See Attachment No.* ___

5. EXISTING WATER RIGHTS AND RELATED FILINGS

a. Do you claim an existing right for the use of all or part of the water sought by this application? ☐ YES ☒ NO
If YES, please specify: ☐ Riparian ☐ Pre-1914 ☐ Registration ☐ Permit ☐ License
☐ Percolating groundwater ☐ Adjudicated ☐ Other (specify) _____

b. For each existing right claimed, state the source, year of first use, purpose, season and location of the point of diversion (to within quarter-quarter section). Include number of registration, permit, license, or statement of

water diversion and use, if applicable. _____

c. List any related applications, registrations, permits, or licenses located in the proposed place of use or that utilize the same point(s) of diversion? _____

☐ *See Attachment No.* ___

6. OTHER SOURCES OF WATER

Are you presently using, or do you intend to use, purchased water or water supplied by contract in connection with this project? ☐ Yes ☒ No If yes, please explain: _____

7. MAP REQUIREMENTS

The Division cannot process your application without accurate information showing the source of water and location of water use. You must include a map with this application form that clearly indicates the township, range, section and quarter/quarter section of (1) the proposed points of diversion and (2) the place of use. A copy of a U.S.G.S. quadrangle/topographic map of your project area is preferred, and can be obtained from sporting goods stores or through the Internet at http://topomaps.usgs.gov. A certified engineering map is required when (1) appropriating more than three cfs by direct diversion, (2) constructing a dam which will be under the jurisdiction of the Division of Safety of Dams, (3) creating a reservoir with a surface area in excess of ten acres or (4) appropriating more than 1000 acre-feet per annum by underground storage. See the instruction booklet for more information.

☒ *See Attachment No.* 3

SECTION C: ENVIRONMENTAL INFORMATION

Note: Before a water right permit may be issued for your project, the State Water Resources Control Board (SWRCB) must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared for your project, a determination must be made of who is responsible for its preparation. If the SWRCB is determined to be responsible for preparing the CEQA document, the applicant will be required to pay all costs associated with the environmental evaluation and preparation of the required documents. Please answer the following questions to the best of your ability and submit with this application any studies that have been conducted regarding the environmental evaluation of your project.

1. COUNTY PERMITS

a. Contact your county planning or public works department and provide the following information:

Person contacted: Sonoma County Date of contact: 4/17/06
Department: Planning Department Telephone: (707) 565-1900
County Zoning Designation: 118-100-51 LIA 40 VOH SR 118-100-38 RRD 40 SR
Are any county permits required for your project? ☐ YES ☒ NO If YES, check appropriate box below:
☐ Grading permit ☐ Use permit ☐ Watercourse ☐ Obstruction permit ☐ Change of zoning
☐ General plan change ☐ Other (explain): _____

b. Have you obtained any of the required permits described above? ☐ YES ☐ NO
If YES, provide a complete copy of each permit obtained.
☐ *See Attachment No.* ___

2. STATE/FEDERAL PERMITS AND REQUIREMENTS

a. Check any additional state or federal permits required for your project:
☐ Federal Energy Regulatory Commission ☐ U.S. Forest Service ☐ U.S. Bureau of Land Management
☐ U.S. Corps of Engineers ☐ U.S. Natural Res. Conservation Service ☐ Calif. Dept. of Fish and Game
☐ State Lands Commission ☐ Calif. Dept. of Water Resources (Div. of Safety of Dams)
☐ Calif. Coastal Commission ☐ State Reclamation Board ☐ Other (specify) _____

b. For each agency from which a permit is required, provide the following information:

AGENCY	PERMIT TYPE	PERSON(S) CONTACTED	CONTACT DATE	TELEPHONE NO.

☐ *See Attachment No.* ___

c. Does your proposed project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank, or riparian habitat of any stream or lake? ☐ YES ☒ NO
If YES, explain: _____

☐ *See Attachment No.* ___

d. Have you contacted the California Department of Fish and Game concerning your project? ☐ YES ☒ NO
If YES, name and telephone number of contact: _____

3. ENVIRONMENTAL DOCUMENTS

a. Has any California public agency prepared an environmental document for your project? ☐ YES ☒ NO

c. If YES, submit a copy of the latest environmental document(s) prepared, including a copy of the notice of determination adopted by the California public agency. Public agency: _____

d. If NO, check the appropriate box and explain below, if necessary:
☐ The applicant is a California public agency and will be preparing the environmental document.*
☒ I expect that the SWRCB will be preparing the environmental document.**
☐ I expect that a California public agency other than the State Water Resources Control Board will be preparing the environmental document.* Public agency: _____
☐ *See Attachment No.* ___

* Note: When completed, submit a copy of the final environmental document (including notice of determination) or notice of exemption to the SWRCB, Division of Water Rights. Processing of your application cannot proceed until these documents are submitted.

** Note: CEQA requires that the SWRCB, as Lead Agency, prepare the environmental document. The information contained in the environmental document must be developed by the applicant and at the applicant's expense under the direction of the SWRCB, Division of Water Rights.

4. WASTE/WASTEWATER

a. Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation?
☐ YES ☒ NO
If YES, or you are unsure of your answer, explain below and contact your local Regional Water Quality Control Board for the following information (See instruction booklet for address and telephone no.):

☐ *See Attachment No.* ___

b. Will a waste discharge permit be required for your project? ☐ YES ☐ NO
Person contacted: _____ Date of contact: _____

c. What method of treatment and disposal will be used? _____

☐ *See Attachment No.* ___

5. ARCHEOLOGY

a. Have any archeological reports been prepared on this project? ☐ YES ☒ NO

b. Will you be preparing an archeological report to satisfy another public agency? ☐ YES ☒ NO

c. Do you know of any archeological or historic sites located within the general project area? ☐ YES ☒ NO
If YES, explain: _____

☐ *See Attachment No.* ___

6. ENVIRONMENTAL SETTING

Attach **three complete sets of color photographs**, clearly dated and labeled, showing the vegetation that exists at the following three locations:
☒ Along the stream channel immediately downstream from the proposed point(s) of diversion.
☒ Along the stream channel immediately upstream from the proposed point(s) of diversion.
☒ At the place(s) where the water is to be used.
☒ *See Attachment No.* 4

SECTION D: SUBMITTAL FEES

Calculate your application filing fee using the "Water Right Fee Schedule Summary" that was enclosed in the application packet. The "Water Right Fee Schedule Summary" can also be viewed at the Division of Water Rights' website (www.waterrights.ca.gov).

A check for the application filing fee, payable to the "Division of Water Rights" and an $850 check for the environmental review fee, payable to the "California Department of Fish and Game," must accompany this application. All applicable fees are required at the time of filing. Your application will be returned to you if it is not accompanied by all required fees.

SECTION E: DECLARATION AND SIGNATURE

I declare under penalty of perjury that all information provided is true and correct to the best of my knowledge and belief. I authorize my agent, if I have designated one above, to act on my behalf regarding this water right application.

Signature of Applicant	Title or Relationship	Date
	Owner	4-26-06

Signature of Co-Applicant (if any)	Title or Relationship	Date

"APPLICATION TO APPROPRIATE WATER" CHECKLIST

Before you submit your application, be sure to:

- ☐ **Answer each question completely in Sections A, B, and C.**
- ☐ **Number and include all necessary attachments.**
- ☐ **Include a legible map that meets the requirements discussed in the instruction booklet (Item B6).**
- ☐ **Include the Water Availability Analysis or sufficient information to demonstrate that there is reasonable likelihood that unappropriated water is available for the proposed appropriation (Item A6).**
- ☐ **Include three complete sets of color photographs of the project site (Item C6).**
- ☐ **Enclose a check for the required fee, payable to the Division of Water Rights, as specified in Section D.**
- ☐ **Enclose a $850 check for the environmental review fee, payable to the Department of Fish and Game, as specified in Section D.**
- ☐ **Sign and date the application in Section E.**

Send the original and one copy of the entire application to:

State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

Attachment 1 to Accompany
Water Right Application
by
Kenneth L. Kahn and Cheryl W. Kahn Trust

Project Description

This project consists of the storage of water in one existing offstream reservoir located on the Applicant's property. Water will be used for irrigation of 46 acres of existing vineyard. The offstream reservoir was built in 2002 and currently stores water pumped from groundwater wells located on the property. This application requests the approval for the construction of an offset well at Point of Diversion #1 to be located on an unnamed stream on the northern boundary of the property (see enclosed map). This offset well is named as a point of diversion to offstream storage in the existing reservoir. Water will also be used for incidental recreation and fire protection purposes. The property has historically been used for pasture and some vineyard since the early 1900's. The 46 acres of existing vineyard were planted in 1982.

The reservoir and 46 acres of vineyard are in place and are located in areas that were historically cleared. All irrigation and water transfer pipelines for the system are in place and will not be altered pursuant to this application. The water transfer pipeline between the offset well and the existing offstream reservoir will be constructed in areas currently planted to vineyard and are not proposed to interfere with and lands outside of the footprint of the vineyard.

ATTACHMENT 2

Estimate of Water Availability to Accompany Water Right Application by Kenneth L. Kahn & Cheryl W. Kahn Trust

California Water Code Section 1260(k) requires that every application for a permit to appropriate water shall include "sufficient information to demonstrate a reasonable likelihood that unappropriated water is available for the proposed appropriation." This narrative and accompanying calculations provide the required information.

The subject Application is within the watershed of an unnamed stream tributary to the Russian River in Sonoma County (see attached map). According to State Water Resources Control Board Order WR 98-08, there is no fully appropriated limitation on the subject watershed. The Application proposes a diversion season of November 1 to June 1, which conforms to Order WR 98-08. The following describes the methodology used to demonstrate a *reasonable* likelihood that water is physically available for the proposed appropriation.

The attached map shows the proposed point of diversion and the watershed area tributary thereto. The map also shows lines of equal mean annual runoff as shown on the map included with the document entitled *Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 by S.E. Rantz, 1974.*[1] An excerpt of this map is attached (Rantz map).

The weighted mean annual runoff for the watershed tributary to the proposed point of diversion was computed based on the Rantz map. Mean *seasonal* runoff for the subject watershed was estimated by adjusting the mean annual runoff assuming that the ratio of seasonal to annual runoff is identical to the ratio of seasonal to annual mean precipitation. The Healdsburg precipitation station was used for this purpose. The resulting seasonal runoff value was adjusted by deducting the *face value* of any senior water rights in the watershed above the proposed point of diversion.

Calculations for the foregoing methodology are attached. These calculations show that in an average year runoff of approximately 90.1 acre-feet would occur at the point of diversion during the proposed season of diversion. The diversion of 16.6 acre-feet under senior rights and 35 acre-feet under the subject application would leave about 38.5 acre-feet of runoff remaining during the proposed diversion season. Accordingly, it is reasonable to conclude that water is available for the subject Application.

KAHNB008.doc

[1] USGS Miscellaneous Field Studies Map MF-613, prepared in cooperation with the California Department of Water Resources.

Water Right Application by Kenneth L. Kahn & Cheryl W. Kahn Trust
Estimate of Water Availability

Point of Diversion #1 & Reservoir "A"

Monthly Precipitation[1]

HEALDSBURG, CALIFORNIA

Month	Mean Precipitation (in)
October	2.24
November	5.35
December	8.05
January	8.94
February	7.42
March	5.45
April	2.59
May	1.11
June	0.31
July	0.04
August	0.13
September	0.38
Annual	**42.01**

Mean Precipitation for requested diversion season (11/1 - 6/1):	38.91 in
Precipitation during requested diversion season as a percentage of total precipitation:	92.62%
Mean Annual Runoff:[2]	17.2 in
Estimated Mean Seasonal Runoff:[3]	15.9 in
Combined Watershed Area for POD #1 and Reservoir "A":	68.0 ac

Total Estimated Mean Seasonal Runoff at POD #1 and Reservoir "A":	90.1 ac-ft
Senior Divterters of Record within watersheds:	
D031142R - Kenneth L. Kahn (10/1-5/1):	9.7 ac-ft
D031145R - Kenneth L. Kahn (10/1-5/1):	6.9 ac-ft
Total water available:	73.5 ac-ft
Requested diversion amount:	35.0 ac-ft
Total Seasonal Amount Remaining in Stream After Diversion:	38.5 ac-ft

Notes:

[1] Source: Western Regional Climate Center website, http://www.wrcc.dri.edu/summary/climsmnca.html

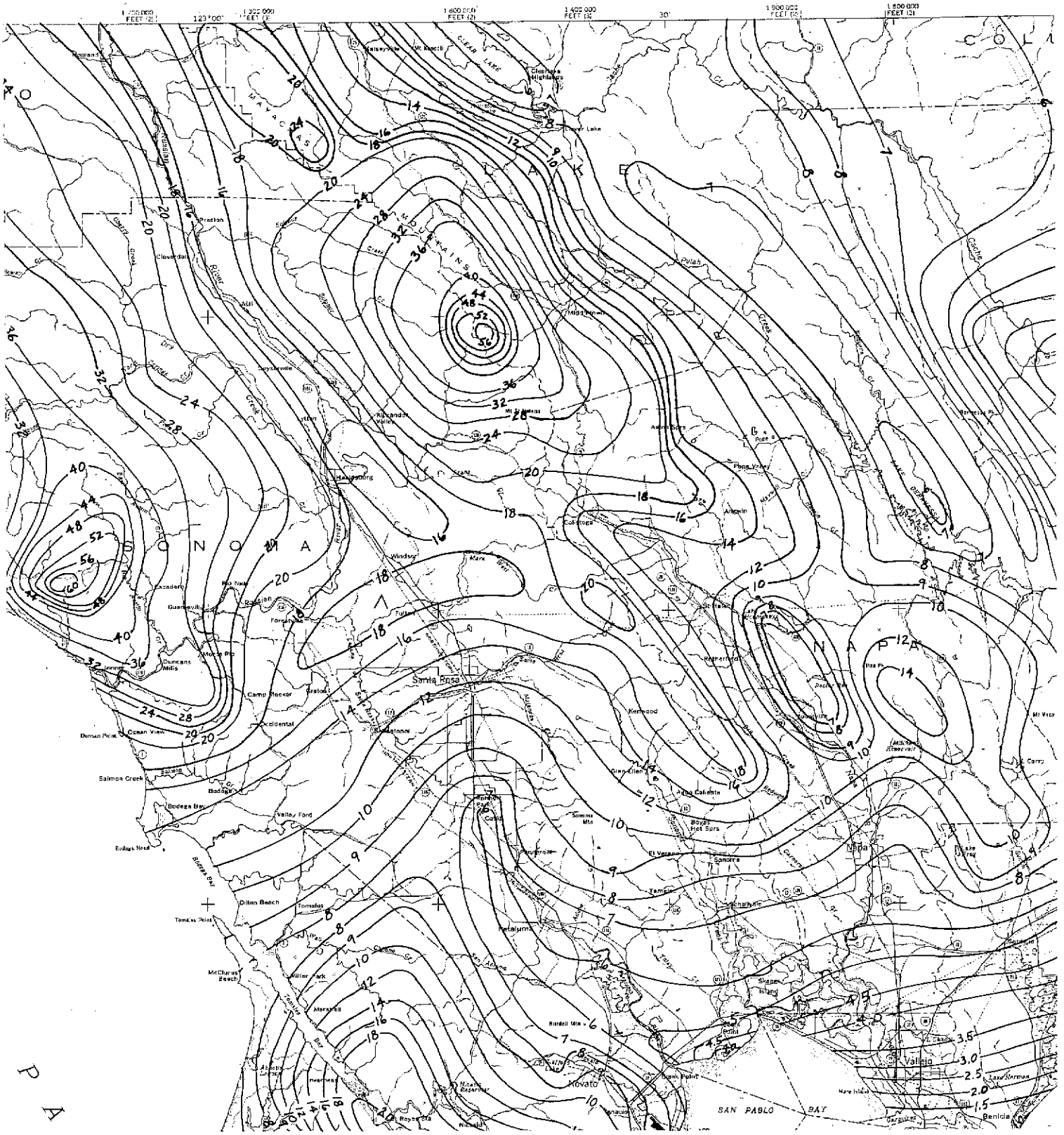
[2] *Mean Annual Runoff in the San Francisco Bay Region, California, 1931-70 (Miscellaneous Field Studies Map MF-613)*, by S.E. Rantz, 1974.

[3] Estimated mean seasonal runoff is computed by multiplying mean annual runoff by percent seasonal precipitation.

Kenneth L. Kahn & Cheryl W. Kahn Trust
Calculation of Weighted Mean Annual Runoff in POD Watersheds

Watershed	Area (ac)	Mean Annual Runoff (in)	Volume (ac-in)	Volume (ac-ft)
POD #1 and Reservoir "A"				
	65.5	17.2	1,127	94
	2.5	16.1	40	3
Total	**68.0**		**1,167**	**97**
Weighted Average		**17.2**		

Prepared in cooperation with the
CALIFORNIA DEPARTMENT OF WATER RESOURCES



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WATER AVAILABILITY ANALYSIS

Policy Report
August 2003

Introduction:

At the height of the 1990 drought in Napa County, the Napa County Board of Supervisors and the Napa County Planning Commission became very concerned with the approval of use permits and parcel division that would cause an increased demand on groundwater supplies within Napa County. During several Commission hearings, conflicting testimony was entered as to the impact of such groundwater extraction on water levels in neighboring wells. The Commission asked the Department of Public Works to evaluate what potential impact an approval might have on neighboring wells and on the basin as a whole. In order to simplify a very complex analysis, the Department developed a three phase water availability analysis to provide a cost-effective answer to the question.

On March 6, 1991, an interim policy was presented and approved by the Commission which requires the applicants for use permits and parcel divisions to submit a water availability analysis with their proposal. The staff report that provides the procedure to follow for compliance with the Commission policy was intended to be an interim one. With the passage on August 3, 1999 by the Board of Supervisors of Napa County Ordinance #1162 (the Groundwater Conservation Ordinance) it became apparent that the interim policy required updating and formalization. The purpose of the revised report is to provide the procedure for preparation of water availability analysis and to restate the purpose and functionality of the analysis as related to the revised Groundwater Ordinance (Napa County Ordinance # 1162).

Water Availability Analysis:

The Water Availability Analysis (WAA) sets up guidelines to determine if a proposed project will have an adverse impact on the groundwater basin as a whole or on the water levels of neighboring wells with the overriding benefit of helping to manage groundwater resources. An important sidelight to the process is public education and awareness. WAA's are comprised of potentially three phases; phase one, phase two and phase three.

A **phase one analysis** is a reconnaissance level report that may be prepared by the applicant or their agent. **It must be signed by the applicant. If prepared by the applicant's agent, it must contain the letterhead of the agent, the name of the agent, and the agent's signature.** The phase one WAA contains the following information:

1. The name and contact information of the property owner and the person preparing the phase one report.

2. Site map of the project parcel and adjoining parcels. The map should include: Assessor's Parcel Number (APN), parcel size in acres, location of project well(s) and other water sources, general layout of structures on the subject parcel, location of agricultural development and general location within the county.

3. Narrative on the nature of the proposed project including: all land uses on the subject parcel, potential for future water uses, details of operations related to water use, description of interconnecting plumbing between the various water sources and any other pertinent information.

4. Tabulation of existing water use compared to projected water use for all land uses contained on the parcel. Should the water use extend to other parcels, they should be included in the analysis (see Appendix E for additional information on determining fair share estimates when multiple parcels are involved). **These estimates should reflect the specific requirements of the applicant's operations.** The applicant should use the guidelines attached in Appendix A

The Department will review the analysis for completeness and reasonableness (based on the guidelines outlined in Appendix A) and then compare the analysis to a threshold level of groundwater use for the subject parcel. The threshold is based upon several factors including annual rainfall, topography, soil types, proximity to recharge zones and available groundwater information. In general, parcels located on the Valley Floor or in strong alluvial areas will be assigned a threshold of 1 acre-foot per acre of land (an acre-foot of water is the amount of water it takes to cover one acre of land to a depth of one foot, or 325,851 gallons). Therefore, a 40-acre parcel will have an acceptable level of groundwater use of 40 acre-feet per year. The threshold for Hillside parcels (primarily located in volcanic rock and soils) is 0.5 acre-feet per acre or 20 acre-feet per year for a 40-acre parcel. Areas designated as "Groundwater Deficient Areas" as defined in the Groundwater Conservation Ordinance will have threshold established for that specific area. For example, the Milliken-Sarco-Tulocay Basin (M-S-T) is currently the only "groundwater deficient area" and has an established threshold of 0.3 acre-feet per acre per year. Thus, the same 40-acre parcel has an acceptable level of water use of 12 acre-feet per year (see Appendix B).

If the Phase I analysis shows a water use above the parcel threshold then further analysis may be required in the form of a Phase II or Phase III analysis.

In instances where the applicant is in the M-S-T basin and their estimated future water usage will be significantly less than the values listed in Appendix A, or if the estimate is within 50% of the estimated threshold, the County may require the applicant to install a water meter to verify actual groundwater usage. If the actual usage exceeds the parcel's threshold, applicant may be required to reduce groundwater consumption and/or find alternate water sources to ensure that no more groundwater is consumed than the threshold for the parcel(s) (See Appendix D).

In the M-S-T basin a phase one analysis examines only the estimated quantity of groundwater water usage as compared to the established water usage threshold. It is assumed that if all consumers within the MST basin were to limit their consumption to 0.3 acre-feet per acre per year* there will be sufficient groundwater for all properties within that area.

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

Any new project within the M-S-T Basin whose estimated use exceeds the threshold use will likely be recommended for denial to the County Department requesting review of the application.

For projects in all other areas within Napa County whose estimated water use exceeds the threshold, the applicant will be required to conduct either a **phase two or a phase three analysis (or both).**

The phase two analysis is commonly called an acquifer test or well test. It requires the pumping of the project well(s) at the maximum rate needed to meet project water demands and at the same time requires the monitoring of the immediate effects of groundwater pumping on a neighboring or monitoring well(s). The following requirements must be met when performing a phase two analysis:

- An approved hydrogeologist, a list of which is on file with the Department of Public Works, must develop the test procedure. Upon approval of test procedures, the hydrologist will supervise the test and submit a report to the Department evaluating impacts to neighboring static water levels.
- A licensed well drilling contractor must perform the actual testing and monitor static and dynamic water levels of the project well and monitoring wells during the duration of the test, including the recovery phase of the project well and monitoring wells.
- The test must be conducted long enough to stabilize the dynamic water level of the project well or include an analysis of what the impact* of continued pumping would have.

- The applicant or agent must notify the Department at least 48 hours prior to conducting the test.

* Impact is unique to each project and will be evaluated on a case by case basis by the department of public works.

Any projects requiring a phase two analysis may also be required to install water meters to measure the actual amount of water consumed, and be required to find alternate water sources if their actual groundwater usage exceeds the threshold for their property (see Appendix D).

The Department will review the phase two analysis and determine if the impacts to static water levels of neighboring wells are within acceptable limits. If the phase two is unacceptable, **a phase three analysis** is required. The phase three analysis may include many measures aimed at reducing water consumption and/or the maximum pumping rate. The Department will require periodic monitoring of static water levels with annual submittals of well production and static water level reports.

The phase three analysis only determines possible actions which could be taken to moderate the immediate effects of groundwater pumping to neighboring wells. These mitigation measures will be designed to reduce, but may not eliminate, the immediate effects of groundwater pumping to neighboring wells.

The preparation and submittal of WAA's for all use permits and parcel divisions, as well as for all Groundwater Conservation Ordinance permits must be submitted through the normal procedures for the Conservation, Development and Planning Department (CDPD) and the Department of Environmental management (DEM) respectively. All subsequent communication should likewise pass through CDPD or DEM. Any mitigation measures identified in the phase three analysis will become either project modifications to, or conditions of approval for, the proposed project.

Details of the use permit or land division can be obtained from CDPD and details of the Groundwater Ordinance and related permit process can be obtained from the Department of Environmental Management. Mapping of "Groundwater Deficient Areas" is available at all three Departments with final determination being supplied by the Department of Public Works.

Conclusions:

The Napa County Board of Supervisors has long been committed to the preservation of groundwater for agriculture and rural residential uses within the County. It is their belief that through proper management, the excellent groundwater resources found within the county can be sustained for future generations.

Since 1991, several conclusions can be drawn from application of the water availability analysis process:

- In the process of conducting the analysis, applicants become much more aware of water use for their project, providing a higher level of awareness and potentially leading to more efficient use of the resource.

- Information submitted by applicants has lead to a broader database for future study and management.

- Groundwater use can vary widely depending upon its availability.

- The current practice of evaluating an applicant's Phase I WAA to determine if additional analysis is needed has been the accepted method for making groundwater determinations. Due to the limited information available on Napa County groundwater basins in general (with the exception of the MST basin), the Phase 1 WAA has been the most reasonable approach to the process and has not been shown to be inaccurate or inadequate. As such, the established WAA procedures for making groundwater determinations as outlined above and throughout the Appendices will continue to be the accepted method of making groundwater determinations and findings.

The water availability analysis is based upon the basic premise that each landowner has equal right to the groundwater resource below his or her property. By attempting to limit the extraction to a threshold amount, it is believed that sufficient groundwater will be available for both current and future property owners.

APPENDIX A: Estimated Water Use for Specified Land Use

Guidelines For Estimating Residential Water Usage:

Residential water use can vary dramatically from house to house depending on the number of occupants, the number and type of appliances and water fixtures, the amount and types of lawn and landscaping. Two homes sitting side by side on the same block can consume dramatically different quantities of water.

Example:

Home #1 is 2500 square feet. Outside the house there is an extensive bluegrass lawn, a lot of water loving landscaping, a swimming pool with no pool cover. Inside the house all the appliances and fixtures, including toilets and showerheads, are old and have not been upgraded or replaced by water saving types. The owners wash their cars weekly but they don't have nozzles or sprayers on the hose. They do not shut off the water while they are soaping up the vehicles, allowing the water to run across the ground instead. Water is commonly used as a broom to wash off the driveways, walkways, patio, and other areas. The estimated water usage for Home #1 is 1.2 acre-feet of water per year.

Home #2 is also 2500 square feet. Outside of the house there is a small lawn of drought tolerant turf, extensive usage of xeriscape landscaping, and no swimming pool. Inside the house all of the appliances and fixtures, including toilets and showerheads, are of the low flow water saving types. The owners wash their cars weekly, but have nozzles or sprayers on the hose to shut off the water while they are soaping up the vehicles. Driveways, walkways, patios, and other areas are swept with brooms instead of washed down with water. Estimated water usage for Home #2 is 0.5 acre-feet of water per year.

Residential water usage can be estimated in a number of ways, however, for the purpose of the WAA, estimates based on the potential number of people who can live on the parcel, and the type of water saving techniques employed, is preferred. The following paragraphs outline this method.

Estimating water use:

Determine if you will be using passive or active water saving techniques on your parcel. Passive techniques require that all appliances and fixtures be of the low flow water saving type. It also requires that the area of your lawn be of drought tolerant turf and no larger that the square footage of your house. If there is a pool, it must be covered whenever it is not in use to prevent evaporation.

Active techniques require all appliances and fixtures to be of the low flow water saving type. The lawn area cannot exceed 1000 square feet of drought tolerant turf, and xeriscape landscaping techniques must be employed. Any plant watering will be accomplished through drip irrigation. No swimming pools are allowed.

Guidelines for Estimating Residential Water Use-For use with the Phase I WAA

1. Count the total number of bedrooms and potential bedrooms on the parcel.
2. Assume 2 people per bedroom.
3. Add 0.2 people for every full time employee not living on site. (maids, landscapers etc.)
4. Calculate the water demand using 0.084AF/year per person (number of people x 0.084)
5. Determine if you will be using passive or active landscaping techniques.
6. If you will use passive water saving your water usage factor is 0.08 per person. If you will use active water saving techniques your water usage factor is 0.04. If no water saving techniques are employed, then an unlimited use factor of 0.14 should be used.
7. Multiply the number of potential residents by the appropriate factor to determine the additional estimated outdoor annual water usage in acre-feet per year. Add the additional estimated outdoor annual water usage number to the number calculated in 4 above to determine the total estimated annual water use.

If you have very limited outdoor irrigation and feel the additional water use included in number 7 above is not relative to your property, you must submit evidence in the form of pictures or a site plan of existing/proposed landscaping (or other indication of vegetation or lack thereof) on the property. The department of public works will evaluate submittals and a lesser number may be allowed. On the contrary, if there is extensive landscaping and outdoor irrigation, you must account for it as noted below.

Example: A Three Bedroom residence with a full time maid using passive water saving techniques.

- 3 Bedrooms x 2 people per bedroom = 6 people + 0.2 (maid)
- 6.2 people x 0.084 AF = .50 AF/year
- 6.2 people x 0.08 AF (passive)=.52AF
- Total annual water use estimated at 1.02 AF/year.

Additional Usage To Be Added

1. Add an additional 0.1 acre-feet of water for each additional 1000 square feet of drought tolerant lawn or 2000 square feet of non-xeriscape landscaping above that already counted above.
2. Add an additional 0.05 acre-feet of water for a pool with a pool cover.
3. Add an additional 0.1 acre-feet of water for a pool without a cover.

Guidelines For Estimating Non-Residential Water Usage:

Agricultural:	
Vineyards	
Irrigation only	0.2 to 0.5 acre-feet per acre per year or 100 to 200 gallons of water per vine per year
Heat Protection	0.25 acre feet per acre per year
Frost Protection	0.25 acre feet per acre per year
Farm Labor Dwelling	1.0 acre-feet per year (6 people)
Irrigated Pasture	4.0 acre-feet per acre per year
Orchards	4.0 acre-feet per acre per year
Livestock (sheep or cows)	0.01 acre-feet per acre per year
Winery:	
Process Water	2.15 acre-feet per 100,000 gal. of wine
Domestic and Landscaping	0.50 acre-feet per 100,000 gal. of wine
Industrial:	
Food Processing	31.0 acre-feet per employee per year
Printing/Publishing	0.60 acre-feet per employee per year
Commercial:	
Office Space	0.01 acre-feet per employee per year
Warehouse	0.05 acre-feet per employee per year

Parcel Location Factors:

The Fair share allotment of water is based on the location of your parcel. There are 3 different location classifications. Valley Floor, Hillside and Groundwater Deficient Areas. Valley Floor areas include all locations that are within the Napa Valley and the Carneros Region except for areas specified as groundwater deficient areas. Groundwater Deficient areas are areas that have been determined by the Department of Public Works as having a history of problems with groundwater. The only Groundwater Deficient Basin in Napa County is the MST basin. All other areas are classified as Hillside Areas. Public Works can assist you in determining your classification.

Parcel Location Factors	
Valley Floor	1.0 acre feet per acre per year
Hillside Areas	0.5 acre feet per acre per year
MST Groundwater Deficient Area	0.3 acre feet per acre per year*

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

The threshold for the Valley Floor Area was determined in 1991 in the form of a Staff Report to the Board of Supervisors. The value of 1.0 AF/A/Year was established as the expected demand an average vineyard would have. It was noted that the Valley Floor threshold would have relatively little effect on neighboring wells.

The threshold for the Mountain Area was established due to the uncertainty of the geology, and the increasingly fractured aquifer in the mountainous and non Napa Valley areas.

The threshold for the Groundwater Deficient Areas was determined using data from the 1977 USGS report on the Hydrology of the Milliken Sarco Tulocay region. The value is calculated by dividing the "safe annual yield" (as determined by the USGS study of 1977) by the total acreage of the affected area (10,000 acres).

APPENDIX B: Values Used to Establish Thresholds

Average Annual Rainfall (Source: Napa County Road & Streets Standards):

American Canyon	1.5 feet per year
City of Napa	2.0 feet per year
Yountville	2.5 feet per year
Oakville	2.5 feet per year
Rutherford	2.67 feet per year
St. Helena	2.75 feet per year
Calistoga	3.0 feet per year
Western Hills	increase by 20%
Eastern Hills	increase by 10%

Threshold Factors of Acceptable Water Use:

Valley Floor	1.0 acre-foot per acre
Hillsides	0.5 acre-foot per acre
MST Groundwater Deficient Areas	0.3 acre-foot per acre*

* Does not apply to the Ministerial Exemption as outlined in the Groundwater Conservation Ordinance

APPENDIX C: Guidance for M-S-T Basin Permit Applications

Data collected from the monitoring of wells within the M-S-T Basin over the last forty years indicate that it may be in overdraft, leading to the conclusion that the existing water users within the basin are pumping more water from the ground than is being naturally replaced each winter season. The only way to end the overdraft trend is to cease all water extraction from the basin. However, as no other reasonable water resources exist in the M-S-T, the Department, to avoid a ban on all new construction, has assumed that each property owner should be able to develop their property to a "reasonable" level of water use while reducing the rate at which the groundwater levels are being lowered.

Within the near future, the U.S.G.S. will release a report on a recent study of the M-S-T Basin. From the U.S.G.S. report we will be able to determine to what extent the overdraft condition may exist and infer what problems may occur from the continued extraction of groundwater from the Basin. Results of the study will be used to plan for alternatives to address these problems. Until the report is available, and alternative measures can be implemented, the Department will use the following analysis to evaluate impacts from proposed projects in the M-S-T Basin:

Single Family Dwellings on Small Parcels In the M-S-T Basin: The average, single family dwelling will likely use between 0.5 and 1.5 acre-feet of groundwater per year. Using a threshold of 0.3 acre-ft/year/acre, the minimum parcel size able to support the above range is between 1.5 to 5.0 acres. Therefore, if an existing residence that uses 0.5 acre-feet per year of groundwater is located on a one-acre parcel, it already exceeds the acceptable level of water use for the property. Applications for the construction of a single family home in these instances can be approved ministerially if the owner agrees to the conditions outlined in the Groundwater Ordinance.. If the conditions are not agreed upon, or if the project involves a secondary dwelling or other groundwater uses not consistent with a single family dwelling, then the project would be subject to the complete groundwater permit process including but not limited to the submittal of a Phase 1 analysis detailing all water use, existing and proposed, on the project parcel.

Agricultural Development In the M-S-T Basin: Agriculture in the M-S-T Basin is not exempt from the groundwater permit process. In these cases, such development will require an application for a groundwater permit including a phase one analysis detailing the existing and proposed water use(s) on the project parcel(s). It is likely that all agricultural development in the M-S-T will be required to meter all wells supplying water to the property with periodic reports to the Department.

Existing Vineyard, New Primary or Secondary Residence In the M-S-T Basin: On an application related to a new residence on a parcel with an existing

vineyard or residence, the Phase 1 WAA shall include all water use on the property, both existing and proposed. Projects on parcels with an established vineyard will likely be required to meter all wells supplying water to the property with periodic reports to the Department.

Wineries and Other Use Permits In the M-S-T Basin: On an application for a use permit, the applicant is required to provide a phase one analysis. Should the application be approved, a specific condition of approval will be required to meter all wells supplying groundwater to the property with periodic reports to the Department. It is also possible that water conservation measures will be a condition of approval. All new use permits must meet the threshold water use for the project parcel.

APPENDIX D: Water Meters

If required, water meters shall measure all groundwater used on the parcel. Additional meters may also be required for monitoring the water use of individual facilities or operations, such as a winery, residence, or vineyard located on the same parcel. If a meter(s) is installed, the applicant shall read the meter(s) and provide the readings to the County Engineer at a frequency determined by the County Engineer. The applicant shall also convey to the County Engineer, or his designated representative, the right to access and verify the operation and reading of the meter(s) at any time.

If the meters indicate that the water consumption of a parcel in the M-S-T basin exceeds the fair share amount, the applicant will be required to submit a plan which will be approved by the Director of Public Works to reduce water usage. The applicant may be required to find additional sources of water to reduce their groundwater usage. Additional sources may include using water provided by the City of Napa, the installation of water tanks which are filled by water trucks, or other means which will ensure that the groundwater usage will not exceed the fair share amounts.

The readings from water meters may also be used to assist the County in determining trends in groundwater usage, adjusting baseline water use estimates, and estimating overall groundwater usage in the M-S-T basin.

Appendix E: Determining water use numbers with multiple parcels

The water availability analysis is based on the premise that each landowner has equal right to the groundwater resource below his or her property. There will be cases where one person or entity owns multiple parcels and requests that the total water allotment below all of his or her parcels be considered in the Phase I water availability analysis. Determining the total threshold based on multiple parcels is acceptable, however to protect future property owners, certain safeguards must be in place to ensure that the water allotment and transfer between parcels is clearly documented and recorded, especially in cases where the water from more than one parcel will ultimately serve a use on a single parcel.

When multiple parcels are involved, the parcels for which the total threshold is being based on must be clearly identified on a site plan with assessors parcel numbers noted. The transfer of water from these parcels to the parcel on which the requested use is located must be documented using the form provided by the department of public works. The form must be approved by the County and subsequently recorded by the applicant prior to commencement of any activity authorized by the groundwater permit or other county permit or approval. A condition requiring such will be placed on the use permit, groundwater permit or other permit for approval.

NAPA COUNTY

DEPARTMENT OF PUBLIC WORKS

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ROBERT J. PETERSON
Director of Public Works
County Surveyor-County Engineer
Road Commissioner

WATER AVAILABILITY ANALYSIS

PHASE 1 STUDY

Introduction: As an applicant for a permit with Napa County, It has been determined that Chapter 13.15 of the Napa County Code is applicable to approval of your permit. One step of the permit process is to adequately evaluate the amount of water your project will use and the potential impact your application might have on the static groundwater levels within your neighborhood. The public works department requires that a Phase 1 Water Availability Analysis (WAA) be included with your application. The purpose of this form is to assist you in the preparation of this analysis. You may present the analysis in an alternative form so long as it substantially includes the information required below. Please include any calculations you may have to support your estimates.

The reason for the WAA is for you, the applicant, to inform us, to the best of your ability, what changes in water use will occur on your property as a result of an approval of your permit application. By examining the attached guidelines and filling in the blanks, you will provide the information we require to evaluate potential impacts to static water levels of neighboring wells.

Step #1:

Provide a map and site plan of your parcel(s). The map should be an 8-1/2"x11" reproduction of a USGS quad sheet (1:24,000 scale) with your parcel outlined on the map. Include on the map the nearest neighboring well. The site plan should be an 8-1/2"x11" site plan of your parcel(s) with the locations of all structures, gardens, vineyards, etc in which well water will be used. If more than one water source is available, indicate the interconnecting piping from the subject well to the areas of use. Attach these two sheets to your application. If multiple parcels are involved, clearly show the parcels from which the fair share calculation will be based and properly identify the assessors parcel numbers for these parcels. Identify all existing or proposed wells.

Step #2: **Determine total parcel acreage and water allotment factor. If your project spans multiple parcels, please fill a separate form for each parcel.**

Determine the allowable water allotment for your parcels:

Parcel Location Factors

The allowable allotment of water is based on the location of your parcel. There are 3 different location classifications. Valley floor areas include all locations that are within the Napa Valley, Pope Valley and Carneros Region, except for areas specified as groundwater deficient areas. Groundwater deficient areas are areas that have been determined by the public works department as having a history of problems with groundwater. All other areas are classified as Mountain Areas. Please circle your location classification below (Public Works can assist you in determining your classification if necessary):

Valley Floor	1.0 acre feet per acre per year
Mountain Areas	0.5 acre feet per acre per year
MST Groundwater Deficient Area	0.3 acre feet per acre per year

Assessors Parcel Number(s)	Parcel Size (A)	Parcel Location Factor (B)	Allowable Water Allotment (A) X (B)

Step #3:

Using the guidelines in Attachment A, tabulate the existing and projected future water usage on the parcel(s) in acre-feet per year (af/yr). Transfer the information from the guidelines to the table below.

EXISTING USE:		**PROPOSED USE:**	
Residential	_____ af/yr	Residential	_____ af/yr
Farm Labor Dwelling	_____ af/yr	Farm Labor Dwelling	_____ af/yr
Winery	_____ af/yr	Winery	_____ af/yr
Commercial	_____ af/yr	Commercial	_____ af/yr
Vineyard*	_____ af/yr	Vineyard*	_____ af/yr
Other Agriculture	_____ af/yr	Other Agriculture	_____ af/yr
Landscaping	_____ af/yr	Landscaping	_____ af/yr
Other Usage (List Separately):		Other Usage (List Separately):	
_____	_____ af/yr	_____	_____ af/yr
_____	_____ af/yr	_____	_____ af/yr
_____	_____ af/yr	_____	_____ af/yr
TOTAL:	_____ af/yr	**TOTAL:**	_____ af/yr
TOTAL:	_____ gallons**	**TOTAL:**	_____ gallons**

*Water use for vineyards should be no lower than 0.2 AF—unless irrigation records are available that show otherwise.

**To determine your existing and proposed total water use in gallons, multiply the totals (in acre-feet) by 325,821 gal/AF.

Is the proposed use less than the existing usage ( ) Yes ( ) No ( ) Equal

Step #4:

Provide any other information that may be significant to this analysis. For example, any calculations supporting your estimates, well test information including draw down over time, historical water data, visual observations of water levels, well drilling information, changes in neighboring land uses, the usage if other water sources such as city water or reservoirs, the timing of the development, etc. Use additional sheets if necessary.

_____

_____

_____

_____

Conclusion: Congratulations! Just sign the form and you are done! Public works staff will now compare your projected future water usage with a threshold of use as determined for your parcel(s) size, location, topography, rainfall, soil types, historical water data for your area, and other hydrogeologic information. They will use the above information to evaluate if your proposed project will have a detrimental effect on groundwater levels and/or neighboring well levels. Should that evaluation result in a determination that your project may adversely impact neighboring water levels, a phase two water analysis may be required. You will be advised of such a decision.

Signature: _____ **Date:** _____ **Phone:** _____

Attachment A: Estimated Water Use Guidelines

Typical Water Use Guidelines:

Primary Residence	0.5 to 0.75 acre-feet per year (includes some landscaping)
Secondary Residence	0.20 to 0.30 acre-feet per year
Farm Labor Dwelling	0.06 to 0.10 acre-feet per person per year

Non-Residential Guidelines:

Agricultural:	
Vineyards	
Irrigation only	0.2 to 0.5 acre-feet per acre per year
Heat Protection	0.25 acre feet per acre per year
Frost Protection	0.25 acre feet per acre per year
Farm Labor Dwelling	0.06 to 0.10 acre-feet per person per year
Irrigated Pasture	4.0 acre-feet per acre per year
Orchards	4.0 acre-feet per acre per year
Livestock (sheep or cows)	0.01 acre-feet per acre per year
Winery:	
Process Water	2.15 acre-feet per 100,000 gal. of wine
Domestic and Landscaping	0.50 acre-feet per 100,000 gal. of wine
Industrial:	
Food Processing	31.0 acre-feet per employee per year
Printing/Publishing	0.60 acre-feet per employee per year
Commercial:	
Office Space	0.01 acre-feet per employee per year
Warehouse	0.05 acre-feet per employee per year

TO: CONSERVATION, DEVELOPMENT AND PLANNING COMMISSION

FROM: TRENT CAVE, DIRECTOR, ENVIRONMENTAL MANAGEMENT
KEN JOHANSON, DIRECTOR, PUBLIC WORKS
JEFF REDDING, DIRECTOR, CDPD
ROBERT WESTMEYER, COUNTY COUNSEL

SUBJECT: GENERAL PLAN AMENDMENT #GPA98-04: County-initiated text amendment to the Land Use Element of the County General Plan to require groundwater findings prior to certain specified redesignations of land.

NAPA COUNTY CODE AMENDMENT #98279-ORD: County-initiated text amendment to Titles 13, 15 and 18 of the Napa County Code to establish findings and permit requirements for the extraction and use of pumped groundwater as a water source on affected properties.

DATE: APRIL 7, 1999

BACKGROUND

Article XI, section 7 of the California Constitution provides counties with the power to make and enforce within their limits all local police, sanitary and other ordinances not in conflict with the general laws. Article X, section 2 of the California Constitution provides an additional constitutional basis for counties to enact ordinances prohibiting the extraction and use of groundwater resources for wasteful, unreasonable or non-beneficial purposes. This self-executing constitutional provision requires that water use be reasonable and that waters be conserved for as many uses as possible. In short, that local management of groundwater resources is a valid exercise of the police power has been a well established principle of California law since the 1930's. In recent years, this principle has been applied to promote conservation and protect and enhance environmental quality.

Various studies conducted or reviewed by the County demonstrate the need for the zoning ordinance proposed. The most important of these studies are attached hereto in full for your review. The remainder are on file with the Department of Public Works.

1991 Study (full copy enclosed for Commission, Executive Summary for others).

The 1991 study provides a detailed review of the relationship between water needs and supply in the short and long term for urban, rural and agricultural users in Napa County, including groundwater needs and supplies. Drawing upon the 1973 and 1977 USGS reports and dividing the county into several discrete subareas, the study calculates the estimated safe yield for each of the four areas in the county with a potential for groundwater extraction. The estimated annual safe yield figures for these regions include 22,500 acre feet for the North Napa Valley Basin, less

than 5,400 acre feet for Milliken-Sarco-Tulucay Groundwater Basins, less than 300 acre feet for Carneros, and less than 400 acre feet for the Lake Berryessa Basin.

The 1991 study also develops short and long-term projections of water needs among users and regions in Napa County using these figures to balance water needs and supplies for the period 1990 through 2020. The results of this balance reveal substantial long-term inadequacies in supply throughout the county's subareas, although admittedly at present some areas have a short-term surplus. From this study it is reasonable to conclude that as the county's water needs increase in the future, increases in agricultural and rural uses are likely to eliminate any existing groundwater surplus. This change from surplus to deficit is likely to be far more pronounced and occur sooner rather than later if increased municipal and industrial demands are also satisfied by using groundwater. Staff notes that in recent years various proposals have surfaced involving the City of Napa and the City of St. Helena proposing to augment their water supplies through increased use of groundwater. Thus, the possibility of municipal and industrial increased water demands being satisfied from groundwater supplies is far from a theoretical concept in Napa County. In 1991, the surplus presently existing for agricultural groundwater users was projected to turn into a deficiency in ten years.

The study concluded in part that the County in issuing use permits should ensure that the applicant demonstrates the adequacy of water supply and retain drainage on site to encourage groundwater recharge.

1993 Report of the Water Advisory Committee (copy enclosed)

The 1993 Report confirmed the 1991 Study's results and projected a growing deficiency in overall county water supply. The Report identified shortfalls of 10,900 acre feet by the year 2000 which would increase to 18,600 acre feet by 2020 and 23,000 acre feet by 2030.

May 1992 Napa River Diversion Feasibility Study

The Napa River Diversion Feasibility Study suggests pursuing further investigation of a groundwater recharge/conjunctive use project that would use surface water from the Milliken Reservoir to recharge the Milliken-Sarco-Tulocay groundwater basin in the southeast portion of the county. This was to be expected, since the Milliken-Sarco-Tulocay groundwater basin is presently, and has been for some time, in a deficit situation. The 1992 Study also recommended that this recommended groundwater recharge project should be coordinated with a County-wide groundwater basin management plan strategy that protects groundwater resources. This proposed ordinance and general plan amendment begin the implementation of an overall groundwater basin management plan.

Conclusions

The studies referenced above demonstrate the presence of an emerging long-term shortfall in water resources, and particularly in groundwater resources heretofore serving agriculture, throughout Napa County's subareas. The emerging shortfall appears to be particularly acute in certain areas surrounding the groundwater basins which have been designated as open space in the county's general plan, but does not appear to be exclusively confined to these areas.
As a result of these studies, the Board during 1996-1997 adopted a series of urgency ordinances

restricting the extraction of groundwater to varying degrees (Napa County Ordinance Nos. 1117, 1118, 1119, 112[illegible]nd 1130). The purpose of these ordinances was to maintain the *status quo* to the maximum extent possible while the comprehensive groundwater ordinance and general plan amendment you are considering today were developed.

It is staff's view that when these studies, as well as other reports on file with the Department of Public Works (i.e. August 1997 USGS report "Groundwater Hydrology of the Lower Milliken-Sarco-Tulucay Creeks Area" and the November 1973 USGS report "Groundwater Hydrology of Northern Napa Valley") are taken into account, it becomes clear that if the water supplies of the County are to be protected, additional regulations are needed to ensure that further development, be it agricultural or urban, will be required to demonstrate that its development will not adversely impact the groundwater basins located in Napa County.

ENVIRONMENTAL

Staff has prepared an Initial Study on the proposed General Plan amendment and Zoning Ordinance text amendment (attached). No potential significant adverse environmental effects have been identified. The proposed amendments will have an overall beneficial impact on the environment by establishing General Plan findings and additional regulations to avoid overdrafts and maximize the long-term beneficial use of groundwater resources, thus serving to protect the public health, safety and welfare of the citizens of Napa County. As such, no adverse environmental effects have been identified as resulting from the adoption of these amendments. A Negative Declaration has been prepared, and the attached Planning Commission Resolution includes a recommendation to the Board of Supervisors to adopt the Negative Declaration.

STAFF ANALYSIS

Amendment of the General Plan:

The proposed groundwater ordinance, like all other zoning ordinances, must be consistent with the Napa County General Plan.. Although the county general plan does not expressly call for the adoption of a groundwater ordinance, the general plan contains sufficient language to enable the Commission to make a finding that the proposed ordinance is consistent with the Napa County General Plan (see section 2 of the proposed ordinance)..

The purpose of the proposed general plan amendment is to make clear that the Board of Supervisors considers groundwater usage and impacts in the redesignation of lands currently designated "Agriculture, Watershed and Open Space" or Agricultural Resource". Specifically, the proposed general plan amendment would add a seventh mandatory finding to subsection 3.f.9.d of the Land Use Element that the Board must make prior to any Board-adopted redesignation of land now designated on the land use map as "Agriculture, Watershed or Open Space" or "Agricultural Resource" to a designation other than "Agriculture, Watershed or Open Space" or "Agricultural Resource" This additional finding would state that, " The applicant for redesignation and its successors will not extract groundwater from the affected property or use pumped groundwater as a water source on the affected property except pursuant to a valid groundwater permit or use permit meeting the requirements of the Napa County Groundwater Conservation Ordinance, unless a final determination of exemption or waiver is made under that ordinance."

The proposed amendments do not change the following provisions of the Land Use Element of the Napa County General Plan: Sections 3.F.7.a, 3.F.7.c, 3.F.7.d, 3.F.8.a, 3.F.8.c, 3.F.8.d of the Land Use Element. Nor do the amendments propose changing the Land Use Map. Therefore, the proposed general plan amendments contained in this resolution do not require a vote of the people pursuant to Measure J.

State law allows the County to amend its General Plan up to four times within a calendar year. No amendments have yet been adopted for calendar year 1999.

Groundwater Ordinance:

General Rule. With certain exceptions to be discussed below, the installation of a new water system or the improvement of an existing water system that may use groundwater as a water source requires a groundwater permit or the equivalent. As one would expect, this requirement applies to use permits, variances, subdivisions and the like. In addition, the ordinance requires development that heretofore has not been required to obtain permits as a condition of commencing a use (other than a building permit if construction is involved) will be required to obtain a groundwater permit or the equivalent. Thus, for example, agriculture in Napa County is not typically required to secure a use permit prior to commencing operations. If this ordinance is enacted as proposed, an agricultural operation that will utilize a new water system or require the improvement of an existing water system that may utilize groundwater as a water source will be required to obtain a groundwater permit prior to commencing operations unless it is exempt.

Exemptions From the General Rule. There are three exemptions from this general requirement that development must secure a groundwater permit or the equivalent. The first exemption applies to development that does not require the issuance of a use permit prior to commencing the use (i.e. the construction of a single family residence). Applications to install or improve a water system for development that will serve the parcel on which the water system is located or a single contiguous parcel are exempt from the groundwater permit requirement. The second exemption applies to agricultural operations. Applications to install or improve a water system for development involving agricultural operations are exempt even if the water system will serve multiple contiguous parcels. In the case of this exemption, contiguity is defined in a manner that should allow for a series of parcels that are part of a single agricultural operation to draw water from a single source without being required to secure a groundwater permit or the equivalent (see subparagraph (A) of section 13.15.040 of the attached ordinance). The third exemption applies to emergencies. The Director of Environmental Management is authorized to declare a site specific emergency if an individual has lost his/her water source and needs to immediately improve the on-site water system to restore his/her water supply.

Exceptions to the Exemption. There are two exceptions to the first two exemptions identified above. First, neither of these exemptions apply if the parcel on which the water system is located within a groundwater deficient area. At present, only the Milliken-Sarco-Tuolcay (hereafter "Milliken") groundwater basin is classified as a groundwater deficient area. However, as the attached studies indicate, it is possible that other groundwater basins in the ensuing years will join Milliken on the list of groundwater deficient areas in Napa County. Second, parcels of less than one acre where the water system would serve only that parcel and public water is available cannot qualify for first exemption described above.

Groundwater Permit Equivalent. The ordinance provides that in the case of uses requiring the issuance of a use permit a separate groundwater permit shall not be required. In those circumstances the required groundwater review will occur as a part of the use permit approval process.

Procedures - Applications For Exemptions. Any applicant is entitled to apply for an exemption from the provisions of the ordinance. Any such application is first reviewed by the Public Works Department to determine whether an exemption is appropriate and by the Conservation, Development and Planning Department for the purpose of environmental review of the application. In the case of environmental review, the ordinance provides that determinations of exemption involving development serving not more than one contiguous parcel (see the first exemption discussed above) are ministerial and therefore exempt from CEQA. In all other cases, a determination of the appropriate level of environmental review will need to be conducted by the Conservation, Development and Planning Department prior to the time that the Director of Environmental Management considers whether the application for an exemption should be approved or denied. No notice of determinations of exemption are required to be provided to anyone other than the applicant. An individual wishing to be provided notice of such determinations should file a request with the Director of Environmental Management that he or she be provided with notice.

Procedures - Applications For A Groundwater Permit

If an exemption is not sought, or an application for an exemption is denied, the following procedure is followed. The applicant is required to file a Groundwater Declaration on a form that will be developed by the Director of Environmental Management (The content of this declaration is described in section 13.15.060 of the attached ordinance). The Director of Environmental Management is also required to notify the applicant that a Phase I, II and III water availability study must be performed. As a part of the staff presentation before the Commission, the Director of Public Works or his designee will describe the function of these water availability studies and how it is determined which study is required to be performed.

The Declaration and Study is then forwarded to the Public Works Department and the Conservation, Development and Planning Department for review. The Public Works review will determine whether approving the application would adversely affect static water level of neighboring wells, assess any drawdown of the impacted groundwater table, assess the degradation of water quality, evaluate the adverse effects on reasonable and beneficial uses of groundwater and determine whether the application, if approved, would interfere with surface water flows or result in other adverse changes to the physical environment. The Conservation, Development and Planning review is for the purpose of conducting the required environmental review.

After reviewing the various documents described above, including the reports/comments from the Public Works and Conservation, Development and Planning Departments, the Director of Environmental Management is required to approve or deny the requested groundwater permit. Approval may occur only after making any required environmental determination (i.e. determining the application is categorically exempt, adoption of a Negative Declaration, certification of Final EIR) and finding that the water system would not significantly affect the impacted groundwater basin. This decision is referred to as the Director's *tentative* decision.

Factors that will be considered in making the decision include, but are not limited to: drawdown of the impacted groundwater table; degradation of water quality; adverse effects on the reasonable and beneficial uses of groundwater; interference with surface water flows; or other adverse changes in the environment. As in the case of a use permit, the Director of Environmental Management may impose reasonable conditions as needed to satisfy the requirements of this Chapter and protect the public health, safety and welfare.

Within seven days of the date the Director of Environmental Management makes his tentative decision, notice of the tentative decision must be given to the applicant, affected public agencies, and to all persons owning real property within 300 feet of the site of the proposed extraction. For this purpose, the site of the proposed extraction is considered the outer perimeter of the properties the water system will serve. Written requests for notices of such decisions may also be filed by any interested person with the Director of Environmental Management, regardless of where such interested persons live in relation to the proposed water system. The Notice will identify the date by which a hearing must be requested if the individual receiving the notice objects to the tentative decision of the Director of Environmental Management. Noticed individuals must be given at least ten calendar days following the mailing of the notice to request a hearing.

If a hearing is not requested in a timely manner the tentative decision becomes final. In such a case, an appeal to the Board of Supervisors is not permitted.

If a hearing is requested in a timely manner, the Director of Environmental Management will establish a hearing date and notify all persons who have been previously notified of the tentative decision of the hearing date. The notification will be mailed at least ten days prior to the hearing date. The hearing is expected to be handled in the same procedural manner as a hearing before the Commission. Not later than five days after the close of the hearing the Director of Environmental Management will render his final decision. Notice of the final decision will be given to all persons who both appeared *and* presented testimony at the hearing. Written requests for notices of final decisions may also be filed by any interested person with the Director of Environmental Management. Appeals of the Director's decision to the Board of Supervisors occur in the usual manner.

Technical changes to the Zoning Code are made by Sections 5 through 10 of the proposed Ordinance to ensure internal consistency. The changes to these existing Code sections are clearly indicated in the attached ordinance by underlining.

AMENDMENT PROCEDURES

The provisions for amendment of the General Plan are set forth by State law and by resolution of the Board of Supervisors. The provisions for the amendment of the County Code are set forth by State law, resolution of the Board of Supervisors, and Chapter 18.136 of Title 18 of the County Code. These provisions require a public hearing before the Planning Commission. Consideration of the proposed general plan amendment and Code amendment was duly noticed by a one-eighth page display ad in both the Napa Valley Register and the St. Helena Star. At the conclusion of the public hearing, the Commission must render its written recommendation to the Board of Supervisors.

If the Commission ... to recommend the adoption of the ... osed general plan amendment and the Code amend... ...t to the Board of Supervisors, they ...ould do so by adoption of the attached resolutions. The resolutions include a finding of general plan consistency and a finding that the amendments will not have a significant effect on the environment.

RECOMMENDATION

ADOPT RESOLUTION NO. 99-04 recommending that the Board of Supervisors approve General Plan Amendment #GPA98-04, as described in Exhibit A; and

ADOPT RESOLUTION NO. 99-05 recommending that the Board of Supervisors amend the Napa County Code by approving Code Amendment #98279-ORD, as described in Exhibit B.

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NAPA COUNTY

FLOOD CONTROL AND WATER CONSERVATION DISTRICT

WILLIAM E. BICKELL
District Engineer

1195 Third St., Rm. 201
Napa, California 94559-3082
(707)253-4351

MEMORANDUM

January 19, 1993

TO: Mayors, Vice Mayors and Members of the Board of Supervisors

FROM: Water Advisory Committee

SUBJECT: Report of the Water Advisory Committee (WAC)

The attached Committee Report is being provided to commence the next phase local agencies will consider in planning long term water policy for the Napa Communities. The Committee believes the most important committment that can be made by these agencies is to continue to work cooperatively and dynamically to reach common objectives in developing and maintaining water supplies serving the Napa Communities. This report identifies a phased approach to meeting targeted water supply shortfalls anticipated in the next 30 years.

The attached report has been compiled by the staffs from the community jurisdictions as directed by locally elected officials to advise all of the Napa Communities as to the most feasible methods to insure future water supplies within Napa County. The report relies heavily upon the 1990 Montgomery Water Resources Study and the 1992 Kennedy/Jenks Napa River Diversion Study.

It is suggested that each jurisdiction undertake review and evaluation of this Committee Report, consider the approaches presented and determine how appropriate recommendations can best be implemented.

Background:

A Technical Advisory Committee (TAC) was established in July of 1991 to review and guide the work done on the Napa River Diversion Study by Kennedy/Jenks Consultants. After presentation of their study to the Board and participating City Councils in May

of 1992, the same staff members of the TAC continued to meet and formed the WAC. This group was established to evaluate the merits of a diversion project in conjunction with other water supply alternatives being considered and to provide technical assistance to policy makers from the various Napa Communities.

The WAC met over a dozen times from June 1992 to the present and includes the following individuals:

City of American Canyon	- Steven Kimborough, former Interim City Manager Robert Schwerin III, Operations Superint. Ronald Kiedrowski, City Manager
City of Napa	- Bob Peterson, Manager Water Department Michael O'Bryon, Director of Public Works
Town of Yountville	- Robert Myers, former Town Administrator Walt Graham, Consulting Town Engineer Jan Wellman, Town Administrator
City of St. Helena	- Marty Oldford, Director of Public Works
City of Calistoga	- Wally Kolb, Director of Public Works
Napa County & District	- Ken Johanson, Assistant District Engineer Bob Sorsen, Project Manager District Myke Praul, Assistant Engineer

Conclusions:

The WAC concluded that Napa County will require an additional 10,900 Acre-Feet of additional water supply by the year 2000. This deficiency will increase to 18,600 by 2020 and 23,000 by 2030.

Projections beyond 2030 are quite difficult, but it is generally agreed that somewhere in the order of 30,000 Acre-Feet will be required in the next 50 years. This magnitude of new supply requires development of an action plan by local water supply agencies which must come from the following combination of sources:

- Local Groundwater

- Local Surface Water

- Reclamation

- State Water Project Entitlements

- Outside Water Purchases

- More Efficient Utilization & Conservation

All future water supplies require consideration of reliability, cost, environmental, institutional and legal issues. The process to fully evaluate these parameters will require a conscientious plan on strict time lines for completion. While it is common for us to think of droughts as temporary water shortages, they are part of the normal weather pattern for California and have significant effects on long range water supply planning. It is with that in mind that the WAC established two major goals for a Napa County Water Policy:

- Assure adequate water supply during periods of prolonged periods of below average rainfall which equates to reliability or drought protection;

- Provide a phased approach to increasing future supplies to meet projected shortfalls which provides added flexibility through cooperative planning.

COMMITTEE REPORT

TO: Napa County Board of Supervisors; Directors, Napa County Flood Control & Water Conservation District, (NCFC & WCD); Council Members, Cities of American Canyon, Napa, St.Helena, Calistoga and Town of Yountville

FROM: Water Advisory Committee (WAC)

SUBJECT: Recommendations for a Countywide Policy for Water Supply

The Directors of the NCFC & WCD and Council Members of the various Cities directed staff to meet with local water departments in Napa County for the review and evaluation of water supply studies in order to suggest a countywide water policy and recommendations for future planning activities. The District Engineer has met with the public work directors and water supply staff from the various Cities, which formed this Water Advisory Committee (WAC) to consolidate information and to determine the most reasonable way of meeting projected water supply shortfalls. This report summarizes the activities of the WAC to date and sets forth the following short, mid and long term recommendations for future actions by the District and Cities.

RECOMMENDATIONS:

Based upon the analysis and conclusions reached, the Committee has developed several recommendations for the respective Board/Councils. The Water Advisory Committee recommends that a three phased approach to meeting the targeted shortfalls be taken.

Short Term Strategies (1992 to 2000)

1. Develop a minimum of 10,900 AF of new, highly reliable water supplies by focusing on the following sources:

   a. <u>Groundwater.</u> Perform studies as needed to determine more accurate yield information in targeted sub-basins. Investigate the feasibility of a Countywide Groundwater Recharge and Management Program.

b. Reclamation. Support and cooperate with the Napa Sanitation District in the development of a customer base and master plan to provide reclaimed water as an economical source of supply on a larger scale. Establish development policies that require the use of reclaimed water where feasible.

c. Water transfers through NBA. Continue to pursue the purchase of permanent water rights and/or mid or long term drought protection agreements with other entities, using the NBA for wheeling (the physical moving of the water supply). Although these supplies are not considered very reliable during drought conditions, they have the potential to be consummated in the short term. A larger quantity may be needed to offset the lower reliability. As more reliable supplies come on line it may be possible to sell these water rights to others.

d. Milliken watershed. Perform a feasibility and yield analysis study to determine the possible benefits of year round operation of the treatment plant or other, more optimum utilization of the water rights. Fund and construct improvements as warranted.

2. Complete all preliminary steps necessary to be able to construct the Napa River diversion facilities and raise Conn Dam by the year 2005.

a. This involves applying to the State for water rights, preparing a detailed operations plan, financing plan, environmental impact report, preliminary design and construction drawings.

b. It is important that the process begin early because many of the steps are time-consuming and will be dealing with some very substantive issues that could jeopardize the project. It is critical that these issues surface early so that there is time to either deal with them or turn our attention to another option. For example, the water rights process may take 8-10 years. The financing plan may recommend partnership arrangements that could require a number of years to develop.

3. Each water agency should determine its water supply needs and the extent to which it will want to participate in the Napa River Division project.

4. Complete current study being conducted for the Cities of Napa, American Canyon and Vallejo to determine the feasibility of providing additional NBA storage in a reservoir in the Jamieson Canyon area to better utilize water bank, carryover and unscheduled NBA water when available.

5. Provide fu[illegible] to purchase land in [illegible] Carneros area for possible future construction of a Carneros area reservoir site. The land could be leased until needed. The purchase would preserve the ability to develop a reservoir on one of the few sizeable sites remaining in the Valley. It would also make it more difficult for another agency outside Napa County from gaining control of the potential reservoir site.

6. Continue support of the Department of Water Resources in it's attempt to fully develop the State Water Project, and continue to monitor Statewide water marketing attempts.

7. Review the existing policy making structure relative to water supply issues and determine if alternatives should be developed to better address them.

8. Establish negotiations with the State of California pertaining to the utilization of unused yield available from Rector Reservoir.

Mid-term Strategies (2000 to 2020)

1. Develop a minimum of 7,700 acre feet of additional, highly reliable water supplies by constructing the Napa River diversion facilities and raising Conn Dam. Timing of the project should be in accordance with the financing plan. Construction of the project early in the time period will result in more water supplies than the County Communities will need initially. This would give these communities the ability to be a net exporter of water until about the year 2020, at which time it is anticipated the communities would need the full supply. The sale of this water would assist in paying for the project.

2. Continue to expand the use of reclaimed water in accordance with the Master Plans of the various sewer agencies in the County.

3. Investigate the feasibility of enlarging Bell Canyon Reservoir.

4. Continue support of the State Water Project and determine if conditions have changed regarding the 45% unfilled entitlement figure. WAC feels that the need for water in Southern California may become so critical as to eventually force a political solution that will bring at least some of that entitlement to us. This possibility is too speculative to be counted on for drought planning purposes. It is sufficient at this point to simply keep an eye on it.

Long-term Strategies (2020 to 2050)

1. Develop new, highly reliable water supplies as needed to meet drought protection and future agricultural and municiple needs.

2. Replace less reliable supplies with more reliable supplies.

3. Pursue the feasibility of a diversion/storage facility on the Carneros region site.

4. Continue support of the State Water Project.

BACKGROUND:

The 1991 Montgomery report identified certain water supply shortfalls in the year 2020. Those shortfalls have been reviewed and refined by the WAC. That review shows that the major water supply deficiency in 2020 will be in the Municipal & Industrial areas closely followed by Agriculture & Rural Residential. In 2030, shortfalls will increase as projections of State Water Project deliveries decrease. Continued shortfalls will occur well into the year 2050 - the fiscal life of the State Water Project. Solutions to future water supply deficiencies must address both M & I and Agriculture & Rural Residential.

Municipal & Industrial:

The term "Municipal and Industrial" (or M & I) use is standard phraseology in water circles for urban water demand, as contrasted to agricultural demand. In Napa County, the water supplies that have been developed by each of our cities and towns are considered to be M & I supplies.

The current 6 year drought has caused each water agency to reevaluate the reliability of its water supplies. Firm yield is a term that refers to the amount of water that can be used each year consistently without running short during drought periods. The drought has shown us that the firm yield of our existing supplies is far lower than we once thought. For example, the firm yield of Lake Hennessey was thought to be 10,000 acre-feet before the drought. It has been re-evaluated to be 5000 acre-feet. Likewise, before the drought no one questioned the ability of the State Water Project to provide us with our current entitlements, even though we all knew that they wouldn't be able to in the future. It was quite an impact when the State cut our entitlement to 20% in 1991.

The WAC believes that the reliability of our existing M & I supplies must be considered in determining our current and future needs. Each Napa community should go through the exercise of gaining a clear understanding of the vulnerability of its current supplies and then set tentative goals for the community relative to where it wants to be when the next drought hits. For example, a goal might be: our community should not have to suffer more than a 10% shortage of water during a drought similar to the one we are currently in. Staff can then determine strategies and associated costs for reaching the goal. This level of conservation equates to a 20% reduction in shortfalls as presented in Table #1, attachment #1.

The WAC believes that most agencies will want to improve their water supply situation and that the most cost effective solutions may very well be achieved through a cooperative effort among all interested agencies in one or more water supply projects. New water supplies will be expensive and it will be well worth the effort of all agencies to give serious consideration to joint projects in order to keep the costs down.

In projecting the drought shortfalls of each Napa Community for this report, the firm yields of existing supplies were compared to projected normal demands. Normal demands have a 10% permanent conservation figure factored in to them as a result of measures taken during this drought. The target values assume that as a whole, all county water users can be called upon to conserve an additional 10% in a drought. This does not preclude each agency from determining its own goal. It simply provides a point from which to start to review the overall magnitude of the water supply problem of the County as a whole.

Agricultural & Rural Residential:

Most of these water users are vineyards, wineries, and residences with a combination of uses that lie outside the jurisdictional boundaries of water service areas. A minor amount of water is supplied to these users by water service districts but it is interruptible at various times. Groundwater and river/stream diversions are the primary source of water for these users. The major portion of this use, agriculture and commercial (wineries), is during the irrigation and frost/heat protection months and as such is not a constant demand during the year. Domestic and livestock uses are much more evenly distributed monthly. All uses need a high degree of reliability and tend to require onsite storage sufficient to meet the demand. Storage is provided, in the case of diversions, by onsite reservoirs and in the case of groundwater by the local aquifer.

While the upper Napa Valley has an extremely reliable groundwater basin (static water levels respond quickly to rainstorms), certain areas within the County suffer from declining groundwater levels. Wells that supply water to rural residential users are typically shallow, older wells which tend to be effected more by fluctuating water levels. Groundwater has long been viewed as the only reasonable, economical and reliable source of supply for agriculture.

In the process of developing projected water needs, the Montgomery report made certain demand assumptions for vineyards that can be challenged. The rate of new planting, the rate of replanting, the density and yield of existing acreages and the water application rate for irrigation and frost/heat protection are

ever changing and therefore somewhat elusive. Past studies have validated the fact that if water is available, it will get applied to the vines. If not, then other varieties of grapes and growing techniques will be developed that need less water. We do know that the initial planting of the vines requires substantially more water during the first few years than needed to support the vines on a long term basis. We also know that densities of vines per acre are increasing. With the current replanting due to the phyloxera outbreak, the WAC believed it important to assume that substantial quantities of water will be needed in the future to support Napa County's most valuable industry. Projections of the growth of the wine industry can be found in the Napa County Wine Industry Growth Master Environmental Assessment, 1990-2010, Section III Industry Projections and the Napa County General Plan.

Based upon these projections, and the demand information presented in the Montgomery report, the additional water requirement for agriculture and rural residential in the year 2020 is estimated to be 9,400 Acre-Feet and in the year 2030, 12,000 Acre-Feet (see attachment #1, Table #1).

Increased utilization of groundwater as a source of supply can have severe detrimental effects on the rural residential community. In response to this, the Napa County Planning Commission adopted a policy requiring every applicant for a use permit or parcel division utilizing groundwater as their source of supply, to submit a "Water Availability Analysis" which essentially evaluates potential effects of the project on the local aquifer. Agricultural users not tied to a use permit process, are not required to provide this analysis.

The Montgomery report recommends increased utilization of groundwater as a source of supply. To further this concept, each water agency within Napa County is looking to further utilize groundwater and, as such, more information is needed to determine the effect of this pumping on the groundwater subbasins within the County.

In addition to utilizing groundwater to meet these needs, increased private river/stream diversions will also provide another source of supply. The 1992 Kennedy/Jenks diversion report provides some convincing information about the potential to more fully utilize the Napa River as an M & I source and through a program of conjunctive use, could provide substantial benefit to the agricultural and rural residential needs. Conjunctive use is defined in the water supply area as the cooperative joining together of two or more entities to increase the safe yield of a common source of supply. For example, the development of well fields by local water agencies can, when used in conjunction with an effective groundwater management program, result in greater

yield from local aquifers. This use of groundwater for M & I users would be temporary and replaced by other surface sources as they come on line. Groundwater would then be available in the future for Agricultural & Rural Residential users. The information in the Kennedy/Jenks report and communications with other potential water supply sources have been closely reviewed by the WAC in an attempt to fully evaluate the various water supply alternatives.

GOALS OF THE WATER ADVISORY COMMITTEE:

Water Resource Planning for Napa Communities must be a dynamic process involving all water supply interests. There is a very important timing element to meeting future water needs as well as the need to plan for future periods of below average rainfall. It is important to realize that California will always have these periods and to insure continuous water supply we must plan accordingly. The Water Advisory Committee sought to achieve two major goals in planning for future water sources:

Assure adequate water supply during prolonged periods of below average rainfall (Reliability or Drought Protection), and

Provide a phased approach to increasing future supplies to meet projected shortfalls (added Flexibility through Conjunctive Use)

The Water Advisory Committee then set out to meet these goals by reviewing and analyzing all information gathered during the last few years and developed the following specific conclusions from that information.

ANALYSIS AND CONCLUSIONS OF THE WAC:

The Committee concluded that, due to the State Department of Water Resources inability to construct statewide water supply facilities integral to the State Water Project, Napa County can reasonably expect to only receive 55% of its full entitlement in the year 2021. This 45% reduction in entitlement will continue for the short and mid term periods and could conceivably continue to the end of the economic life of the State Project, 2050. All efforts to "fill" the North Bay Aqueduct through the State Water Project will be long and arduous. Such efforts will require State and local policy making bodies to support some or all of the following projects: The Los Banos Grande Reservoir, enlargement of the Clifton Forebay, a thru-Delta facility, environmental studies to quantify Delta and Bay flow requirements, the purchase by the State of the Federally owned Central Valley Project, continued support of the activities of the State Water Contractors Association, and the support of Department of Water Resource controlled water marketing. Efforts by the State to "fill" the pipe and meet their contractual entitlements must rely on either construction of some or all of these facilities or, water marketing. The hurdles to construction of additional facilities include environmental, financial and institutional constraints and appear almost insurmountable. Water marketing, while appearing attractive to environmental interests, contains many second and third impacts which must be fully evaluated. Open market bidding on water rights may also drive prices up leaving smaller, northern California agencies outbid by larger southern California interests.

The Committee further concluded that additional information pertaining to the quantities of groundwater and divertible surface water are necessary to fully evaluate the local water supply potentials. Groundwater has been identified as a very desirable and immediate source of water supply but the short and long term effects of such development need to be evaluated. Surface water diversions were studied by the Kennedy/Jenks Napa River Diversion Report and the Committee confirms that excess winter flows are available for diversion to offstream locations.

The WAC also concluded that current and projected water shortfalls are time dependent and greatly controlled by periods of below average rainfall. While shortfalls currently exist in certain users categories, they will change over the next 40 to 50 years as will the period of hydrologic record. Current and future supplies, which are both reliable and flexible, need to be pursued with joint consideration by each water agency within the County.

Water shortfalls need to be categorized as short term, middle term and long term with corresponding supply alternatives. To fully accomplish that potential, it is necessary to promote cooperation between local agencies in the area of conjunctive use. Where shortfalls exist for one user, a particular surplus supply might be diverted from another user on a temporary basis, and later be replaced by a newly developed source as discussed earlier.

The Advisory Committee utilized water need projections from the Montgomery report supplemented with additional information developed during 1991 to obtain figures for projected shortfalls in the years 1991, 2020 and 2030. The Montgomery report gives shortfall figures based upon "normal" years or years of average rainfall. The Committee developed additional shortfalls based upon historical production records for the year 1991. We know that 1991 water demand numbers reflect the effects of 5 years of below average rainfall and, as such, the figures are taken to be the "worst case" scenario for future water shortfall projections. These values are compared to what the County's projected shortfall would be during a normal rainfall year. This then gives us a range of values to plan water needs and is presented in Table #1, attachment #1.

It was then assumed that the mandatory and voluntary water rationing all Napa communities invoked in 1991/1992 was marginally acceptable. The approximate average cutbacks were 30%. The Montgomery report assumes a 10% permanent reduction in individual water use due to State and local water conservation measures. Therefore, to obtain a projected water shortfall, the Committee assumed that an additional 10% reduction from "normal" consumption for all user groups would be acceptable for short periods of time. The "targeted" shortfalls used for planning future water needs were obtained by taking the assumed drought condition or "worst case" scenario and reducing the projected shortfall by 20%. This analysis also assumes that, in a period of sustained below average rainfall, it is expected that the State Water Project would reduce entitlements to 20% thus causing a shortage in water supply. The resulting shortfall, reduced for 20% conservation effort, became the "targeted shortfalls" or additional need for 1991, 2020, and 2030 are shown in Table #1, column #3, #5, and #7.

Examination of these values shows a shortfall to Municipal & Industrial users in 2020 of 11,100 Acre-feet and the year 2030 of 13,500 Acre-feet. Agriculture & Rural Residential show a 2020 shortfall of 7,520 Acre-feet and the year 2030 of 9,600 Acre-feet. The total projected shortfalls for 2020 is 18,600 Acre-feet and for 2030 is 23,000 Acre-feet.

ALTERNATIVE WATER SUPPLY SOURCES:

The Water Advisory Committee then sought to evaluate all reasonable additional water supply sources based upon the conclusions, goals and targeted shortfalls as established. Identifying alternatives resulted from information contained in the Montgomery report, Kennedy/Jenks report and continued communications with Solano County and other outside water agencies. Table #2 lists these alternatives and separates them into two categories; those that utilize the North Bay Aqueduct (NBA) and those that don't. The following seven alternatives are ones that attempt to "fill the pipe" and include the following:

SWP/NBA (45%) - Given the assumption that the State will only supply 55% of the 2021 entitlement of 25,000 Acre-feet, this alternative assumes that the State will construct additional facilities that will eventually deliver Napa full contracted entitlement. Napa is already subscribed to this supply but has no real control over its future.

Yuba County Water - The City of Napa has for the last few years, entered into short term (annual) contracts with Yuba County to purchase and release given amounts of water to the Delta which is then collected at the intake for the NBA facility. This alternative assumes, as above, 45% capacity available in the NBA facilities. It is not likely to involve permanent water rights but could become long term.

Glenn-Colusa Plan - This alternative involves conjunctive use with Yolo and Solano Counties the details of which are contained in the Borcalli report. It also assumes the 45% capacity of the NBA is available and results in the sale of permanent water rights.

Lake Berryessa Plan - The County of Napa agreement for the sale of Monticello Dam to Solano County contains a provision for Solano County to provide Napa County with 2,000 AF of water. This water could be delivered a number of ways but would probably involve the NBA as stated above.

Delivery of this water is conditioned on Congressional passage of the sale of the dam facilities to the Solano Water Agency.

SWP Unscheduled - The State Water Project has available at certain times of the year, excess water that can be delivered to Napa thru the NBA facilities. This seasonal water is usually available in early spring.

SWP Water Bank - Last year due to the drought, the Department of Water Resources purchased additional water from various sources and made it available to State Water Contractors thru their existing facilities. Continuation of this program is uncertain at this time but is likely to occur during drought periods.

Waikea - A private farm group in the Redding area possesses pre-1914 water rights and have offered them for sale on the open market. This alternative would require them to release, or not divert, their water from the Sacramento River and in turn Napa would intake this water at its NBA facilities which are assumed not to be at capacity.

The second set of alternatives in Table #2 represent locally developed sources which do not rely upon the NBA facilities to deliver water to Napa County. They are;

NSD Reclamation - The Napa Sanitation District has plans to upgrade their facility to produce Title 22 water which can be applied to turf and agricultural areas. The District anticipates this water to be available about 1995. One interesting option of this alternative may be to recharge groundwater basins with reclaimed water.

Milliken Upgrade - The City of Napa believes that additional water may be available from Milliken Reservoir with certain improvements made to the treatment plant. A reservoir operation/yield

study will be required to determine the feasibility of this alternative. Utilization of unused flows might also support a groundwater recharge program for the Milliken basin.

Well Fields - This alternative combines privately and municipally owned wells that would put to use the full safe yield from the upper Napa Valley and other subbasins. Such plans should fully evaluate the impact on the Napa Valley's entire groundwater basin and its ability to to be recharged.

Napa River Diversion - This alternative is as described in the Kennedy/Jenks report and would involve the diversion of excess winter flows of the Napa River to an enlarged Lake Hennessey.

Enlarge Bell Canyon - Both the Montgomery and the Kennedy/Jenks report believe that Bell Canyon Reservoir could be increased and provide an additional amount of water. A feasibility level report would be required to further evaluate this alternative.

Rector - The State of California owns Rector as the source of supply to the Vet's Home and the State Hospital. Through negotiations with the Town of Yountville or the City of Napa, there may be water available for other users.

The bottom row of Table #2 gives information on our current situation with the State Water Project and its delivery through the NBA. It is included for informational purposes and is not an alternative.

The balance of Table #2 is an evaluation matrix, developed by the WAC, of the above alternatives. Each alternative was evaluated based on six separate parameters, each given a different weighted value as follows:

- Reliability	30%
- Cost	25%
- Water Quality	20%
- Environmental/Institutional	15%
- Flexibility	5%
- Other Benefits	5%

Reliability refers to the expected quantity of water received from a source in drought years. The reliability number is stated in percent and relates to the percentage of years during which the full amount of water listed would be available. The lower the reliability factor, the less likely Napa Communities are of getting the full amount of water from that source during a period of below average rainfall.

Cost attempts to include all cost to develop the source of raw water and does not include treatment, pumping or distribution costs. For example, the cost for developing well fields includes the cost to purchase the land (or water rights), the cost of drilling the well and the cost of maintaining the facilities. Cost for Waikea Water, for another example, includes the purchase of the water right from the seller and transportation costs thru the NBA. It does not include costs for construction of the NBA or its maintenance which will have to be born even if this alternative was not selected.

Water Quality evaluates the source of supply to determine the quality of the source relative to the other alternatives. This factor is important in that it effects treatment costs, as well as, future problems that may result from the increasing Federal and State reporting and monitoring requirements. For example, the water we receive from the Delta has been used upstream by several entities before it reaches the NBA intake. It also comes from a very large watershed which may contain thousands of sources of contaminants. Treatment of this water and monitoring or control of the contaminants can be costly and may eventually reduce reliability. Water from the Milliken watershed, for example, does not have near the same concerns.

Environmental parameters to evaluate include: concerns for salmon spawning, the loss of Delta smelt at the NBA intake, potential loss of fresh water shrimp, possible loss of wildlife habitat, effects of groundwater pumping or river diversions and aesthetics. Institutional parameters are included with this category since so many constraints to development of water supplies are controlled by State or Federal agencies embroiled in environmental issues. For example, the issue of loss of Delta smelt during pumping periods from the Delta is an environmental issue that may cause DWR to not allow diversion pumping from Contractor facilities during certain periods of the year. While this is an environmental issue, it can become an institutional constraint placed on Napa Communities by DWR. Another example of an institutional parameter is various jurisdictions within the County which control the various facilities. It may prove to be unfeasible to provide certain sources of water to certain users.

Flexibility parameters take into account the ability of an alternative to supply various users at a variety of times. For example, groundwater can be pumped in most areas of the County at any time of year by any user group. Development of well fields therefore have the highest level of flexibility. Other alternatives utilizing the SWP/NBA as the source, have much less flexibility because they can only originate at one point, at certain times and be delivered to the County at one point in the system. Groundwater, on the other hand, can at times be an unreliable resource. During the period of 1976-77, several wells in the Valley went dry. The reliability of well water as a source of supply can be periodic. This makes the need to manage the resource very important.

The other benefits category attempts to take into account all other parameters otherwise unevaluated. An example is the additional recreational benefits that diverting water to Lake Hennessey have. Another such benefit is the utilization of reclaimed water which helps to finance the Napa Sanitation District's plant which is required by Federal and State standards.

All evaluation parameters within a certain category require the ranking between 0 and 10 relative to the other alternatives. Where there is essentially no difference between two alternatives, they can receive the same ranking score. The ranking number is then multiplied by the weighing factor (enumerated above) to obtain a weighted score for that parameter and that alternative. The scores are then added to get a total score (see column #11 of Table #2, attachment #2) which can be a maximum of 10. The Committee acknowledges that the consideration and ranking of many evaluation parameters is subjective in nature. Different people may rank these parameters differently but it is felt that, given the goals established earlier, the variation would not be significant. Once again, the planning of future water resources is a dynamic process which will require constant monitoring and updating.

The four alternatives that scored highest from this analysis, have been shaded in column #12, Table #2. They are:

ALTERNATIVE:	SCORE:	YIELD(cumulative)
Well Fields	9.10	6,100
Milliken Upgrade	8.85	8,100
NSD-Reclamation	8.00	11,100
Napa River Diversion	7.65	23,300

It is important to note that the estimated yield of water from these four sources is 23,300 Acre-feet compared to a targeted shortfall in the year 2020 of 18,600. The estimated time frame for completion of these four alternatives is the year 2020 which would indicate a water surplus of 4,700 Acre-Feet in 2020 and declining

to about a 0 shortfall in 2030. Napa communities would, during this period, be in a position to market this surplus on a short term basis at some point past 2020. The recommended river diversion project, as stated in the Kennedy/Jenks report, is staged to provide 9,000 Acre-Feet initially and 12,200 ultimately with the raising of the dam. The diversion project ranks high in flexibility for this reason.

If the State is able to improve on its contract entitlements, Napa communities would be able to adjust the completion schedule of one of the local projects to accommodate meeting the shortfall. Should the State be successful, or the efforts by Napa communities, to "fill the pipe", the total amount of water planned for is 34,550. This should be very close to our targeted amount in 2050 (the economic life of the SWP/NBA). The Committee concluded, with the probability that the water market will only become more intense in the future and because Napa Communities will have more flexibility in our sources, our communities will always be able to market any surplus water.

WATERALT.MP

ATTACHMENT #1

TABLE #1

AGENCY	SHORTFALLS							
	19 91		20 00		20 20		20 30	
	Drought	Normal	Drought	Normal	Drought	Normal	Drought	Normal
CITY OF NAPA	7,800	3,550	8,800	3,225	11,300	2,350	13,500	4,510
CITY OF AMERICAN CANYON	626	0	1,153	0	1,216	0	1,460	360
TOWN OF YOUNTVILLE	0	0	90	0	200	125	392	317
CITY OF ST. HELENA	0	0	11	11	192	192	391	391
CITY OF CALISTOGA	589	414	625	443	940	765	1,115	1,690
SUBTOTAL	9,015	3,964	10,679	3,679	13,848	3,432	16,858	7,268
AGRICULTURE & RURAL RES.	0	0	2,917	2,917	9,400	9,400	12,000	12,000
TOTAL NAPA COUNTY	9,015	3,964	13,596	6,596	23,248	12,832	28,858	19,268
TARGETED SHORTFALLS	7,200		10,900		18,600		23,000	
COLUMN NUMBER #1	#2	#3	#4	#5	#6	#7	#8	#9

ATTACHMENT #2

TABLE #2

POTENTIAL SUPPLY ALTERNATIVES	YIELD Ac-ft/yr	COST per AC-FT	RELIA. In % of yield	Reliability ranking x 30%	Cost ranking x 25%	Water Quality ranking x 20%	Environmental & Institutional ranking x 15%	Flexibility ranking x 5%	Other Benefits ranking x 5%	SCORE max. of 10	ALTERNATIVES
WP/NBA (45%)	11,250	$185	35	3 x 30% = 0.9	5 x 25% = 1.25	5 x 20% = 1.0	4 x 15% = 0.6	5 x 5% = 0.25	5 x 5% = 0.25	4.25	SWP/NBA (45%)
uba County Water	11,250	$200	75	8 x 30% = 2.4	4 x 25% = 1.0	5 x 20% = 1.0	5 x 15% = 0.75	5 x 5% = 0.25	3 x 5% = 0.15	5.55	Yuba County Water
ilen-Colusa Plan	10,000	$100	75	8 x 30% = 2.4	9 x 25% = 2.25	5 x 20% = 1.0	4 x 15% = 0.6	4 x 5% = 0.20	3 x 5% = 0.15	6.60	Glen-Colusa Plan
ake Berryessa Plan	2,000	$100	75	8 X 30% = 2.5	9 x 25% = 2.25	5 x 20% = 1.0	4 x 15% = 0.6	6 x 5% = 0.30	5 x 5% = 0.25	6.90	Lake Berryessa Pla
WP - Unscheduled	1,000	$50	10	2 x 30% = 0.6	10 x 25% = 2.5	5 x 20% = 1.0	4 x 15% = 0.6	4 x 5% = 0.20	7 x 5% = 0.35	5.25	SWP-Unscheduled
WP - Water Bank	1,000	$100	0	0 x 30% = 0	9 x 25% = 2.25	5 x 20% = 1.0	5 x 15% = 0.75	3 x 5% = 0.15	5 x 5% = 0.25	4.40	SWP-Water Bank
/alkea	3,000	$120	80	9 x 30% = 2.7	8 x 25% = 2.0	5 x 20% = 1.0	5 x 15% = 0.75	5 x 5% = 0.25	6 x 5% = 0.3	7.00	Walkea
SD - Reclamation	3,000	$100*	95	10 x 30% = 3.	9 x 25% = 2.25	5 x 20% = 1.0	7 x 15% = 1.05	4 x 5% = 0.20	10 x 5% = 0.5	8.00	NSD-Reclamation
illiken Upgrade	2,000	$100	80	9 x 30% = 2.7	9 x 25% = 2.25	9 x 20% = 1.8	8 x 15% = 1.2	10 x 5% = 0.5	8 x 5% = 0.40	8.85	Milliken Upgrade
ell Fields	6,100	$150	95	10 x 30% = 3.	8 x 25% = 2.0	10 x 20% = 2.0	9 x 15% = 1.35	10 x 5% = 0.5	5 x 5% = 0.25	9.10	Well Fields
apa River Diversion	12,200	$670	95	10 x 30% = 3.	4 x 25% = 1.0	8 x 20% = 1.6	7 x 15% = 1.05	10 x 5% = 0.5	10 x 5% = 0.5	7.65	Napa River Diversio
nlarge Bell Canyon	1,000	$1,800	95	10 x 30% = 3.	2 x 25% = 0.5	9 x 20% = 1.8	7 x 15% = 1.05	10 x 5% = 0.5	8 x 5% = 0.40	7.25	Enlarge Bell Canyo
ector	200	$250	80	9 x 30% = 2.7	6 x 25% = 1.5	9 x 20% = 1.8	3 X 15% = 0.45	2 X 5% = 0.10	7 x 5% = 0.35	6.90	Rector
WP/NBA (55%)	13,750	$430	65	4 X 30% = 1.2	5 x 25% = 1.25	5 x 20% = 1.0	8 x 15% = 1.2	5 x 5% = 0.25	5 x 5% = 0.25	5.15	SWP/NBA (55%)
#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12

* cost is assumed equal to other raw water sources

TO: CONSERVATION, DEVELOPMENT AND PLANNING COMMISSION

FROM: TRENT CAVE, DIRECTOR, ENVIRONMENTAL MANAGEMENT
KEN JOHANSON, DIRECTOR, PUBLIC WORKS
JEFF REDDING, DIRECTOR, CDPD
ROBERT WESTMEYER, COUNTY COUNSEL

SUBJECT: GENERAL PLAN AMENDMENT #GPA98-04: County-initiated text amendment to the Land Use Element of the County General Plan to require groundwater findings prior to certain specified redesignations of land.

NAPA COUNTY CODE AMENDMENT #98279-ORD: County-initiated text amendment to Titles 13, 15 and 18 of the Napa County Code to establish findings and permit requirements for the extraction and use of pumped groundwater as a water source on affected properties.

DATE: APRIL 7, 1999

BACKGROUND

Article XI, section 7 of the California Constitution provides counties with the power to make and enforce within their limits all local police, sanitary and other ordinances not in conflict with the general laws. Article X, section 2 of the California Constitution provides an additional constitutional basis for counties to enact ordinances prohibiting the extraction and use of groundwater resources for wasteful, unreasonable or non-beneficial purposes. This self-executing constitutional provision requires that water use be reasonable and that waters be conserved for as many uses as possible. In short, that local management of groundwater resources is a valid exercise of the police power has been a well established principle of California law since the 1930's. In recent years, this principle has been applied to promote conservation and protect and enhance environmental quality.

Various studies conducted or reviewed by the County demonstrate the need for the zoning ordinance proposed. The most important of these studies are attached hereto in full for your review. The remainder are on file with the Department of Public Works.

1991 Study (full copy enclosed for Commission, Executive Summary for others).

The 1991 study provides a detailed review of the relationship between water needs and supply in the short and long term for urban, rural and agricultural users in Napa County, including groundwater needs and supplies. Drawing upon the 1973 and 1977 USGS reports and dividing the county into several discrete subareas, the study calculates the estimated safe yield for each of the four areas in the county with a potential for groundwater extraction. The estimated annual safe yield figures for these regions include 22,500 acre feet for the North Napa Valley Basin, less

than 5,400 acre feet for Milliken-Sarco-Tulucay Groundwater Basins, less than 300 acre feet for Carneros, and less than 400 acre feet for the Lake Berryessa Basin.

The 1991 study also develops short and long-term projections of water needs among users and regions in Napa County using these figures to balance water needs and supplies for the period 1990 through 2020. The results of this balance reveal substantial long-term inadequacies in supply throughout the county's subareas, although admittedly at present some areas have a short-term surplus. From this study it is reasonable to conclude that as the county's water needs increase in the future, increases in agricultural and rural uses are likely to eliminate any existing groundwater surplus. This change from surplus to deficit is likely to be far more pronounced and occur sooner rather than later if increased municipal and industrial demands are also satisfied by using groundwater. Staff notes that in recent years various proposals have surfaced involving the City of Napa and the City of St. Helena proposing to augment their water supplies through increased use of groundwater. Thus, the possibility of municipal and industrial increased water demands being satisfied from groundwater supplies is far from a theoretical concept in Napa County. In 1991, the surplus presently existing for agricultural groundwater users was projected to turn into a deficiency in ten years.

The study concluded in part that the County in issuing use permits should ensure that the applicant demonstrates the adequacy of water supply and retain drainage on site to encourage groundwater recharge.

1993 Report of the Water Advisory Committee (copy enclosed)

The 1993 Report confirmed the 1991 Study's results and projected a growing deficiency in overall county water supply. The Report identified shortfalls of 10,900 acre feet by the year 2000 which would increase to 18,600 acre feet by 2020 and 23,000 acre feet by 2030.

May 1992 Napa River Diversion Feasibility Study

The Napa River Diversion Feasibility Study suggests pursuing further investigation of a groundwater recharge/conjunctive use project that would use surface water from the Milliken Reservoir to recharge the Milliken-Sarco-Tulocay groundwater basin in the southeast portion of the county. This was to be expected, since the Milliken-Sarco-Tulocay groundwater basin is presently, and has been for some time, in a deficit situation. The 1992 Study also recommended that this recommended groundwater recharge project should be coordinated with a County-wide groundwater basin management plan strategy that protects groundwater resources. This proposed ordinance and general plan amendment begin the implementation of an overall groundwater basin management plan.

Conclusions

The studies referenced above demonstrate the presence of an emerging long-term shortfall in water resources, and particularly in groundwater resources heretofore serving agriculture, throughout Napa County's subareas. The emerging shortfall appears to be particularly acute in certain areas surrounding the groundwater basins which have been designated as open space in the county's general plan, but does not appear to be exclusively confined to these areas.
As a result of these studies, the Board during 1996-1997 adopted a series of urgency ordinances

restricting the extraction of groundwater to varying degrees (Napa County Ordinance Nos. 1117, 1118, 1119, 1120 and 1130). The purpose of these ordinances was to maintain the *status quo* to the maximum extent possible while the comprehensive groundwater ordinance and general plan amendment you are considering today were developed.

It is staff's view that when these studies, as well as other reports on file with the Department of Public Works (i.e. August 1997 USGS report "Groundwater Hydrology of the Lower Milliken-Sarco-Tulucay Creeks Area" and the November 1973 USGS report "Groundwater Hydrology of Northern Napa Valley") are taken into account, it becomes clear that if the water supplies of the County are to be protected, additional regulations are needed to ensure that further development, be it agricultural or urban, will be required to demonstrate that its development will not adversely impact the groundwater basins located in Napa County.

ENVIRONMENTAL

Staff has prepared an Initial Study on the proposed General Plan amendment and Zoning Ordinance text amendment (attached). No potential significant adverse environmental effects have been identified. The proposed amendments will have an overall beneficial impact on the environment by establishing General Plan findings and additional regulations to avoid overdrafts and maximize the long-term beneficial use of groundwater resources, thus serving to protect the public health, safety and welfare of the citizens of Napa County. As such, no adverse environmental effects have been identified as resulting from the adoption of these amendments. A Negative Declaration has been prepared, and the attached Planning Commission Resolution includes a recommendation to the Board of Supervisors to adopt the Negative Declaration.

STAFF ANALYSIS

Amendment of the General Plan:

The proposed groundwater ordinance, like all other zoning ordinances, must be consistent with the Napa County General Plan. Although the county general plan does not expressly call for the adoption of a groundwater ordinance, the general plan contains sufficient language to enable the Commission to make a finding that the proposed ordinance is consistent with the Napa County General Plan (see section 2 of the proposed ordinance).

The purpose of the proposed general plan amendment is to make clear that the Board of Supervisors considers groundwater usage and impacts in the redesignation of lands currently designated "Agriculture, Watershed and Open Space" or Agricultural Resource". Specifically, the proposed general plan amendment would add a seventh mandatory finding to subsection 3.f.9.d of the Land Use Element that the Board must make prior to any Board-adopted redesignation of land now designated on the land use map as "Agriculture, Watershed or Open Space" or "Agricultural Resource" to a designation other than "Agriculture, Watershed or Open Space" or "Agricultural Resource" This additional finding would state that, " The applicant for redesignation and its successors will not extract groundwater from the affected property or use pumped groundwater as a water source on the affected property except pursuant to a valid groundwater permit or use permit meeting the requirements of the Napa County Groundwater Conservation Ordinance, unless a final determination of exemption or waiver is made under that ordinance."

The proposed amendments do not change the following provisions of the Land Use Element of the Napa County General Plan: Sections 3.F.7.a, 3.F.7.c, 3.F.7.d, 3.F.8.a, 3.F.8.c, 3.F.8.d of the Land Use Element. Nor do the amendments propose changing the Land Use Map. Therefore, the proposed general plan amendments contained in this resolution do not require a vote of the people pursuant to Measure J.

State law allows the County to amend its General Plan up to four times within a calendar year. No amendments have yet been adopted for calendar year 1999.

Groundwater Ordinance:

General Rule. With certain exceptions to be discussed below, the installation of a new water system or the improvement of an existing water system that may use groundwater as a water source requires a groundwater permit or the equivalent. As one would expect, this requirement applies to use permits, variances, subdivisions and the like. In addition, the ordinance requires development that heretofore has not been required to obtain permits as a condition of commencing a use (other than a building permit if construction is involved) will be required to obtain a groundwater permit or the equivalent. Thus, for example, agriculture in Napa County is not typically required to secure a use permit prior to commencing operations. If this ordinance is enacted as proposed, an agricultural operation that will utilize a new water system or require the improvement of an existing water system that may utilize groundwater as a water source will be required to obtain a groundwater permit prior to commencing operations unless it is exempt.

Exemptions From the General Rule. There are three exemptions from this general requirement that development must secure a groundwater permit or the equivalent. The first exemption applies to development that does not require the issuance of a use permit prior to commencing the use (i.e. the construction of a single family residence). Applications to install or improve a water system for development that will serve the parcel on which the water system is located or a single contiguous parcel are exempt from the groundwater permit requirement. The second exemption applies to agricultural operations. Applications to install or improve a water system for development involving agricultural operations are exempt even if the water system will serve multiple contiguous parcels. In the case of this exemption, contiguity is defined in a manner that should allow for a series of parcels that are part of a single agricultural operation to draw water from a single source without being required to secure a groundwater permit or the equivalent (see subparagraph (A) of section 13.15.040 of the attached ordinance). The third exemption applies to emergencies. The Director of Environmental Management is authorized to declare a site specific emergency if an individual has lost his/her water source and needs to immediately improve the on-site water system to restore his/her water supply.

Exceptions to the Exemption. There are two exceptions to the first two exemptions identified above. First, neither of these exemptions apply if the parcel on which the water system is located within a groundwater deficient area. At present, only the Milliken-Sarco-Tuolcay (hereafter "Milliken") groundwater basin is classified as a groundwater deficient area. However, as the attached studies indicate, it is possible that other groundwater basins in the ensuing years will join Milliken on the list of groundwater deficient areas in Napa County. Second, parcels of less than one acre where the water system would serve only that parcel and public water is available cannot qualify for first exemption described above.

Groundwater Permit Equivalent. The ordinance provides that in the case of uses requiring the issuance of a use permit a separate groundwater permit shall not be required. In those circumstances the required groundwater review will occur as a part of the use permit approval process.

Procedures - Applications For Exemptions. Any applicant is entitled to apply for an exemption from the provisions of the ordinance. Any such application is first reviewed by the Public Works Department to determine whether an exemption is appropriate and by the Conservation, Development and Planning Department for the purpose of environmental review of the application. In the case of environmental review, the ordinance provides that determinations of exemption involving development serving not more than one contiguous parcel (see the first exemption discussed above) are ministerial and therefore exempt from CEQA. In all other cases, a determination of the appropriate level of environmental review will need to be conducted by the Conservation, Development and Planning Department prior to the time that the Director of Environmental Management considers whether the application for an exemption should be approved or denied. No notice of determinations of exemption are required to be provided to anyone other than the applicant. An individual wishing to be provided notice of such determinations should file a request with the Director of Environmental Management that he or she be provided with notice.

Procedures - Applications For A Groundwater Permit

If an exemption is not sought, or an application for an exemption is denied, the following procedure is followed. The applicant is required to file a Groundwater Declaration on a form that will be developed by the Director of Environmental Management (The content of this declaration is described in section 13.15.060 of the attached ordinance). The Director of Environmental Management is also required to notify the applicant that a Phase I, II and III water availability study must be performed. As a part of the staff presentation before the Commission, the Director of Public Works or his designee will describe the function of these water availability studies and how it is determined which study is required to be performed.

The Declaration and Study is then forwarded to the Public Works Department and the Conservation, Development and Planning Department for review. The Public Works review will determine whether approving the application would adversely affect static water level of neighboring wells, assess any drawdown of the impacted groundwater table, assess the degradation of water quality, evaluate the adverse effects on reasonable and beneficial uses of groundwater and determine whether the application, if approved, would interfere with surface water flows or result in other adverse changes to the physical environment. The Conservation, Development and Planning review is for the purpose of conducting the required environmental review.

After reviewing the various documents described above, including the reports/comments from the Public Works and Conservation, Development and Planning Departments, the Director of Environmental Management is required to approve or deny the requested groundwater permit. Approval may occur only after making any required environmental determination (i.e. determining the application is categorically exempt, adoption of a Negative Declaration, certification of Final EIR) and finding that the water system would not significantly affect the impacted groundwater basin. This decision is referred to as the Director's *tentative* decision.

Factors that will be considered in making the decision include, but are not limited to: drawdown of the impacted groundwater table; degradation of water quality; adverse effects on the reasonable and beneficial uses of groundwater; interference with surface water flows; or other adverse changes in the environment. As in the case of a use permit, the Director of Environmental Management may impose reasonable conditions as needed to satisfy the requirements of this Chapter and protect the public health, safety and welfare.

Within seven days of the date the Director of Environmental Management makes his tentative decision, notice of the tentative decision must be given to the applicant, affected public agencies, and to all persons owning real property within 300 feet of the site of the proposed extraction. For this purpose, the site of the proposed extraction is considered the outer perimeter of the properties the water system will serve. Written requests for notices of such decisions may also be filed by any interested person with the Director of Environmental Management, regardless of where such interested persons live in relation to the proposed water system. The Notice will identify the date by which a hearing must be requested if the individual receiving the notice objects to the tentative decision of the Director of Environmental Management. Noticed individuals must be given at least ten calendar days following the mailing of the notice to request a hearing.

If a hearing is not requested in a timely manner the tentative decision becomes final. In such a case, an appeal to the Board of Supervisors is not permitted.

If a hearing is requested in a timely manner, the Director of Environmental Management will establish a hearing date and notify all persons who have been previously notified of the tentative decision of the hearing date. The notification will be mailed at least ten days prior to the hearing date. The hearing is expected to be handled in the same procedural manner as a hearing before the Commission. Not later than five days after the close of the hearing the Director of Environmental Management will render his final decision. Notice of the final decision will be given to all persons who both appeared *and* presented testimony at the hearing. Written requests for notices of final decisions may also be filed by any interested person with the Director of Environmental Management. Appeals of the Director's decision to the Board of Supervisors occur in the usual manner.

Technical changes to the Zoning Code are made by Sections 5 through 10 of the proposed Ordinance to ensure internal consistency. The changes to these existing Code sections are clearly indicated in the attached ordinance by underlining.

AMENDMENT PROCEDURES

The provisions for amendment of the General Plan are set forth by State law and by resolution of the Board of Supervisors. The provisions for the amendment of the County Code are set forth by State law, resolution of the Board of Supervisors, and Chapter 18.136 of Title 18 of the County Code. These provisions require a public hearing before the Planning Commission. Consideration of the proposed general plan amendment and Code amendment was duly noticed by a one-eighth page display ad in both the Napa Valley Register and the St. Helena Star. At the conclusion of the public hearing, the Commission must render its written recommendation to the Board of Supervisors.

If the Commission ... to recommend the adoption of the ... osed general plan amendment and the Code amendm... ...t to the Board of Supervisors, they ...ould do so by adoption of the attached resolutions. The resolutions include a finding of general plan consistency and a finding that the amendments will not have a significant effect on the environment.

RECOMMENDATION

ADOPT RESOLUTION NO. 99-04 recommending that the Board of Supervisors approve General Plan Amendment #GPA98-04, as described in Exhibit A; and

ADOPT RESOLUTION NO. 99-05 recommending that the Board of Supervisors amend the Napa County Code by approving Code Amendment #98279-ORD, as described in Exhibit B.

ke:gmdwtr.sr

AGENDA ITEM # 11

NAPA COUNTY

CONSERVATION — DEVELOPMENT AND PLANNING DEPARTMENT

JEFFREY R. REDDING
Director

1195 THIRD STREET, ROOM 210 • NAPA, CALIFORNIA 94559-3092
AREA CODE 707/253-4416

MEMORANDUM

TO: Conservation, Development and Planning Commission

FROM: Jeffrey R. Redding, Director

SUBJECT: Public Works Department Report on Water Availability Analysis

DATE: February 27, 1991

In response to the Commissions concerns regarding water availability, the Department of Public Works has prepared a report outlining a three phase process. (see attached) The three phases are 1) a reconnaissance report required at the application stage for all use permits and parcel/subdivision maps; 2) study of the effects of additional water consumption on surounding users based on a threshold level of water consumption; and 3) development of a contingency plan.

The report outlines the content of the Phase 1 Reconnaissance Report and the Phase 3 Contingency Plan; however, additional description is required for the Phase 2 Study. The water consumption thresholds need to be refined and criteria and guidelines must be developed for the the study content and methodology. Based on comments from the Commission and the Departments of Conservation, Development and Planning and Environmental Management, Public Works will proceed with these changes.

RECOMMENDATIONS

1. **The Commission approve, as an interim policy, the recommendations by Public Works for a three phase process to determine water availability for all use permits and parcel/subdivision maps.**

2. **The Commission direct staff to refine the water consumption threshholds and develop criteria and guidelines for the Phase 2 study.**

st\f\water

NAPA COUNTY DEPARTMENT OF PUBLIC WORKS

1195 THIRD STREET • ROOM 201 • NAPA, CALIFORNIA 94559-3082
AREA CODE 707/253-4351

HARRY D. HAMILTON
Director of Public Works
County Surveyor — County Engineer
Road Commissioner

STAFF REPORT
Water Availability Analysis

As a result of the environmental review process and the current drought conditions, the Napa County Planning Commission has expressed concern over water availability for Use Permit and Parcel Map applications. The availability of groundwater and the effects of pumping projected water demands of proposed facilities on the neighboring wells is of ultimate concern to both the Commission, neighbors and the applicant. In an effort to adress these concerns, the Public Works Department has attempted to establish criteria by which the applicant can perform well tests to satisfactorily evaluate the effects of projected water use on the local groundwater aquifer. This Department contracted with J.M.Montgomery, the County's consultant for the Water Resources Study currently in progress, to help establish these criteria. The resulting letter report submitted by Montgomery engineers has revealed two basic flaws in this approach:

1 - The general nature of the criteria to include all types of applications may not give specific enough direction to the applicant or his consultant resulting in a general evaluation of the aquifer no more informative to the Commission than current information presently provided;

2 - The cost of such well studies may be prohibitive to applicants of small wineries or parcel maps.

While this Department is working to bring local experts together to refine these criteria and provide a more definitive result, it is apparent that some form of interim guidelines are required. Therefore, this staff report has been put together to provide the Commission with some basic information pertaining to water use, available groundwater, existing information and interim recommendations to assist the Commission's decision-making process. This report is comprised of the following sections:

I. Existing Groundwater Studies and General Evaluation of Aquifers for Various Areas

II. Projected Water Use of Various Applications

III. Recommendations

I. Existing Groundwater Studies and General Evaluation of Aquifers for Various Areas

The most comprehensive study of groundwater in Napa County was done by the USGS in 1973. This study involved extensive monitoring of hundreds of wells within the Napa Valley floor from Calistoga south to the Oak Knoll Avenue. The Napa County Flood Control and Water Conservation District contracted the study and provided the monitoring program of these selected wells from 1962 to about 1975. The report concluded that the main Napa Valley aquifer was quite large, relatively stable and not in an overdraft situation. It was estimated that the basin contained about 200,000 acre-feet of water of which 24,000 acre-feet per year can be safely withdrawn without overdrafting the aquifer. The 1991 Montgomery study is suggesting a slightly lower "safe yield" for the basin of 22,000 acre-feet per year. Current usage is estimated at 16,000 acre-feet per year available befor an overdraft occurs.

In 1972 a prior USGS study investigated the groundwater basin for the Lower Miliken-Sarco-Tulucay Creeks area east of the City of Napa. Based upon this study, the usable storage capacity of that basin is approximately 20,000 acre-feet per year. The aquifer in this area is considerably more confined than the main Valley floor with lower tranmission rates (slower recharge of wells), fractured rock formations (segmenting of the aquifer) and generally a lower annual yield than the Valley floor. This annual yield is estimated at 3,000 acre-feet and pumpage at times is thought to exceed this amount.

Although no other extensive groundwater studies have been completed in the County, certain lesser investigations have been performed by the Flood Control and Water Conservation District. These investigations are primarily centered in areas with known groundwater problems and relative concentrated use. These areas are: Carneros, Coombsville (area discussed above), Dry Creek, Angwin, Mt. Veeder (and similar mountainous areas in volcanic formations), Pope/Chiles Valley, and Calistoga (mainly from a water quality standpoint). While no estimate of annual yield from these areas has been determined, they have been labeled as areas with groundwater problems that should be dealt with cautiously.

II. Projected Water Demand of Various Applications

It is extremely difficult to apply "across the board" criteria for evaluating water demand without first considering the relative consumptions of various uses for proposed sites. Some of these uses are currently regulated by the Planning Commission while some are not. Following is a table of various uses, their current average water demand and the County process, if any, that regulates that use.

USE	Projected Water Demand, (note units)		County Process
Residential:			
-primary residence	0.75	AC-FT/YR	BP
-secondary res.	0.33	AC-FT/YR	UP,BP
-farm labor dwell.	1.0	AC-FT/YR(6people)	UP,BP
Agricultural:			
-vineyards	1.0	AC-FT/AC-YR	None
-irrigated pasture	4.0	AC-FT/AC-YR	None
-orchards	4.0	AC-FT/AC-YR	None
-livestock (sheep or cows)	0.01	AC-FT/AC-YR	None
Winery:			
-process water	2.15	ac-ft/100kgalwine	UP,BP
-domestic & land.	0.5	" "	UP,BP
Industrial:			
-food processing	31.0	ac-ft/employee-yr	UP,BP
-Printing/Publishing	0.6	"	UP,BP
Commercial:			
-office space	0.01	ac-ft/employee-yr	UP,BP
-warehouse	0.05	"	UP,BP

From these estimated water usage numbers we can consider typical and "worst" case scenarios. For example, consider an 80 acre parcel currently in non-irrigated pasture land. If this parcel is used for grazing cattle or sheep, the water consumption will be approximately 1 ac-ft/yr for 320 head of sheep (or 80 cattle) on non-irrigated pasture. The parcel may also be irrigated to provide grazing for the same number of sheep and require 320 ac-ft/yr for irrigated pasture land. Either of these situations would not require any County permit or land division process. The same 80 acre parcel planted in vineyard would require about 80 ac-ft/yr of water and would likewise not require County approval. A third scenario would be the split of the 80 acre parcel into two 40 acre pieces requiring the owner to apply for a parcel map with the County. If the proposed purpose was to construct two single family dwellings, the resulting water consumption would be approximately 2 ac-ft/yr. All three of these scenarios would most likely rely on groundwater for their water supply though cattle and vineyard operations many times build reservoirs to store surface waters. To take the worst case possible in these three development scenarios let's add a primary residence, secondary residence and farm labor residence all with ample landscaping. Then the water consumption may be as shown in the following table.

SCENERIO	DESCRIPTION	ANNUAL WATER USE ac-ft/yr
#1	320 sheep irrigated pasture primary residence secondary res. farm labor dwell.	324
#2	80 acre vineyard primary residence secondary res. farm labor dwell. 50,000 gal winer	83.5
#3	primary residence secondary res.	1.2

It is apparent from this analysis that certain unregulated uses of parcels can utilize far more groundwater than regulated parcel splits confined to permitted dwelling units. While water consumption for industrial and commercial uses vary greatly and are supplied almost exclusively by M & I suppliers, they do have an overall effect on water supply for the County and during drought periods such as the current one, will cause a shift from imported water to groundwater, the impact of which is difficult to gage.

III. Recommendations

In an effort to provide the Commission with an interim, workable evaluation procedure the Public Works Department proposes the following recommendations:

1. Establish a three phase policy at the aplication stage for all use permit and parcel/subdivision map applications. The initial phase would be a reconnaisance level letter report which would include;

   A. Site Map including
      - property boundaries
      - proposed building facilities
      - proposed agricultural development
      - existing and/or proposed water systems
      - adjoining neighbors
      - adjoining water systems

   B. Narrative on the proposed project with description of processes or land use intended. This should include
      - acreage of vineyard/agricultural development
      - gallons of wine to be produced
      - homesites and number of occupants
      - potential for future development

C. Projected water consumption to include
   total water requirement in acre-feet per year
   peak demands and time of year
   water source and delivery facilities
D. Summary of available information on groundwater for the specific site and general evaluation of the groundwater basin to include
   list of available published information
   available history of wells or water service for site
   probable effects on surrounding wells
   proposed mitigation measures

2. Establish a threshold level of acceptance for various permit processes that would determine the need for further study by the applicant. This threshold level of water consumption would be expressed in acre-feet per year and could be on a sliding scale depending on the hydrologic conditions for that period of time. For example, during the current drought period an appropriate threshold level might be 1 acre-foot per year on the Napa Valley floor. This is the expected demand of an average vineyard. This consumption would have relatively little effect on neighboring wells. In hillside areas, where the aquifer is more fractured, an appropriate threshold level might be 1/2 acre-foot per year. The applicant would then be able to design their facilities to that level of water usage without having to provide a more extensive well study involving the drilling and testing of wells on the site. Applicants wishing to exceed these threshold levels, whether use permit, parcel map or building permit, could provide the phase two study to inform the Commission on the effects of additional water consumption on surrounding users. This concept during the current drought conditions could be applied to all applications including building permits, subdivision development, industrial use permits, etc. with a more extensive study being required for exceeding the threshold levels. In years of average or above rainfall, these thresholds could be adjusted upward and as such be less restrictive on water use. The applicants would have to make certain assumptions for land use of their development and may wish to provide two different scenarios: the most probable use of the property and the worst case (greatest water consumption) for the property. Certain standards for testing of wells for the phase two studies would be necessary and could be developed by this Department in cooperation with the Environmental Management Department which administers the County well ordinance.

Based upon the estimated water usage described in II above, the following threshold levels are suggested:

	Acceptable Water Usage ac-ft/ac-year					
	Below Average Rainfall (Current 1991) Applications AREAS*			Rainfall at Average or Above AREAS*		
	1	2	3	1	2	3
USE PERMIT						
M&I Supplied**	1	.5	Ø	3	2	Ø
Well	1	.5	Ø	3	2	Ø
PARCEL MAP						
M&I Supplied**	1	.5	Ø	3	2	Ø
Well	1	.5	Ø	3	2	Ø
Building Permits						
M&I Supplied**	1	.5	Ø	3	2	Ø
Well	1	.5	Ø	3	2	Ø

*AREAS: 1-valley floor
2-hillside
3-historically poor water areas as identified by maps and records on file with the Department of Public Works

**Water supplied thru municipality or District

3. Develop a contingency for water supply. Even the most exhaustive hydrogeologic study contains assumptions and evaluations which may or may not prove correct. In instances where the study does not accurately evaluate the effects of project water usage on surrounding wells or users, a contingency plan would be required. This may be as simple as implementation of water conservation measures on a permanent basis to adding storage facilities for use during peak demands. Implementation of this contingency plan would be achieved in one of a few different ways:

- application for modification of the permit use
- verified recordings of negative effects on neighboring uses as presented to the Commission through a formal complaint process simular to an appeal
- static well level deterioration documented by Flood Control District monitoring program
- determination by the Board of Supervisors as to a state of emergency requiring severe measures.

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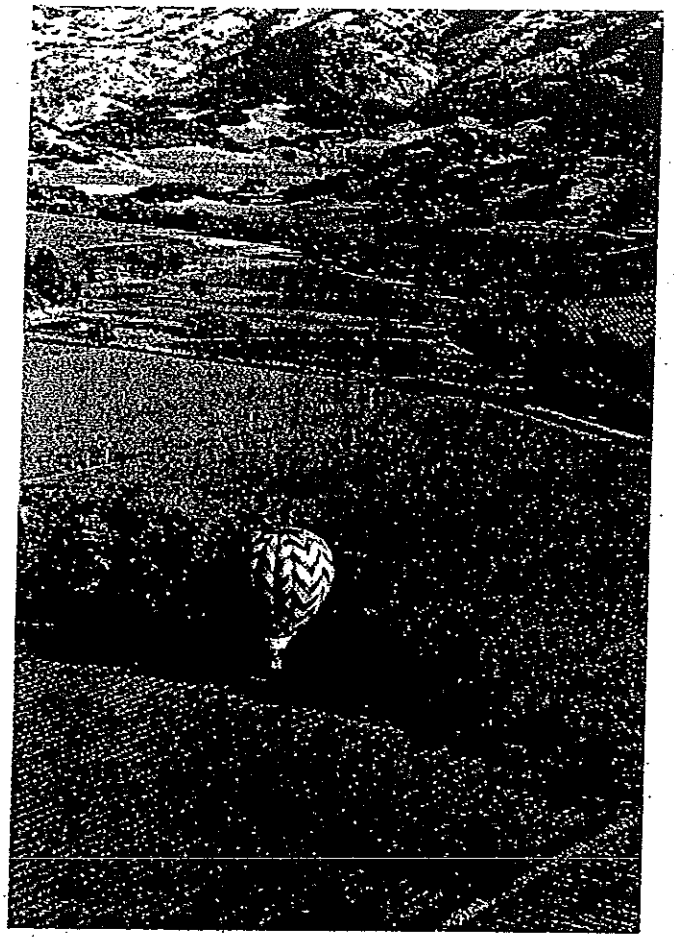

Napa County Flood Control and Water Conservation District

Water Resource Study for the Napa County Region

January 1991

JMM James M. Montgomery
Consulting Engineers, Inc.

Napa County Flood Control and Water Conservation District
WATER RESOURCE STUDY FOR THE NAPA COUNTY REGION

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Napa County Flood Control and Water Conservation District
WATER RESOURCE STUDY FOR THE NAPA COUNTY REGION

STUDY SUMMARY

STUDY OBJECTIVE

Provide an in-depth review of the water need/supply relationship for the County's five major municipal areas - American Canyon, City of Napa, Yountville, St. Helena, and Calistoga; rural areas; and agriculture. Based on this review, recommend a program for balancing water needs and supply.

STUDY SCOPE OF WORK

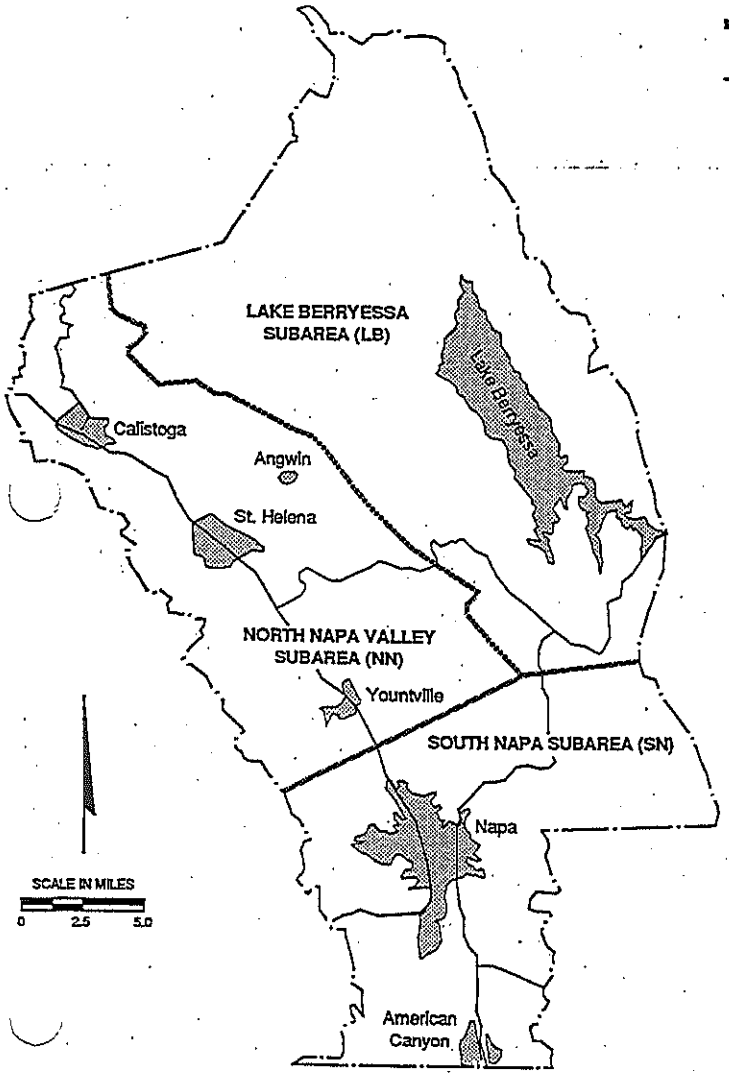
The scope of work contained in Agreement No. 2893-Contract for Engineering Services for Napa County Water Resources Study, approved by the County Board of Supervisors on February 27, 1990, can be summarized as follows:

- Analyze and characterize existing (1989) water use by principal user categories.
- Estimate future water needs to the year 2020 in five-year increments.
- Summarize water quality requirements of users and quality of supplies.
- Analyze the availability of existing water supplies, including groundwater, river diversion, local reservoirs, imported water, and reclamation.
- Discuss the water need/supply relationship and recommend a program for balancing water needs and supplies.

WATER NEEDS

Water use in Napa County primarily satisfies agricultural and municipal needs, with a small percentage of use by industry and rural areas. To facilitate balancing water needs and supplies, existing water use and future needs were established at several levels - by user; by subarea; and County-wide. Users include the five major municipal areas, rural (Angwin and remainder), and agricultural (vineyards and other). Three subareas were defined - North Napa Valley (NN); South Napa (SN); and Lake Berryessa (LB). The subareas and user groups are shown in Figure S-1, along with the water needs methodology.

An extensive data collection effort was undertaken in association with members of an Advisory Committee. The effort consisted of a review of general plans, master water supply plans, water management plans, and previous investigations; a review of agricultural water and land use practices; acquisition of historical water production and metered water sales



NAPA COUNTY MUNICIPALITIES AND SUBAREAS

RECENT HISTORICAL USE (1985-89)

HOW MUCH PER YEAR?

- Municipalities
  - Production Records for:
    - American Canyon CWD
    - City of Napa
    - Town of Yountville
    - City of St. Helena
    - City of Calistoga
- Rural
  - Angwin Area: Production Records:
  - Remainder: Estimate based on population x per capita use
- Agricultural
  - Vineyards
    - Irrigation requirements = 1987 DWR acreage x applied water based on region (Ac-Ft/Ac/Yr)
      - South Napa Subarea = 0.4
      - North Napa Valley Subarea = 0.5
      - Lake Berryessa Subarea = 0.6
    - Frost Protection = DWR acreage x 0.33 Ac-Ft/Ac/Yr
    - Heat Protection = DWR acreage x 0.17 Ac-Ft/Ac/Yr
  - Other Agriculture
    - Pasture - 4.0 Ac-Ft/Ac/Yr
    - Deciduous - 2.0 Ac-Ft/Ac/Yr
    - Truck Crops - 2.4 Ac-Ft/Ac/Yr
    - Grain - 1.2 Ac-Ft/Ac/Yr.

UNIT WATER USE

CHARACTERISTICS?

- Variation in Use
- Unit Use
  - Per Capita
  - Per Acre
- Extent of Conservation

WILL CURRENT CHARACTERISTICS CONTINUE?

- Greater Density
- More Conservation
- Change in Industry
- Change in Crops
- System Improvements

FUTURE WATER NEED

How do local and regional planning entities envision future distribution of population and land use within Napa County?

- Selection of Policies
- Regional Economy
- Land Capabilities

Municipalities

- Residential/Commercial/Public
  To year 2005, ABAG population projections x per capita use.
  To year 2020, California Department of Finance population projections x per capita use.
- Industrial
  General/Specific Land Use Plans for years 2000/10. Acreage of water use category x unit use (Ac-Ft/Ac/Yr)

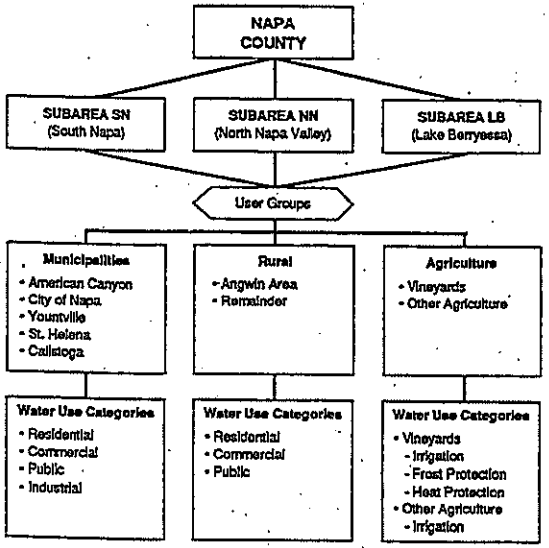
Rural

To year 2005, ABAG population projections x estimated per capita use.
To year 2020, California Department of Finance population projections x estimated per capita use.

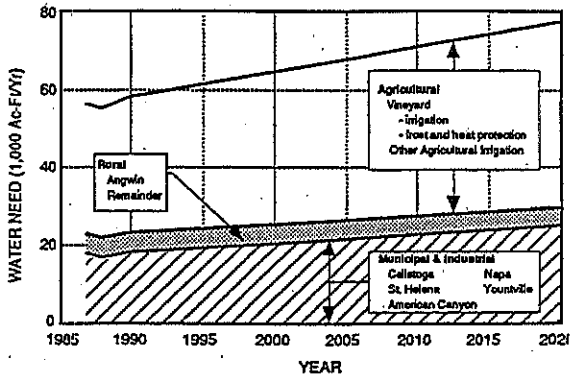
Agriculture

- Vineyards:
  In year 2020, 53,000 Ac (based on Agricultural Resource acreage of County General Plan) x applied water requirement for irrigation and frost and heat protection.
- Other Agriculture: Constant water demand.

WATER USE CALCULATIONS



WATER USER CLASSIFICATIONS



NAPA COUNTY WATER NEEDS

OVERVIEW OF WATER NEEDS METHODOLOGY

FIGURE S-1

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records; collection of historical and projected population data; acquisition of land use maps and data; and consultation with the County Agricultural Commissioner's Office, the U.C. Davis Cooperative Extension, the Farm Bureau, and the Napa County Planning Department. The type of data available was a key factor in establishing the water need methodology.

Future municipal and industrial water needs were based on per capita water consumption factors obtained from 1985-89 water production and sales data applied to population projections made by Napa County, the Association of Bay Area Governments (ABAG), and the California Department of Finance (CDOF). The industrial use component of the per capita factor was reviewed and separated where required to insure that the per capita estimate would be representative of future water use. The adopted per capita factors were also reviewed for extent of in-place conservation and impact of recent drought conditions. The seasonal variation of municipal and industrial water use was also established from the 1985-89 production data. The variation was required to perform operational runs for reservoir yield analyses.

Future rural water needs were based on an estimate of per capita use and population projections. Per capita use was obtained from Howell Mountain Mutual Water Company data and generally-available information for similar rural areas in northern California. The adopted values were 135 and 150 gallons per capita per day for the Angwin area and remainder of Napa County, respectively.

Since records of well pumping and stream diversion are not maintained for public use, an alternative "water duty" approach was utilized to estimate agricultural water needs. Agricultural water use practices have a unique requirement for vineyards, supplemental to vineyard irrigation, from the threat of severe frost and heat conditions. In this study, individual average annual water consumption factors were determined for frost and heat protection, 0.33 and 0.17 Acre-Feet per Acre per Year, respectively. These factors were then added to the irrigation-applied water requirement which varied from 0.4 to 0.6 Acre-Feet per Acre per Year depending upon location (climate), being highest in the warmer Lake Berryessa Subarea. Factors were also established for other irrigated use such as pasture, grain, deciduous, and truck crops. The future agricultural water need was obtained by applying the "water duty" to the acreage by specific crop.

Because of the uncertainty involved in making any projection of future water needs which are based on population and land use, a baseline water need projection and alternative demand scenarios were developed. These scenarios are based on per capita use factors, water duties, population, and land acreage shown in Table S-1. Key scenario conditions are summarized below.

TABLE S-1

NAPA COUNTY WATER NEEDS SCENARIO CHARACTERISTICS

Characteristics	Baseline Projection	Alternative Scenario 1	Alternative Scenario 2
PER CAPITA (gpcd)			
Calistoga	151	136	151
St. Helena	233	209	233
Yountville	223	201	223
Napa	179	161	179
American Canyon	164	148	164
Angwin	135	135	135
Remainder	150	150	150
VINEYARD WATER REQUIREMENTS (ac-ft/ac/yr) (1)			
Frost Protection	0.33	(2)	0.33
Heat Protection	0.17	(2)	0.17
IRRIGATED VINEYARD LAND USE ACREAGE (1)			
South Napa Subarea			
1990	8121	8121	8121
2005	10581	10581	13041
2020	13041	13041	13041
Napa Valley Subarea			
1990	22181	22181	22181
2005	26883	26883	26883
2020	31586	31586	31586
Lake Berryessa Subarea			
1990	2236	2236	2236
2005	3443	2236	5611
2020	4650	2236	8986
POPULATION			
Napa County			
1990	108900	108900	108900
2005	127350	127350	138900
2020	147500	147500	169900

(1) For Alternate Scenarios 1 and 2, the Other Irrigated Agriculture water requirements and land use acreage are the same as the Baseline Projection (see Table 3-2 and Figure 3-3). Vineyard irrigation requirements, also not shown, are not changed for the analysis of Alternative Scenarios 1 and 2 (see Table 3-2).

(2) Conversion from sprinkler systems to wind machines is assumed to occur linearly at a rate such that in the year 2020 sprinkler systems for frost and heat protection are used on 50 percent of the vineyard lands in the North Napa Valley and Lake Berryessa Subareas, with the remaining lands in these subareas utilizing wind machines and other alternatives.

- **Baseline Projection**

  - Per capita use for municipal areas based on the average consumption during the 1985-89 period. The per capita factor for this period of predominantly dry years reflects a conservation - oriented attitude (inherent conservation) deemed to be representative of future use.

  - Population projections from ABAG and CDOF.

  - "Water Duties" for crop irrigation and protection as discussed above.

  - Irrigated crop acreage from Napa County 1989-2005 General Plan Land Use Map, with area dedicated to Agricultural Resource fully developed as vineyards by year 2020 for South Napa and North Napa Valley Subareas, and 50 percent developed in the Lake Berryessa Subarea due to restricted water availability. Frost and heat protection not required for 50 percent of future vineyard lands in the North Napa Valley and Lake Berryessa Subareas due to hillside location.

- **Alternative Scenario 1**

  - Per capita use factors reduced by 10 percent from potential additional water conservation in the incorporated communities and American Canyon.

  - No further growth in current vineyard acreage in the Lake Berryessa Subarea due to limited water availability.

  - Wind machines will replace sprinkler systems for frost and heat protection in 50 percent of vineyards in the North Napa Valley and Lake Berryessa Subareas by year 2020.

- **Alternative Scenario 2**

  - A greater projected population than the ABAG and CDOF estimates based on the 1980-2000 growth rates used in the Napa County General Plan, assuming that the growth rates remain in effect until year 2020.

  - Due to potential rapid development of Carneros vineyards, the acreage designated as Agricultural Resource in the South Napa Subarea is assumed to be fully developed by year 2005, instead of year 2020.

The resultant total County water needs for these scenarios are shown in Figure S-2.

WATER QUALITY

User water quality requirements for municipalities (drinking water), industries, and vineyard irrigation, and quality of sources (local reservoirs, North Bay Aqueduct, Lake Berryessa, Napa River, and four groundwater basins) were summarized. Source quality issues were discussed based on a comparison of source quality parameters with user requirements. The parameters of concern are summarized below by user:

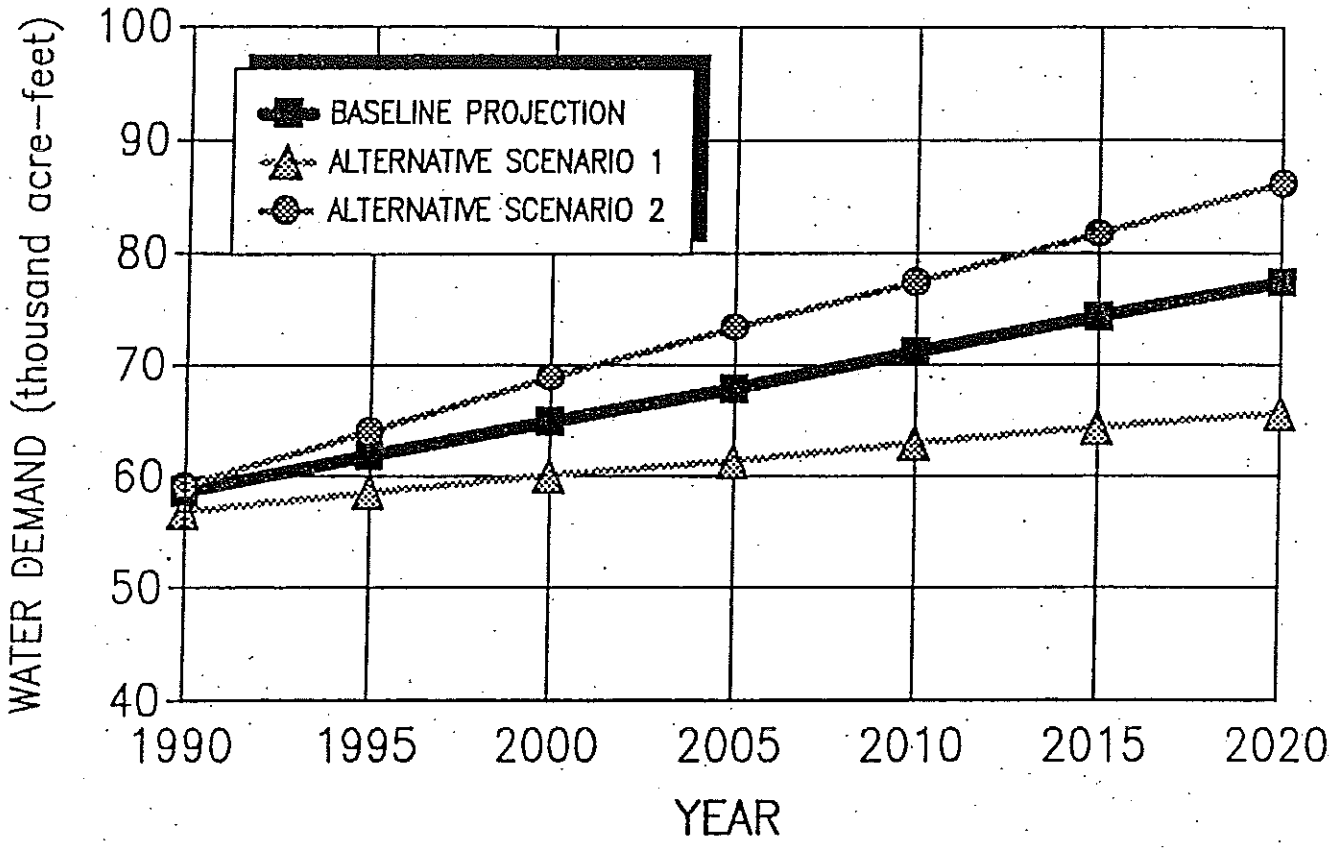
Water Quality Parameter	User		
	Municipal	Industrial	Agricultural
Turbidity	X		
Color			
Odor	X		
Iron and Manganese	X		
Hardness		X	
Nitrates	X		X
Total Dissolved Solids		X	X
Sodium	X		X
Chlorides			X
Boron			X

EXISTING WATER SUPPLIES

Napa County's agriculture, municipalities, and rural areas satisfy their current water needs from five supplies:

- Groundwater
- River Diversion
- Reservoirs
- Imported Water
- Reclamation

The quantity, its buildup (if any) with time, and availability (reliability) of these supplies were analyzed, with a focus of effort on estimating the safe yield of the main Napa (North Napa Valley) groundwater basin and the yield-frequency relationship for the five major municipal water supply reservoirs - Milliken, Rector, Hennessey, Bell Canyon, and Kimball. In the case of groundwater, where three additional basins were also reviewed (Milliken-Sarco-Tulucay, Carneros, and Lake Berryessa), the safe yield represents a long-range amount



TOTAL PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA

FIGURE S-2

JMM

of well pumpage that can be sustained by recharge, avoiding economic hardship (deep pumping) and water quality degradation. In the case of river diversion, the variation in flow from year to year and seasonally for the Napa River were related to the timing of water need for vineyard irrigation and frost and heat protection. For the major local reservoirs, the variation of inflow from their respective watersheds and variation of consumption played key roles in arriving at a yield-frequency relationship. For Lake Berryessa, the water rights and Napa-Solano negotiations were reviewed. For the North Bay Aqueduct (imported) water supply, contract buildup and potential drought cutbacks were summarized. And for reclamation, the plans by the Napa Sanitation District were reviewed.

The yield of existing water supplies resulting from the above analyses and reviews are as summarized in Table S-2.

BALANCING WATER NEEDS AND SUPPLIES

The study estimated the likely range of future water needs through development of a baseline projection and low- and high-demand alternative scenarios, and the availability of individual existing supplies - groundwater, river diversion, reservoirs, imported water, and reclamation. The relationship between year 1990 and 2020 water need and existing supplies was established by user, subarea, and for the County using the baseline water need projection and the following assumptions regarding supplies:

- **Groundwater.** Safe yield extraction rate.
- **River Diversion.** Napa River above Oak Knoll Ave - 10,000 Ac-Ft/Yr. Others - estimated.
- **Reservoirs.** Rector and Hennessey at firm yield (100 percent frequency) rate; Milliken, Bell Canyon, and Kimball at 80 percent frequency yield. Lake Berryessa-1,500 Ac-Ft/Yr based on existing agreement for lakeside use.
- **Imported Water.** North Bay Aqueduct maximum contract entitlement of 6,475 Ac-Ft/Yr in 1990 to 13,695 Ac-Ft/Yr in 2020, with the latter based on a reduced entitlement at 55 percent of the ultimate amount (State delivery capability with existing facilities).
- **Reclamation.** Current reclamation capacity of 200, 314, and 1,622 Ac-Ft/Yr for Calistoga, Yountville, and Napa Sanitation District, respectively.

From a review of the water need/supply relationship for Napa County water users, its three subareas, and the County as a whole, as shown in Table S-3 and Figure S-3, the following observations can be made:

TABLE S-2

YIELD OF EXISTING WATER SUPPLIES

Source	Safe or Firm Yield (Ac-Ft/Yr)	Based on Record Period
Groundwater		
North Napa Valley Basin	22,500	1962-89
Milliken-Sarco-Tulucay Basin	<5,400	---
Lake Berryessa Basin	< 400	---
Carneros Area Basin	< 300	---
Total Groundwater	**28,600 max**	---
River Diversion		
Napa River above Oak Knoll	10,000	1960-88
Reservoirs		
Major Municipal		
Milliken	400	1940-89
Rector	1,200	1940-89
Lake Hennessey	5,000	1940-89
Bell Canyon	480	1940-89
Kimball	110	1949-89
Subtotal Reservoirs	7,190	
Lake Berryessa	1,500	---
Imported Water (North Bay Aqueduct)		
Maximum - 1990	6,745	---
- 2020	24,900	---
Minimum - 1990	5,060	---
- 2020	13,695	---
Reclamation		
Minimum	3,103	---
Maximum	5,943	---

User Group	Adequacy of Existing Supplies 1990	2020
Individual User:		
Municipal and Industrial		
City of Calistoga	Barely Adequate	Inadequate
City of St. Helena	Inadequate	Inadequate
Town of Yountville	Adequate	Barely Adequate
City of Napa	Inadequate	Inadequate
American Canyon CWD	Adequate	Adequate
Rural	Probably Adequate	Probably Adequate
Agricultural	Adequate	Inadequate
Subareas:		
Lake Berryessa (LB)	Adequate*	Inadequate
North Napa Valley (NN)	Adequate	Inadequate
South Napa (SN)	Inadequate	Inadequate
Napa County:	Adequate	Inadequate

* Due to the SWRCB depletion reservation for the Putah Creek area, the right to develop any water supply has been available.

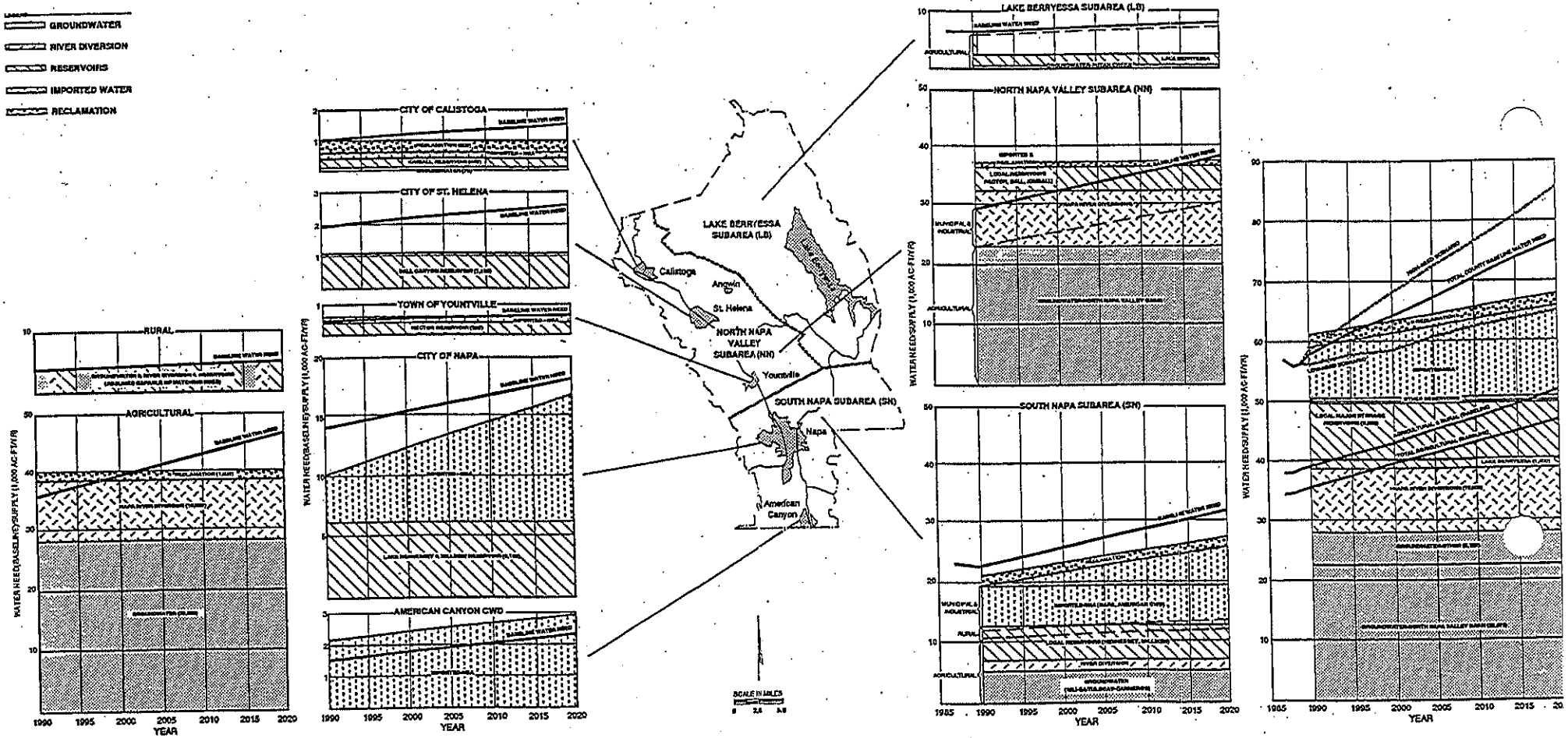
Certain water management issues were addressed in balancing the County's water needs and supplies, as summarized below:

- What is a realistic short-term drought-period cutback in the future water need?
- Can groundwater serve as a potential alternate supply to municipalities, especially during drought periods?
- Have river diversions been maximized through the development of storage?
- Are local municipal reservoirs developed such as to derive the maximum yield from tributary watersheds?
- What supply should be anticipated from Lake Berryessa and who would it serve?

TABLE S-3
NAPA COUNTY WATER NEED/SUPPLY RELATIONSHIP

	Baseline Water Need (Ac-Ft/Yr)							Safe/Firm Yield from Existing Water Supplies										Supply-Need (Ac-Ft/Yr)	
								Ground-Water	River Diversion		Reservoirs			Imported (NBA)		Reclamation	Total			
Water User	1990	1995	2000	2005	2010	2015	2020		Napa	Others	Municipal	Berryessa	Misc.	1990	2020		1990	2020	1990	2020
North Napa Valley (NN) Subarea																				
Municipal & Industrial (M&I)																				
Calistoga	990	1060	1190	1340	1405	1460	1515	75	0	0	400	NA	0	272	275	200	947	950	-43	-565
St. Helena	1935	2195	2275	2380	2495	2595	2690	0	0	0	1200	NA	0	0	0	0	1100	1200	-835	-1490
Yountville	450	490	515	540	570	595	625	0	0	0	325	NA	0	272	275	0	597	600	147	-25
Subtotal M&I	3375	3745	3980	4260	4470	4650	4830	75	0	0	1925	0	0	544	550	200	2744	2747	-631	-2083
Rural(1)	2438	2506	2623	2745	2882	2996	3111	*	*	*	875	NA	*	NA	NA	0	—	—	—	—
								22500*	10,000*								35175	35175	9762	2034
Agricultural-Vineyard	22181	23356	24532	25708	26883	28059	29235													
Agricultural-Other	797	797	797	797	797	797	797													
Agricultural-Total	22978	24153	25329	26505	27680	28856	30032	*	*	*	1500**	NA	*	NA	NA	300	—	—	—	—
Total for Subarea NN	28791	30404	31932	33510	35032	36502	37973	22575	10000	0	4300	0	0	544	550	500	37919	37922	9128	-51
South Napa (SN) Subarea																				
Municipal & Industrial (M&I)																				
City of Napa	13825	14675	15305	15685	16625	17410	18195	0	0	0	6150	NA	NA	4000	10285	0	10150	16435	-3675	-1760
American Canyon	1591	1721	1846	2031	2136	2226	2316	0	0	0	NA	NA	NA	2200	2860	0	2200	2860	609	544
Subtotal M&I	15416	16396	17151	17716	18761	19636	20511	0	0	0	6150	0	0	6200	13145	0	12350	19295	-3066	-1216
Rural	1705	1732	1811	1903	2017	2112	2207	*	*	*	NA	NA	*	NA	NA	0	—	—	—	—
								5700*	1000**	500**			500**				9300	9300	841	629
Agricultural-Vineyard	3248	3576	3904	4232	4560	4888	5216													
Agricultural-Other	3506	3506	3506	3506	3506	3506	3506													
Agricultural-Total	6754	7082	7410	7738	8066	8394	8722	*	*	*	NA	NA	*	NA	NA	1600	—	—	—	—
Total for Subarea SN	23875	25210	26372	27357	28844	30142	31440	5700	1000	500	6150	0	500	6200	13145	1600	21650	28595	-2225	-2845
Lake Berryessa (LB) Subarea																				
Municipal & Industrial (M&I)	0	0	0	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Rural	95	96	101	106	112	117	123	*	NA	*	NA	*	*	NA	NA	0	—	—	—	—
								400*		100*		1500*	250*				2250	2250	-3664	-5744
Agricultural-Vineyard	2460	2802	3144	3486	3828	4170	4512													
Agricultural-Other	3359	3359	3359	3359	3359	3359	3359													
Agricultural-Total	5819	6161	6503	6845	7187	7529	7871	*	NA	*	NA	0	*	NA	NA	0	—	—	—	—
Total for Subarea LB	5914	6257	6604	6951	7299	7646	7994	400	0	100	0	1500	250	0	0	0	2250	2250	-3664	-5744
Total All Subareas	58580	61871	64908	67818	71175	74290	77407	28675	11000	600	10450	1500	750	6744	13695	2100	61819	68770	3239	-8637

NOTES: * Supply available to rural and agricultural, combined - ** Assumed (no detailed information available) - NA - Not available to user - (1) Includes Veterans Home at Yountville.



RURAL & AGRICULTURAL WATER NEED/SUPPLY BALANCE

MUNICIPAL & INDUSTRIAL WATER NEED/SUPPLY BALANCE

NAPA COUNTY MUNICIPALITIES AND SUBAREAS

SUBAREAS

NAPA COUNTY (ALL SUBAREAS)

WATER NEED/ SUPPLY RELATIONSHIPS

FIGURE S-3

JMM

- What can be done about firming up the North Bay Aqueduct supply?
- Can any additional in-County water transfers be implemented?
- What supplemental water supplies might be considered?

Incremental water supplies available from these water management measures are summarized in Table S-4.

WATER MANAGEMENT PLAN

Based upon the water need/supply balance (surplus or deficit for 1990 and 2020,) as shown in Table S-3, and the incremental supply available from alternative water management measures, as shown in Table S-4, it is recommended that the Napa County Water Management Plan consist of the following elements (See summary in Figure S-4):

- Public Information Element. Develop, maintain, and distribute information to County water users regarding:
  - the source of the County's water supplies.
  - current hydrologic conditions in the County and those pertinent to its imported supply.
  - status of State's efforts to meet its North Bay Aqueduct contract entitlements.
  - status of municipal, industrial, and agricultural water conservation efforts.
  - status of wastewater reclamation efforts.

  Consideration should be given to establishing a water deficiency (drought) index that would trigger certain actions to restrain water use and preserve or enhance supplies through transfers or short-term supplemental supplies.

- Water Need Element. At five-year intervals, update the County-wide water needs analysis to track the baseline water use. In addition, encourage discussion on optimum beneficial use; compliance by municipalities with the conservation commitments contained in their urban water management plans and introduction of incentives for water conservation; the use of advanced water-saving vineyard development and irrigation methods; and facilitate increased wastewater reclamation by identifying potential users.

TABLE S-4
INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES

Water Management Measure	Incremental Supply (Ac-Ft/Yr) 1990	2020
Drought-Period Water Use Cutback (25%)		
Calistoga	248	379
St. Helena	484	672
Yountville	112	156
City of Napa	3,456	4,549
American Canyon	398	579
Rural (Total)	947	1,245
Agricultural (Total)	8,888	11,656
Total	14,533	19,236
Groundwater as Municipal Supply		
Calistoga	---	---
St. Helena	---	---
Yountville	---	---
City of Napa	---	---
American Canyon	Not Available	
Total	9,776	2,048
Maximizing River Diversions		
Napa River above Oak Knoll Avenue	---	
Other Streams	---	
Total	5,000	
Maximizing Municipal Reservoir Yield		
Milliken (20-ft dam height increase)	600	
Rector	Minimal	
Lake Hennessey (15-ft dam height increase)	1,500	
Bell Canyon (20-ft dam height increase)	700	
Kimball (40-ft dam height increase)	500	
Total	3,300	
Lake Berryessa Supply	Indeterminate	
Firming Up North Bay Aqueduct Supply (45%)		
Calistoga	0	225
Yountville	0	225
City of Napa	0	8,415
American Canyon	0	2,340
Total	0	11,205

TABLE S-4
INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES
(CONTINUED)

Water Management Measure	Incremental Supply (Ac-Ft/Yr) 1990	2020
In-County Water Transfers		
American Canyon NBA Entitlement	610	546
North Napa Valley Groundwater	9,776	2,048
Total	10,386	2,594
Additional Wastewater Reclamation		
Napa Sanitation District		4,321
Calistoga		200
St. Helena		500
Yountville		100
Total		5,121
New Supplemental Water Supplies		
Local Storage Reservoirs		
Napa River, Off-stream		10,000
Others		1,000
Imported		
Central Valley Project		10,000
Total		21,000

PUBLIC INFORMATION ELEMENT

Develop, maintain, and distribute information regarding the water resources of Napa County:

- ☐ Supplies - groundwater, river diversion, local reservoir storage, imported water, wastewater reclamation.
- ☐ Current Hydrologic Conditions - Drought Index
- ☐ Status of North Bay Aqueduct Entitlements
- ☐ Status of Water Conservation Efforts
- ☐ Status of Wastewater Reclamation Efforts

WATER NEED ELEMENT

Update County-wide water needs analysis periodically and encourage the continuation of existing and implementation of additional water conservation measures.

- ☐ At five-year intervals update baseline water needs estimate and alternative demand scenarios.
- ☐ Analyze optimum beneficial use of stored, imported, and groundwater.
- ☐ Encourage compliance with State-mandated urban water management plan commitments on water conservation.
- ☐ Encourage implementation of incentives to promote conservation with a focus on urban turf and landscaping.
- ☐ Encourage agriculture to use advanced vineyard layout and water-saving methods such as moisture tracking and drip irrigation.

WATER SUPPLY ELEMENT

Take the lead role in making arrangements and pursuing opportunities in resolving the County's near-term and long-term water need-supply imbalances

NEAR TERM ACTIONS (Next Five Years)

- ☐ Develop an automatic drought action triggering mechanism (drought index) that would signal a staged program to restrain water use and enhance supplies.
- ☐ Inventory wells or well sites which could be used to supplement municipal water supplies during droughts.
- ☐ Inventory non-municipal water storage capacity along the Napa River to establish diversion capability. Review and summarize existing Napa River diversion water rights.
- ☐ Confirm potential transfers among North Bay Aqueduct contractors within the County.
- ☐ Negotiate multi-year agreement with water surplus-agency to supplement NorthBay Aqueduct entitlement through 1995.
- ☐ Summarize and update the cost of potential existing municipal reservoir enlargements previously studied.

LONG-TERM ACTIONS

- ☐ Sponsor additional investigation of County's smaller groundwater basins to refine yield estimate.
- ☐ Track exploration of new wells by municipalities and wineries.
- ☐ Insure that County use permits demonstrate the adequacy of water supply and retain drainage on site to encourage groundwater recharge.
- ☐ Negotiate with Solano County to resolve Lake Berryessa water allocation.
- ☐ Serve as lead agency in firming up the North Bay Aqueduct supply through a long-term contract with surplus water-agency and extension of supplemental Central Valley Project water into Napa County. Review North Bay Aqueduct conveyance capacity and feasibility of additional terminal storage.
- ☐ Encourage the implementation of wastewater reclamation by the Napa Sanitation District for turf irrigation in the south-Napa and American Canyon area.
- ☐ Review offstream storage potential if unused Napa River flows are available.
- ☐ Investigate the advantages of conversion of the Flood Control and Water Conservation District into a County Water Agency.

NAPA COUNTY
WATER MANAGEMENT PLAN

FIGURE S-4

JM

- Water Supply Element. Based on the Water Resource Study, the following guidelines are offered to the District in resolving near-term and short-term imbalances between County water needs and supplies:

  - Water conservation has a very significant impact on getting through drought periods.

  - Adequate groundwater reserve is available in the North Napa Valley Basin for short-term municipal use during drought periods.

  - Off-stream storage is the key to Napa River diversion capability. The total current storage capacity is not well documented.

  - Some opportunities exist for near-term transfers of water among the County's North Bay Aqueduct contractors.

  - Near-term, multi-year arrangements for water are needed to supplement the County's current North Bay Aqueduct entitlements.

  - There are opportunities at Kimball, Bell Canyon, and Milliken to enhance the existing water supply by dam enlargement, although such enlargements would be very costly.

As far as future activities with regard to water supply, it is recommended that the District consider the following:

- refine the safe yield estimates of the smaller groundwater basins (Milliken-Sarco-Tulucay, Pipe/Capell Valleys, and the Carneros area.

- track exploration for new wells by municipalities and wineries.

- undertake an inventory of non-municipal storage facilities with special emphasis on Napa River diverters, using a follow-up on the winery questionnaire conducted during the current study. Summarize riparian and appropriative river water rights. Review offstream storage potential if unused Napa River flows are available.

- for County development use permits, insure that drainage is retained on site to encourage groundwater recharge, and that adequacy of the water supply is fully demonstrated.

- negotiate with Solano County for allocation of the Lake Berryessa water rights considering the needs and supplies of the Lake Berryessa Subarea as discussed in this study.

- serve as the lead agency in firming up the North Bay Aqueduct supply so that full entitlement will be available.

- encourage the implementation of Napa Sanitation/American Canyon Water District's reclamation plans at the joint Soscol Wastewater Plant.

- investigate the advantages of conversion of the District into a county water agency as water supply consumes an ever-increasing share of the District's activities.

SECTION 1

STUDY OBJECTIVE AND SCOPE

As the existing water supplies of Napa County reach full utilization, and the water needs of the County's municipalities and agriculture continue to go up, formulating practical solutions to the water needs - supply balance is best achieved by a regional, County-wide review of longer-range water needs and alternative water management strategies. Napa County Flood Control and Water Conservation District (County) has evolved as the sponsor of the study since it is the prime regional contractor for supplemental water from the State via the North Bay Aqueduct. Further, the County is the negotiating agency for Solano Project (Lake Berryessa) water, and is the logical requestor of potential uncommitted Central Valley Project (CVP) from the Bureau of Reclamation.

Specifically, the objective of this study is to provide an in-depth review and future projection of water demands and supplies for all of Napa County, with incremental 5-year projections between the years 1990 and 2020 for municipal, industrial, and agricultural users. Although numerous studies have been conducted over the years on various aspects of water needs and supplies, the last comprehensive, County-wide assessment was conducted nearly 30 years ago.

The scope of work of Agreement #2893 - Contract for Engineering Services for Napa County Water Resources Study, approved by the County Board of Supervisors on February 27, 1990, consists of the following series of tasks:

Task	Description
1	Summarize Existing Water Use
2	Characterize Existing Water Use
3	Estimate Water Needs to Year 2020
4	Summarize Existing County Water Supplies
5	Analyze Demand - Supply Relationship
7	Discuss Plans for Supplemental Water Sources
8	Recommend a Program for Balancing Water Needs and Supply
9	Meetings and Reports

Section 1

Study Objective and Scope

Report Section	Title	Task Covered
2	Description of Study Area	----
3	Water Needs	1,2,3,4
4	Existing Water Supplies	5
5	Water Quality	4,5
6	Balancing Water Needs and Supplies	6,7,8

In order to coordinate the study work with the County's primary water users, an Advisory Committee was formed, consisting of the following:

- City of Calistoga
- American Canyon County Water District
- City of Napa
- City of St. Helena
- Town of Yountville
- County of Napa
- Farm Bureau
- Vintners Association
- United Napa Valley Associates/Sierra Club

The input of Advisory Committee members is hereby acknowledged.

SECTION 2

DESCRIPTION OF STUDY AREA

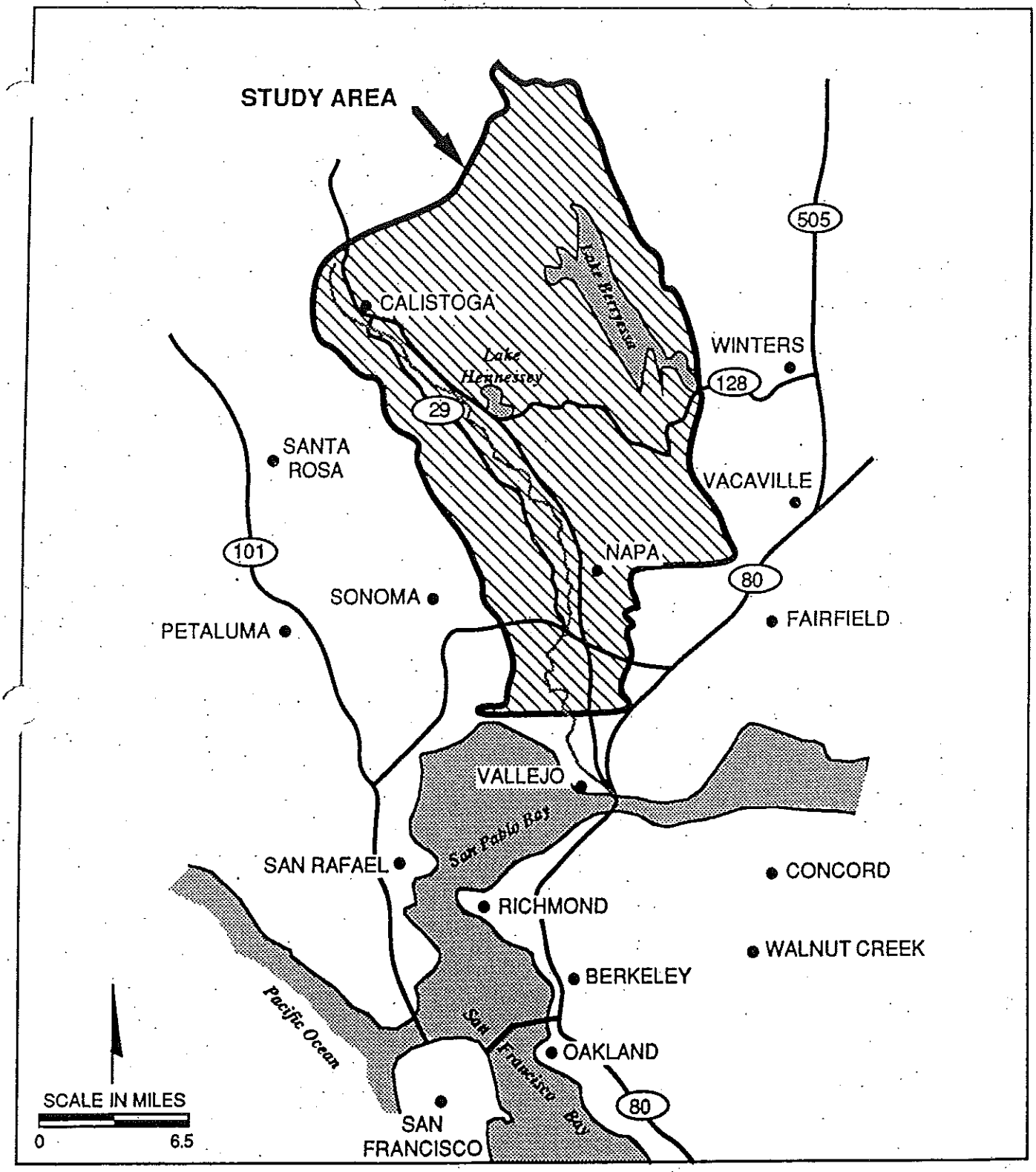
Napa Valley, the key, most well-known portion of Napa County, extends about 35 miles in a gentle northwesterly arc from the shores of San Pablo Bay to the hills above Calistoga, culminating in 4,000 foot-high Mount St. Helena. At the foot of the valley lies the City of Napa; to the southwest, the Carneros region; and to the southeast, the American Canyon area. The valley is surrounded on both sides by mountains, with the Mayacamas on the west side separating Napa from Sonoma County. Beyond the eastside hills lie a series of smaller valleys from Pope Valley in the north to Wooden Valley in the south. Further east lies the large man-made reservoir, Lake Berryessa. (See Figure 2-1 for study area location.)

Napa County is now recognized world-wide for its premium wines and as a popular tour goal based on its scenic vineyards and wineries. It is the Napa Valley floor, between Highway 29 and the Silverado Trail, that dominates as vineyard area, with, however, more and more hillside plantings in recent years. Napa Valley's towns of Napa, Yountville, Oakville, Rutherford, St. Helena, and Calistoga are well known as a result of the valley's wine reputation, with the latter town further recognized as a health resort with natural hot-water geysers, mineral springs and mineralized mud baths. The climate of the valley varies from the cooler, Bay-influenced southern portion such as the Carneros area, to the hotter northern end at Calistoga. The valleys to the east and Lake Berryessa are still hotter. At the southeast end of the County lies the unincorporated community of American Canyon, located adjacent to the City of Vallejo on the border of Napa and Solano Counties.

The County has long recognized the importance of maintaining vineyard land, creating in 1968 the agricultural preserve designation. It is the proper balance between requirements for resource preservation and urban development needs of the County that has occupied many general plan formulations and updates. With 1.5 million County visitors a year and approximately 240 wineries in business or in the approval state, concern about traffic and water recently resulted in new County regulations imposing strict limits on the size and scope of winery expansions and public events. At the southern end of the County, 3,000 acres have been set aside for commercial development including manufacturing, distribution warehouses and office space. Recent announcements indicate a growing commercial and industrial zone. The County and its towns are generally governed by population growth goals, with the greatest urbanization currently taking place in the American Canyon area due to its proximity to Highway 80, the booming city of Vallejo and the recently-relocated Marine World.

For purposes of this study, Napa County has been divided into three subareas:

- North Napa Valley (NN)
- South Napa (SN)
- Lake Berryessa (LB)



STUDY AREA LOCATION

FIGURE 2-1

JMM

Description of Study Area

These subareas were established to facilitate development of the water need and supply balance. For example, the NN Subarea, covering the main Napa Valley north of Oak Knoll Avenue, just outside of the City of Napa, was used by the U.S. Geological Survey in its 1973 groundwater model. The subarea's groundwater basin and the Napa River, which is the main stream within the area, provide a dominant water supply for subarea agriculture. In the case of the Lake Berryessa Subarea, the lake's watershed is the basis of water right reservations associated with construction of Lake Berryessa.

Within each subarea, water needs by user group (agriculture, municipal and industrial, and rural) and appropriate supplies will be brought into balance, to the greatest extent possible, before inter-subarea water transfers are considered.

SECTION 3

WATER NEEDS

Water use in Napa County primarily satisfies agricultural and municipal needs, with a small percentage of use by industry and rural areas. The purpose of this section is to present existing water use (1989) and projections of future water needs to the year 2020 for Napa County. The uses are separated into four primary categories:

- Municipal and Industrial
- Rural
- Vineyard
- Other Irrigated Agriculture

Municipal and industrial users rely primarily on local reservoirs and the North Bay Aqueduct, with a small percentage of supply coming from groundwater. Groundwater pumping and diversions from the Napa River and its tributaries, as well as numerous streams and creeks in the Lake Berryessa watershed, supply water to the other three user categories.

The remainder of this section is organized as follows:

- **Data Collection.** This section discusses the data collection effort conducted for the water needs analysis.

- **Methodology.** This section provides a description of how existing water use and future water needs are estimated for this report.

- **Analysis of Existing (1989) Water Use.** This section presents the existing water needs (1989) for the four major water use categories. The characteristics of water use are also presented for each group; this provides the basis for projecting future water needs, and conducting operations studies of supply sources

- **Future Water Needs.** This section presents estimates of water needs projected to the year 2020. Projections are made in five-year increments according to the water user groups mentioned above. In addition, alternative scenarios are considered which provide a range of likely water needs, accounting for potential variations in the adopted water use characteristics, population growth, and land use development.

DATA COLLECTION

An extensive effort was made to collect data pertaining to water use practices and requirements, population projections, and existing and future land use plans, all of which are desirable for a water needs evaluation. The data collection effort consisted of: a review of

general plans, master water supply plans, water management plans, and previous investigations; a review of agricultural water and land use practices; acquisition of historical water production records and metered water sales records; collection of historical and projected population data; acquisition of land use maps and data; and consultation with the Agricultural Commissioner's Office, the U.C Davis Cooperative Extension, the Farm Bureau, the Napa County Planning Department and the Advisory Committee, a panel consisting of experts in the areas of water and land use in Napa County.

As is common with these types of studies, the available data is not as complete as would be desired and it is not always in a consistent format. From inspection of the database, the following observations were made:

- Historical water production data for the City of Calistoga, the City of St. Helena, the City of Napa, the Town of Yountville, and American Canyon area are available. Recent data for the community of Angwin is not readily available;

- Metered water sales records are not readily available for the entire historical period 1985 through 1989, nor for all the communities; this is a reflection of the water rate structure of the communities;

- Industrial water use supplied by municipal sources is available for some communities, however historical information is limited and the format is not consistent from area to area. Production of water from private sources for industrial uses is not readily available; some information is reported in investigations conducted by the California Department of Water Resources (DWR);

- Very limited data is available for water use by customers served by small water purveyors or water use by rural users on private wells for the historical period 1985 through 1989;

- No measurements of groundwater pumping or surface water diversions for crop irrigation are readily available for the historical period 1985 through 1989;

- Historical and projected population data is available for Napa County from the California Department of Finance (CDOF) for 1985 through 2020. The Association of Bay Area Governments (ABAG) publishes population

projections for Napa County, the incorporated areas, and the American Canyon area for 1985 through 2005;

- Existing land use maps/data (1989) for Napa County and for the communities have not been compiled recently. General Plan land use maps are available;

- Detailed land use maps and land use acreage are available from DWR Land Use Study #88-62. This study, completed in 1988, delineates existing land use (1987) for Napa County on U.S. Geological Survey (USGS) quadrangles; land use is divided into 26 groups -- ten agricultural classifications, six native classifications, six urban classifications, and four recreational classifications. Corresponding acreage for each quadrangle and classifications are also available.

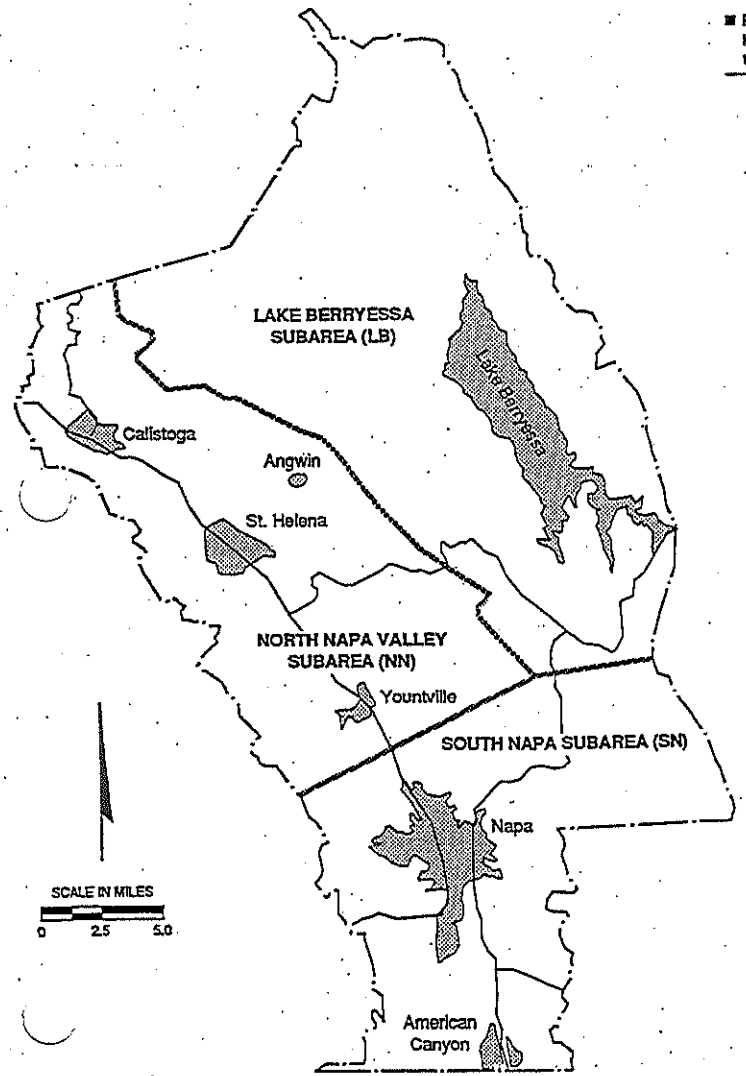
METHODOLOGY

To determine existing and future water needs in Napa County, unit water consumption was analyzed or developed by user group, as discussed below. See Figure 3-1 for an overview of the water needs methodology.

Municipal and Industrial Water Needs Analysis

Municipal and industrial water use for 1989 were determined from an analysis of water production records and metered water sales data maintained by the water service agencies serving communities discussed above.

The most common approach for estimating future water needs of the municipal and industrial sector is the per capita consumption factor. The per capita method is ideal for areas that do not expect dramatic changes in the current composition of the city and its water use characteristics. The data required for this method is the annual water consumed for a service area and the corresponding number of customers served. In this study, water production records for a city, together with historical population data, provided the information necessary to estimate an average annual per capita use for the city. (This assumes the geographic delineation of the water service agency boundary is coincident with the geographic area used for the population estimate). The per capita consumption factor is then used with projected future population data to estimate the corresponding future water need.



NAPA COUNTY MUNICIPALITIES AND SUBAREAS

RECENT HISTORICAL USE (1985-89)

HOW MUCH PER YEAR?

- Municipalities
  - Production Records for:
    - American Canyon CWD
    - City of Napa
    - Town of Yountville
    - City of St. Helena
    - City of Calistoga
- Rural
  - Angwin Area: Production Records
  - Remainder: Estimate based on population x per capita use
- Agricultural
  - Vineyards
    - Irrigation requirements = 1987 DWR acreage x applied water based on region (Ac-Ft/Ac/Yr)
      - South Napa Subarea = 0.4
      - North Napa Valley Subarea = 0.5
      - Lake Berryessa Subarea = 0.6
    - Frost Protection = DWR acreage x 0.33 Ac-Ft/Ac/Yr
    - Heat Protection = DWR acreage x 0.17 Ac-Ft/Ac/Yr
  - Other Agriculture
    - Pasture = 4.0 Ac-Ft/Ac/Yr
    - Deciduous = 2.0 Ac-Ft/Ac/Yr
    - Truck Crops = 2.4 Ac-Ft/Ac/Yr
    - Grain = 1.2 Ac-Ft/Ac/Yr

UNIT WATER USE

CHARACTERISTICS?

- Variation in Use
- Unit Use
  - Per Capita
  - Per Acre
- Extent of Conservation

WILL CURRENT CHARACTERISTICS CONTINUE?

- Greater Density
- More Conservation
- Change in Industry
- Change in Crops
- System Improvements

FUTURE WATER NEED

How do local and regional planning entities envision future distribution of population and land use within Napa County?

- Reflection of Policies
- Regional Economy
- Land Capabilities

Municipalities

- Residential/Commercial/Public
  To year 2005, ABAG population projections x per capita use.
  To year 2020, California Department of Finance population projections x per capita use.
- Industrial
  General/Specific Land Use Plans for years 2000/10. Acreage of water use category x unit use (Ac-Ft/Ac/Yr)

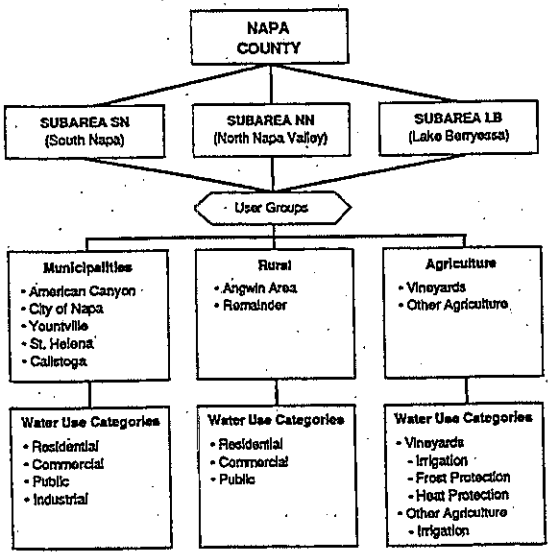
Rural

To year 2005, ABAG population projections x estimated per capita use.
To year 2020, California Department of Finance population projections x estimated per capita use.

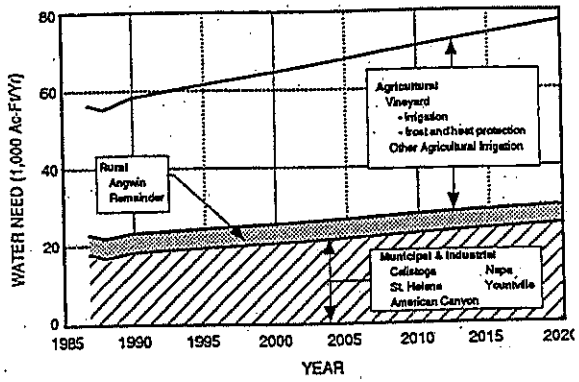
Agriculture

- Vineyards:
  In year 2020, 53,000 Ac (based on Agricultural Resource acreage of County General Plan) x applied water requirement for irrigation and frost and heat protection.
- Other Agriculture: Constant water demand.

WATER USE CALCULATIONS



WATER USER CLASSIFICATIONS



NAPA COUNTY WATER NEEDS

OVERVIEW OF WATER NEEDS METHODOLOGY

FIGURE 3-1

JMM

Section 3

Water Needs

In order for the unit consumption approach to yield valid estimates of future water needs, existing and probable future water use practices must be reviewed. The review considered the current effectiveness of water conservation practices of the municipal and industrial groups, and the likelihood of additional conservation driven by governmental regulation, economics, or technical advancements. The water management plans, mandated by the State, cover a community's goals as far as conservation is concerned. In addition, adjustments were made to the per capita estimates to account for: recent hydrologic conditions; anticipated changes in population density; commercial development; large industrial uses, and tourism.

The characteristics of municipal use in Napa County, consisting of residential, commercial, and public water needs, are not expected to change dramatically over the planning horizon. However, the industrial use component can vary dramatically as a result of the unique water requirements of certain kinds of industrial processes. To guarantee the accurate representation of future water use characteristics, the per capita method was enhanced to accommodate this possibility. The industrial component was separated from the total municipal and industrial water needs prior to calculating the per capita consumption factor.

Future industrial water needs were estimated in one of two ways, based on data availability. If metered water sales records were available, together with corresponding existing land use maps, a water duty for the industrial portion was determined. (A water duty represents the amount of water required per unit area occupied by a particular land use category, expressed in units of acre-feet per acre per year). Estimates of future industrial water needs were then determined by applying the water duty to future land use acreage reserved for industrial development, as stated in the general plans. Alternatively, relying on previous investigations and/or recommendations from Advisory Committee panelists, industrial water use was expressed as a percentage of the total water use. Water needs in the future were then assumed to reflect this same percentage. Any error induced from the special treatment of this industrial factor was presumed to be small since industrial use in Napa County is a relatively small component of the total water needs.

Rural Water Needs Analysis

Existing water use of the rural population can also be determined from a compilation of water production records. However, such records of rural water use are not regularly maintained on a public level. Hence, an estimate of per capita water consumption was used together with historical population data.

A large component of the rural population is made up of individuals associated with wineries situated primarily throughout the Napa Valley. This industry has a water use

component consisting of needs for domestic purposes, bottle washing, tourism, and other incidental uses for processing of wine. A survey revealed that winery operations required relatively little water, with domestic needs requiring the largest percentage. This domestic need was already accounted for in the rural per capita estimate. From the survey, the remaining uses were averaged over the rural population and an additional per capita component included with the overall rural per capita estimate.

The same per capita estimate was used with projected population data to determine future water needs of the rural population. No adjustments were made to the per capita use estimate for calculating future water needs. This assumes that water use characteristics of the rural population will remain constant over the planning horizon.

Agricultural Water Needs Analysis

Generally, irrigation for agricultural purposes is met by pumpage of groundwater, surface water diversions from local streams and creeks, and to a lesser extent water service agencies. Typically, records of agricultural water consumption are not maintained and/or are not easily obtained. The most common approach used to estimate existing agricultural water needs makes use of an applied water requirement factor, expressed in units of acre-feet of water required annually per acre of crop for a particular crop type. The annual water requirement is based on the amount of water needed to meet the evapotranspirative needs of the crop as well as losses incurred in conveyance systems.

Agricultural water use practices in Napa County have a unique requirement for vineyards posed by the threat of severe frost and heat conditions. Water is commonly sprayed over the vineyard to protect the vines from potential damage. If adequate protection against these two factors is not provided, significant economic loss can be incurred. Numerous studies conducted in the past have estimated the seasonal and annual water needs required for frost and heat protection. However, determining an annual average water application for these purposes has been difficult because of the unpredictability due to erratic climatic conditions. In this study, individual average annual water consumption factors were determined for frost and heat respectively based on previous studies. These factors were then added to the irrigation-applied water requirement.

The applied water requirement determined for a particular crop was used, together with crop acreage determined from existing detailed land use maps prepared by DWR, to estimate the existing water needs of a particular crop.

To calculate future irrigated crop water needs, the growth patterns of the different crop types were evaluated, as well as future irrigation practices that may alter the water consumption

factor. Crop development depends on the Napa County general plan land use element, economics, land availability, and water availability. The applied water requirement for each crop was evaluated and adjusted according to potential changes in irrigation practice and irrigation efficiency. Water demand projections were calculated by applying this adjusted applied water requirement to the projected future crop acreage as designated in the Napa County General Plan.

Alternative Scenarios

In addition to the above estimates, alternative scenarios were developed to consider the possibility of changes in projected populations, land use development, and to account for changes in general water use characteristics.

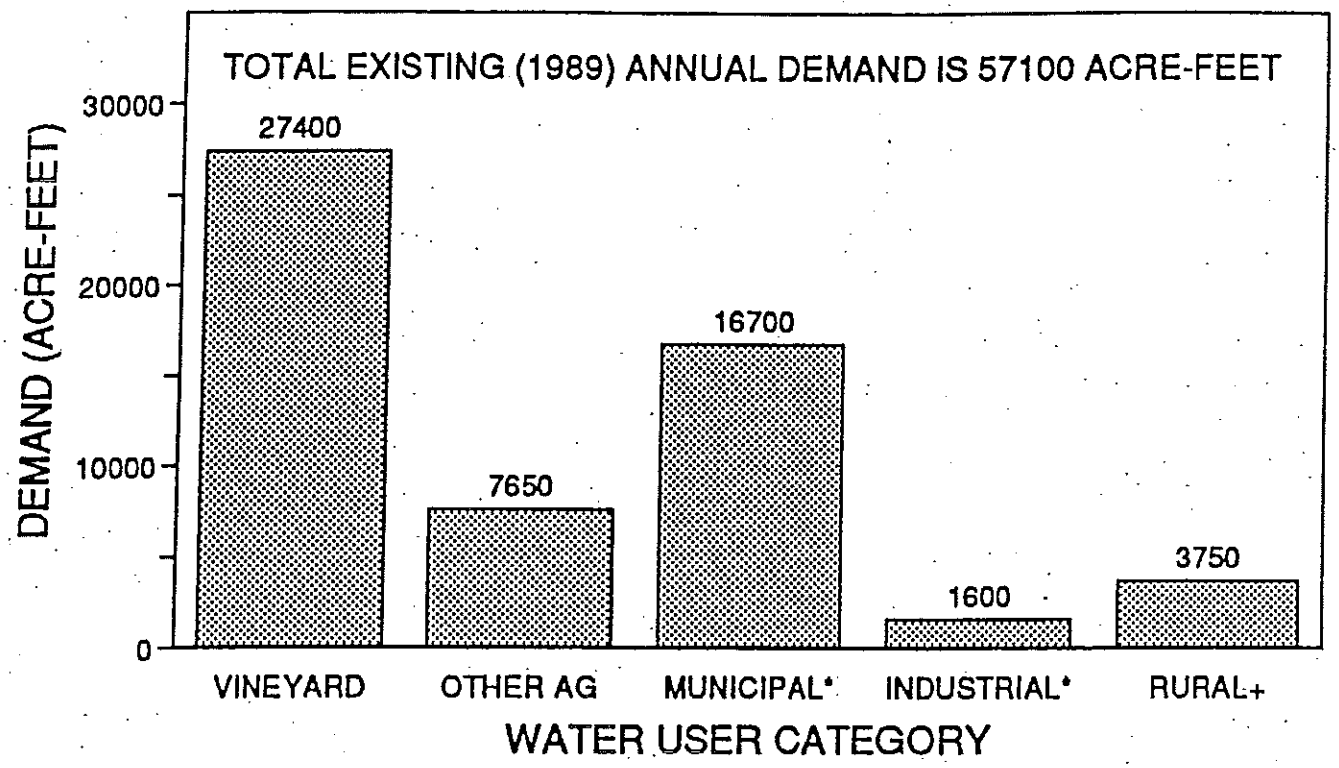
ANALYSIS OF EXISTING (1989) WATER USE

As discussed previously, water use in Napa County has been separated into four categories: Municipal and Industrial; Rural; Vineyard; and Other Irrigated Agriculture. The total current (1989) water use for Napa County is 57,100 acre-feet. The distribution of this total by water use category is shown in Figure 3-2.

Municipal and Industrial Water Demand

The focus of municipal and industrial use is in the urban areas of Calistoga, St. Helena, Yountville, Napa, American Canyon, and Angwin. The residents of these areas make up 81 percent of the total population in Napa County, and are located in the North Napa Valley and South Napa Subareas. Each of these communities, with the exception of Angwin, is served by a single water service agency. The Angwin area receives its water primarily from the Howell Mountain Mutual Water Company, Pacific Union College, and St. Helena Hospital. The water agency boundaries generally coincide with the urban limit lines defined in the general plans, although in some cases a small number of residential and industrial customers exist outside the service area boundaries.

Existing Municipal and Industrial Water Use. Existing municipal and industrial water use was determined using water production records from the individual water service agencies. Additional metered water sales records were available for some cities, though the use of this data is limited since records are incomplete. However, this additional information serves to check and validate the water production data. Each community, as mentioned previously, is treated individually, accounting for the variations in water use practices of the distinctive communities. The total current (1989) combined municipal and industrial use is 18,300 acre-feet (Figure 3-2).



* Includes the cities of Calistoga, St.Helena, and Napa, the Town of Yountville (including the group quarters), and American Canyon.

\+ Includes the rural population, the Angwin area, and winery usage.

EXISTING (1989) WATER USE
NAPA COUNTY, CALIFORNIA

FIGURE 3-2

Section 3

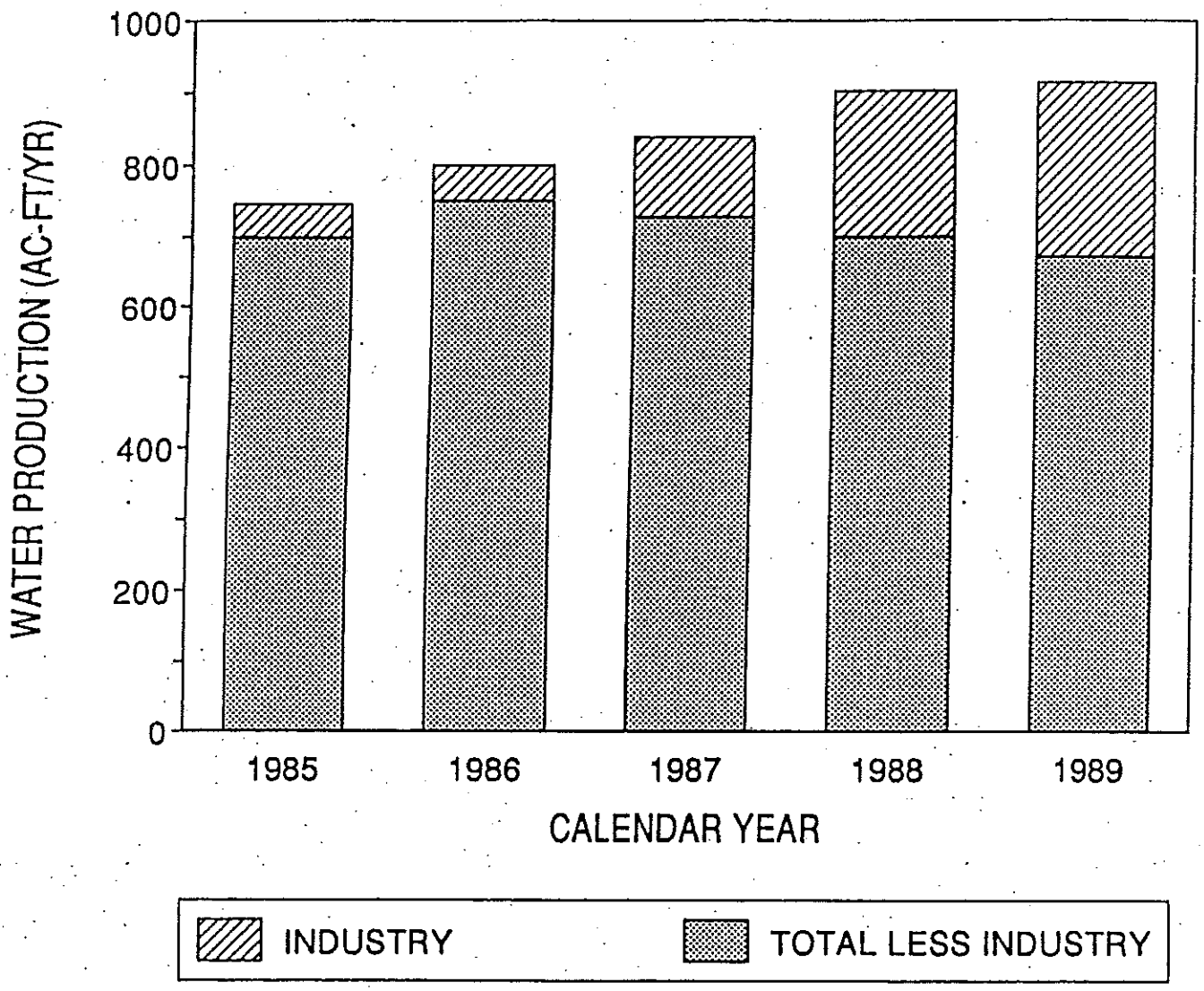
Water Needs

The City of Calistoga, located in the extreme north end of Napa Valley, provides water for residential, commercial, industrial, and public uses within its city limits. The city's water needs are supplied from Kimball Reservoir, the North Bay Aqueduct, and the Fiege well field. The most significant industrial use is for Calistoga bottling works, responsible for producing sparkling mineral water. In recent years this industry has grown tremendously, as is reflected in Figure 3-3 which depicts historical total water production, with industrial use segregated from the total use, and the remainder consisting of residential, commercial, and public uses. The industrial use was determined from 1989 metered water sales records. For 1985 through 1988, industrial water use was estimated from previous work (Heuser, 1989).

The City of St. Helena, located south of Calistoga, near the center of Napa Valley, is served by the Water Enterprise of St. Helena. Water is supplied by Bell Canyon Reservoir, and in recent years, additional water, as needed, has been imported from outside sources according to temporary short term contracts. Currently, groundwater does not provide any supply, though investigation of wells located within the service area are ongoing. The Water Enterprise sells approximately 79 percent of its water within the St. Helena city limits, with the remainder being distributed to residential and commercial use, as well as wineries for wine production outside the service area (Hanson, 1987). In addition, restaurants and overnight accommodations for tourists represent a significant water use. Recent historical use, according to water production records collected from the Louis Stralla Water Treatment Plant, are presented in Figure 3-4. Industrial use was 440 acre-feet in 1987 (Hanson, 1987). The use was assumed to be an average use and was separated from the remaining years as well.

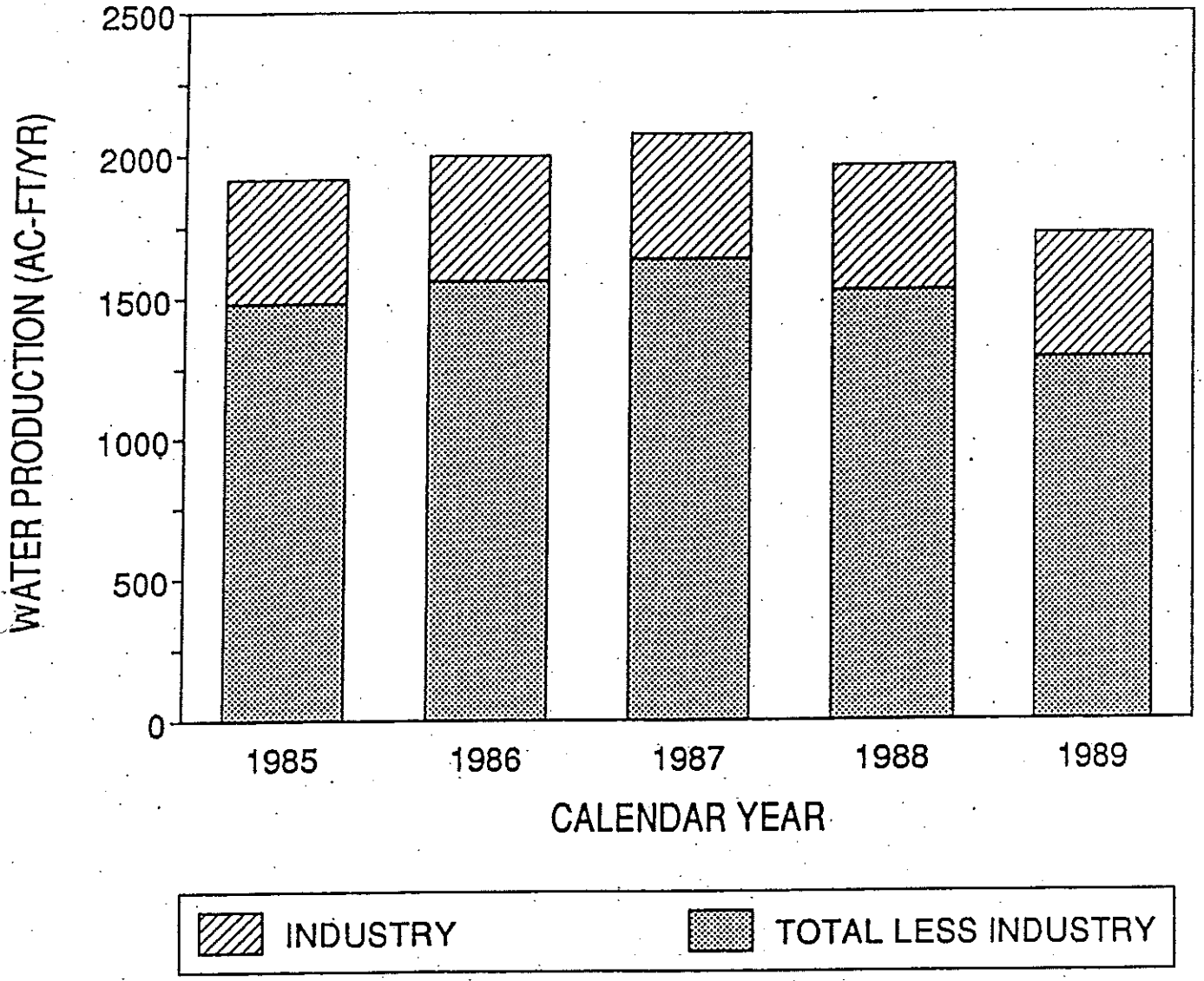
Another residential community within Napa Valley, located north of the City of Napa, is the Town of Yountville. The water service area serving Yountville includes residents in the town limits and excludes those people living in the California Veterans Home. The water supply comes from two sources, the North Bay Aqueduct and Rector Reservoir, through contractual agreements with DWR and the California Department of Veteran Affairs, respectively. The water use in Yountville is dominated by residential and commercial needs; no industrial uses are reported. However, like St. Helena, restaurants and overnight accommodations for tourists represent a significant water use. Water production records for the Yountville water service area are presented in Figure 3-5.

The largest community of Napa County, the City of Napa, is located near the southern-most end of Napa Valley. With a population of approximately 64,500 in 1989, the City of Napa is home to over 60 percent of the total Napa County population. Water needs are currently met by three primary supplies: Lake Hennessey, Milliken Reservoir, and the North Bay Aqueduct. With the exception of two large industrial operations (Napa Pipe and Syar Rock),



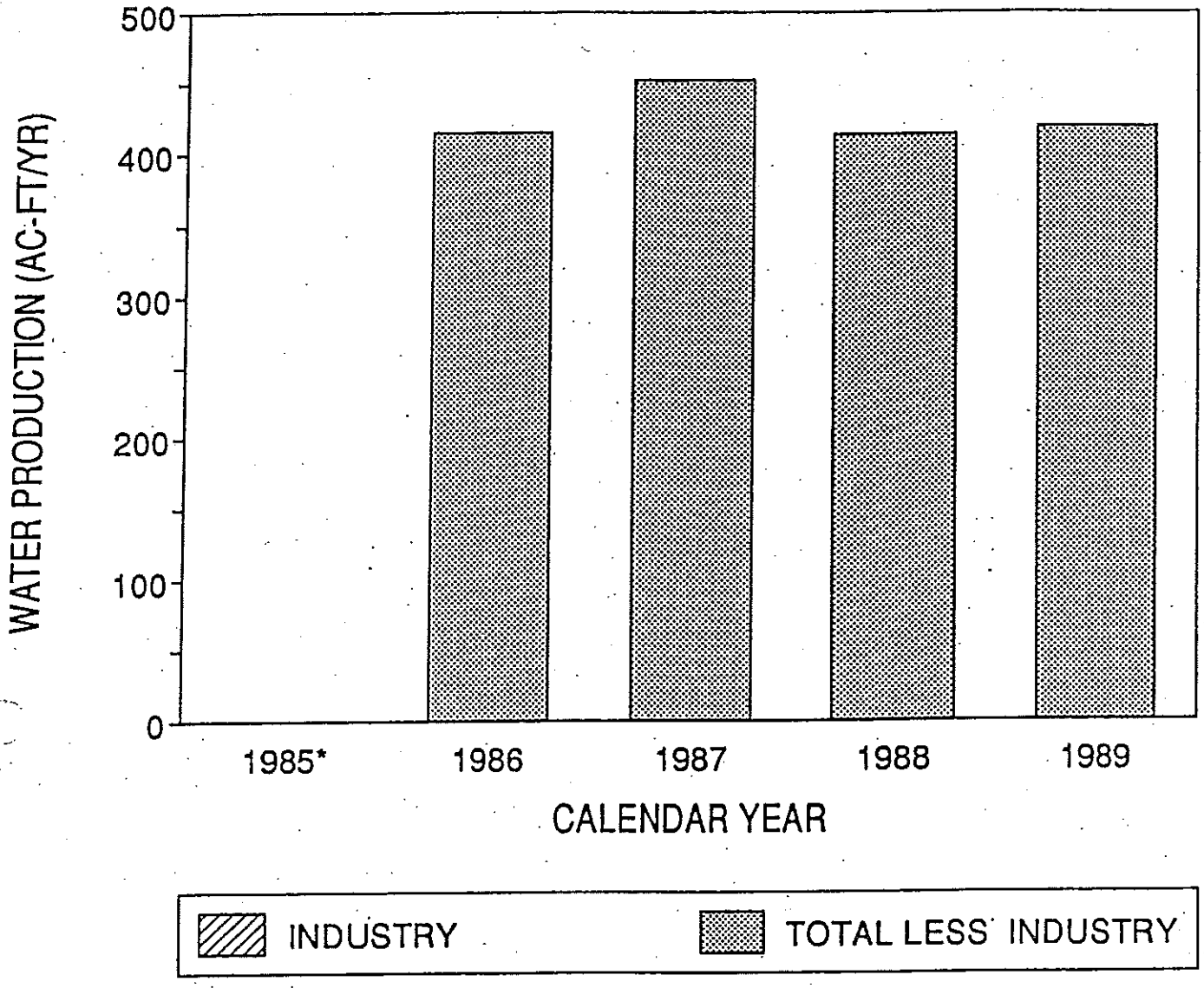
HISTORICAL WATER PRODUCTION FOR THE CITY OF CALISTOGA, NAPA COUNTY, CALIFORNIA

FIGURE 3-3



HISTORICAL WATER PRODUCTION FOR THE CITY OF ST. HELENA, NAPA COUNTY, CALIFORNIA

FIGURE 3-4



* Water Production data not available for 1985

HISTORICAL WATER PRODUCTION FOR THE TOWN OF YOUNTVILLE, NAPA COUNTY, CALIFORNIA

FIGURE 3-5

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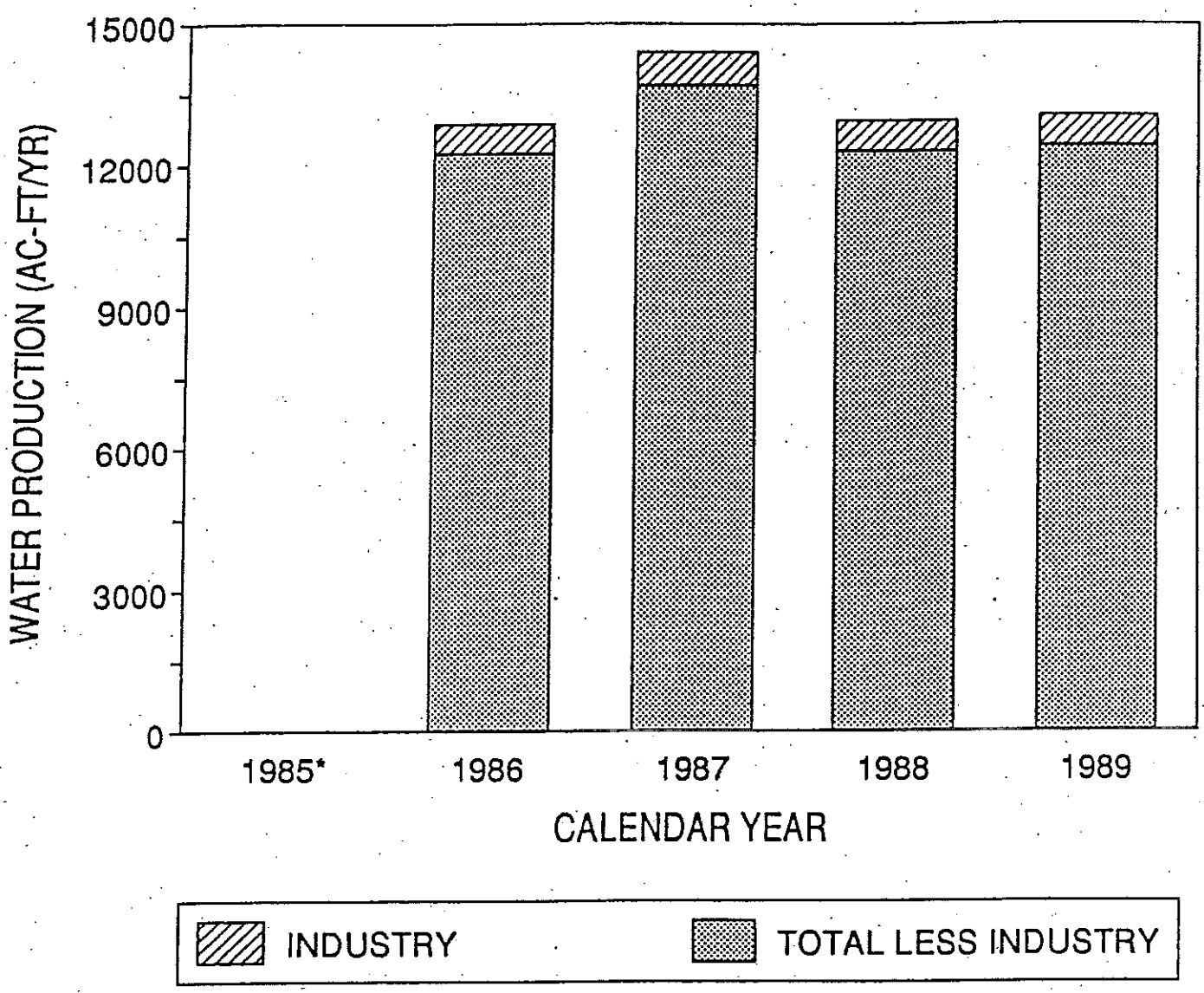
industrial activity is limited to small operations. The City sells surplus water to agricultural customers, primarily vineyards, when the municipal and industrial requirements have been met. This service is provided on a contract basis and is interruptible. The combined recent historical water production records of the three water treatment plants (Hennessey, Milliken, and Jameson) supporting the City of Napa are shown in Figure 3-6. The segregation of industrial use from the total use was based on an estimate that five percent of the total use was for industrial needs. Data from metered water sales records were used to derive this estimate. Industrial use could not be directly extracted from the records due to the water rate structure used by the city of Napa. Consultation with the Advisory Committee enabled the five percent estimate to be determined (City of Napa, 1990).

The American Canyon County Water District (ACCWD) serves a rapidly developing unincorporated community referred to as American Canyon, located in the southern end of Napa County. The Local Area Formation Committee (LAFCOM) has identified a boundary for the area congruent with the ACCWD service area. The service district receives its water supply principally from the State Water Project via the North Bay Aqueduct with minor supplemental supplies from the City of Vallejo and a connection to the City of Napa distribution system. The area is predominantly residential. The steady upward trend of water production, as shown in Figure 3-7, is an indication of recent growth. Figure 3-7 reflects the initiation of a 5-year contract serving an agricultural interest, which, for purposes of this study, was treated as an industrial demand (assumed constant for 1987 through 1989) and separated from the municipal demand. No other industrial uses were reported.

Recent water production data for the Angwin area was not readily available. Instead, estimates of per capita consumption and population were used to determine existing water use. The per capita estimate was taken from a previous investigation conducted for the Howell Mountain Mutual Water Company (Winzler & Kelly, 1985).

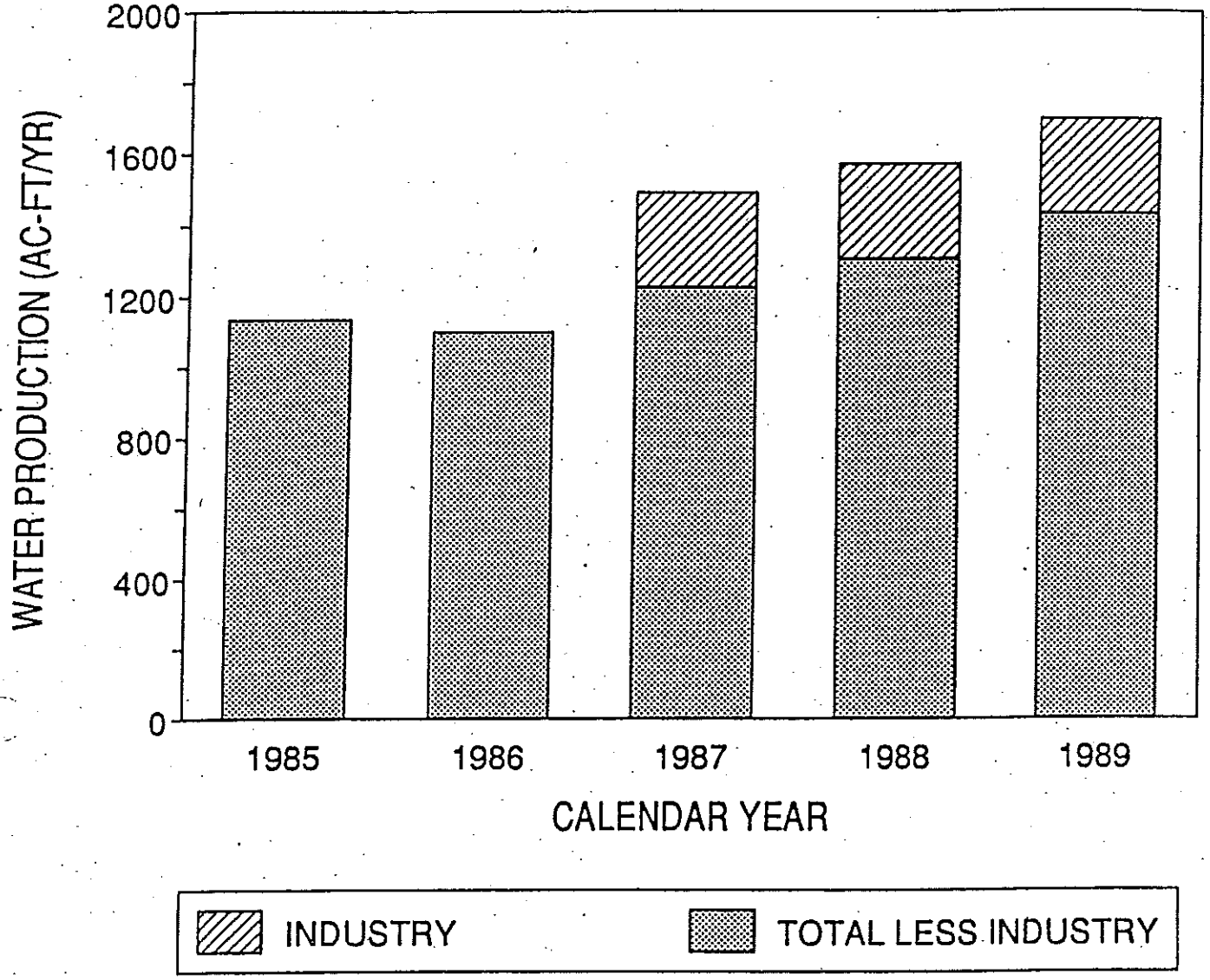
Characteristics of Municipal and Industrial Water Use. For projections to be made of future municipal and industrial water needs, an analysis of the existing water use was conducted, deriving unit consumption factors for each municipality. The historical water production data for each water service agency, together with historical population data obtained from the CDOF and the ABAG, was used to obtain annual per capita consumption in units of gallons per capita per day. The recent drought conditions have affected water use practices in Napa County. To evaluate this impact, data was collected for the period 1985 through 1989. The per capita method is sensitive to large non-residential water use components that have a tendency to fluctuate. For this reason it is important to address any sizable current use that may change dramatically and separate it from the data. The potential for industrial water demands to change independently of population, for example, is accounted for in this case. With the industrial component removed, the per capita method



* Water Production data not available for 1985

HISTORICAL WATER PRODUCTION FOR THE CITY OF NAPA, NAPA COUNTY, CALIFORNIA

FIGURE 3-6



HISTORICAL WATER PRODUCTION FOR THE AMERICAN CANYON COUNTY WATER DISTRICT, NAPA COUNTY, CALIFORNIA

FIGURE 3-7

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is ideal for projecting future water needs of municipalities in Napa County, since water use characteristics of the various cities are expected to remain relatively constant over the planning horizon. The characteristics of recent water use patterns for municipal needs were determined for each of the Napa County communities. These characteristics, expressed as annual per capita water consumption factors, are given in Table 3-1.

Calistoga water production data was adjusted for the recent trend of increased water demand for the bottling works industry. This industrial water use was reflected in metered water sales records for 1989. Per capita use was calculated after this industrial use was removed.

St. Helena also serves a share of its water to nearby wineries during production phases. Based on a recent study, it was assumed that the 1987 industrial use would remain constant over the planning horizon (Hanson, 1987). This community's per capita use is the largest of the group. Two reasons account for this: (1) Tourism is a major component of this area. St. Helena showed the second largest percentage increase in the number of lodging rooms during the 1980 decade (Napa County Conservation, Development and Planning Department, 1990); and (2) delivery system losses are reported as high as 20 to 30 percent (Hanson, 1987). Because the analysis relies on water production data, these losses comprise part of the per capita estimate.

The industrial sector of Yountville is assumed insignificant (Yountville Water Management Plan, 1986), and no adjustment accounting for industrial use was made to the water production data. Like St. Helena, this community also portrayed a high per capita water use estimate relative to the other municipalities. This is primarily due to the large tourist activity in the area, which showed the greatest increase in Napa County during the 1980 decade (Napa County Conservation, Development and Planning Department, 1990).

In the City of Napa, industrial use has historically been a small component of total water needs. It was difficult to separate the industrial water needs due to the water rate structure since industrial contracts were not always distinguished from residential and commercial contracts. A review of data available, reinforced by recommendations from Advisory Committee panelists, resulted in an assumption of a five percent industrial water use. Future land use plans indicate that the composition of the city of Napa's water use characteristics will not change significantly over the planning horizon (City of Napa, 1990).

American Canyon also supports little industry, however in 1987 the service district initiated a single contract for delivering water for vineyard irrigation to the Chardonnay Golf Club (ACCWD, 1990). This use was placed in the industrial use category and, as stated previously, was assumed constant for the years 1987 through 1989.

TABLE 3-1

CHARACTERISTICS OF CURRENT WATER USE

CALENDAR YEAR	CALISTOGA gpcd	NAPA gpcd	ST. HELENA gpcd	YOUNTVILLE gpcd	ACCWD gpcd	ANGWIN gpcd	REMAINDER gpcd
1985	154	N/A	230	N/A	158	N/A	
1986	163	177	242	226	150	N/A	
1987	155	195	254	240	163	N/A	
1988	146	173	237	215	169	N/A	
1989	139	172	200	213	181	N/A	
AVERAGE	151	179	233	223	164	135	150

NOTES:

gpcd = gallons per capita per day
N/A = Not available

CALISTOGA: Production data was adjusted for industrial use. This was necessary due to the rapid growth of "bottling works" which significantly increased overall water use. The resulting per capita estimates reflects a conservation-minded community. Industrial demands were handled by the "Water Duty" approach. A water duty was calculated using existing land use data; this was then applied to future land use acreage provided in the general plan.

ST. HELENA: St. Helena serves a large portion of its water to the wineries during production phases. Based on previous studies (Master Water Plan of 1987 - Hanson) it was assumed that the industrial use of 1987 represented an average annual use. To calculate per capita, this industrial component was separated from the production data; for future projections it was then added back (assuming no future demand increase in this use category).

NAPA: Production data was also adjusted for industrial use in Napa. However, because of limited data it was assumed that five percent of the production data went to industry (based on fiscal year sales data). Industrial use was assumed to make up five percent of future demands as well.

YOUNTVILLE: It was assumed that industry was an insignificant portion of Yountville's annual production. The only adjustment necessary was the separation of the "Group Quarters" population from the rest of the town. Per capita was calculated using the estimates of Town population. A per capita of 50 gpcd was assumed for the Group Quarters indoor use; water duty of 1.5 Ac-Ft/Ac/Yr was applied to 150 acres used by the Veteran's Home (DWR 1987 land use).

ACCWD (AMERICAN CANYON COUNTY WATER DISTRICT): American Canyon also supports little industry, and therefore was not adjusted accordingly. However, in 1986-1987 ACCWD began supplying Chardonnay Golf Course with irrigation water. An estimate of 266 Ac-Ft was then removed from years 1987-1989. Per capita use was then calculated, and the irrigation was carried along as a separate component for future demand calculations.

ANGWIN: Data was not available for the Angwin area, with the exception of a report performed by Winzler and Kelly in 1985 for Howell Mountain Mutual Water Company. A per capita estimate of 135 gpcd was taken from here (119 gpcd for residential use; 12 percent of total use for commercial - 16 gpcd).

REMAINDER (rural): Assumed the per capita use of the rural population of Napa County was 150 gpcd.

As is apparent in Table 3-1, the dry conditions that have prevailed in recent years are partly responsible for the downward trend in the annual per capita use. To evaluate the significance of this on the average per capita use estimate, an average of the period spanning 1985 through 1987 was considered. The net impact is less than a 5 percent increase in future water demands. This is not enough evidence to warrant an adjustment to the per capita use estimates. On the contrary, state wide trends indicate that future per capita use estimates will decline as a result of increased water conservation. This slightly lower per capita estimate inherently reflects this attitude. The primary reasons for historical differences in the individual per capita use estimates was due to large tourism components associated with St. Helena and Yountville relative to the other communities. Calistoga, on the other hand, tends to be lower than the other communities due to a large percentage of trailer parks, which generally have a low per capita use (STA Planning, Inc., 1989). The Napa County General Plan calls for urban development to be restricted to those areas within the urban limit lines. In addition, there are currently no future plans for extending urban limit lines associated with any of the incorporated areas. Thus, the composition of the water user categories should remain relatively constant over the planning horizon warranting the use of the per capita estimate. The average per capita use estimate derived from historical use during the 1985 to 1989 period has been used as the basis for projecting future municipal and industrial water needs.

Production data for the period 1985-89 was reviewed for the five municipal entities to establish the seasonal variation of use. This variation is required for the yield analysis of local reservoirs (See Table 5-5).

Rural Water Use

The rural community represents approximately 19 percent of the total Napa County population, and relies primarily on private wells and small water purveyors for their water supply.

The primary water use is for domestic purposes. However, it is possible that some incidental use occurs as a result of commercial, industrial, and agricultural needs. For purposes of this study it was assumed that a per capita consumption factor would be used to account for these rural water needs. A review of previous investigations indicated an annual per capita use of 150 gallons per capita per day has been calculated in the past (Engineering-Science, Inc., 1971). Using historical population data, the total existing water use for 1989 was calculated (see Figure 3-2). The estimated water use supports an earlier assumption that the rural water use category represented only a small percentage of the total water needs of Napa County -- approximately 6 percent. This reinforces the idea that the

same per capita estimate can be used for projecting the future water needs of this category, with little chance of significant error based on these estimates.

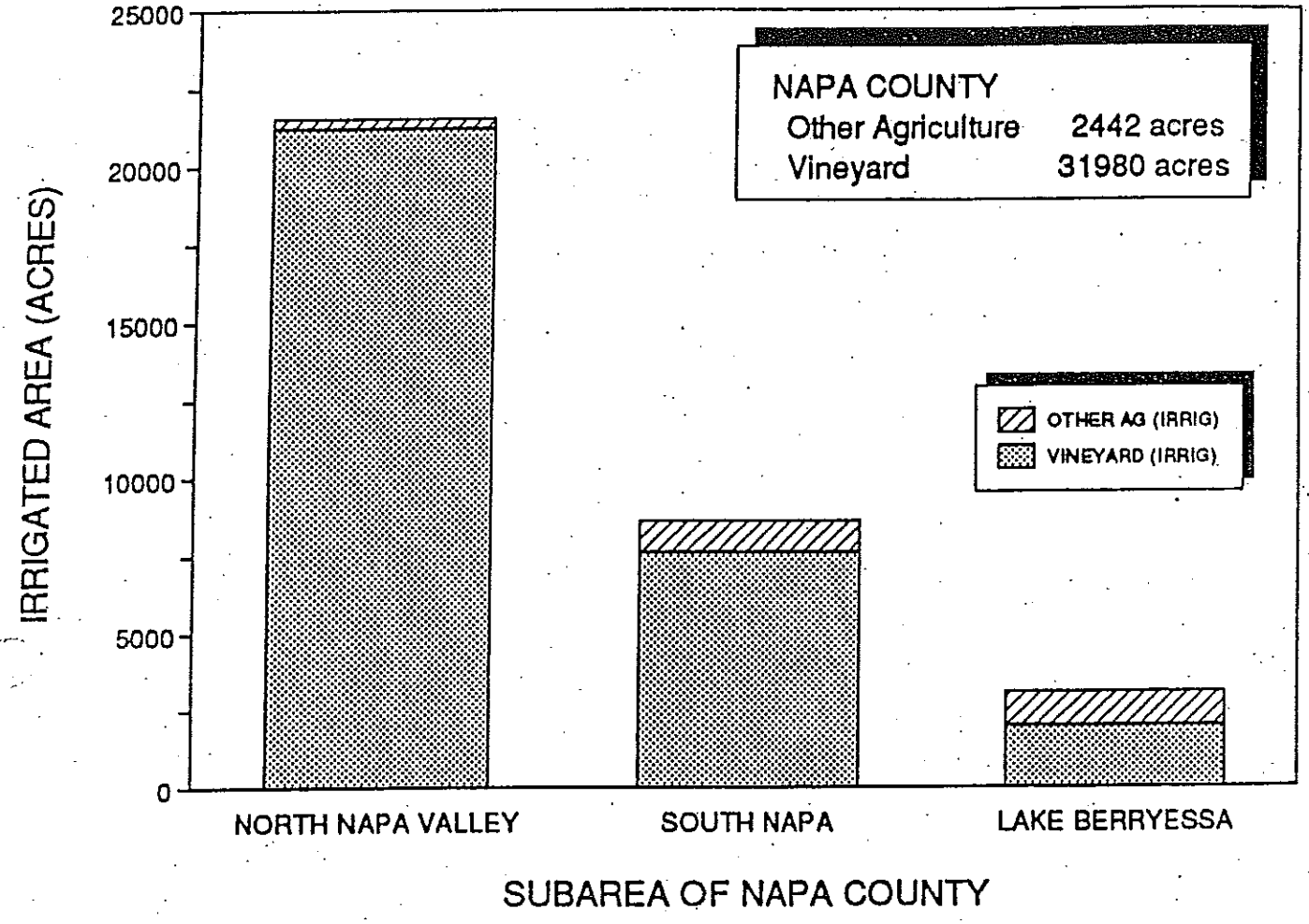
Agricultural Water Use

The largest component of existing water use is the agricultural base of Napa County. The primary crop grown is wine grapes, which account for 92 percent of the irrigated agriculture (1989). Other irrigated crops consist of pasture, grain, deciduous, and truck crops. The irrigated agricultural land use acreage distribution by subarea is shown in Figure 3-8. Crops are irrigated using both groundwater and diversions of Napa River water and its tributaries, as well as a number of small streams and creeks in the Lake Berryessa watershed. A very small percentage of crop water requirements are met by municipal water agencies, on an as-available basis.

Agricultural water use in Napa County is largely devoted to vineyards covering the Napa Valley floor, and increasingly the hillsides, as well as the Carneros area, Jameson and American Canyons, and Chiles and Pope Valley. The annual current water requirements for vineyard is composed of water for irrigation, protection of the vines from spring frost damage, and protection of maturing grapes from heat damage during extremely hot summer temperatures. Several references have addressed vineyard development in Napa County and its water requirements. The key sources of information used in this study included: the Napa County Department of Agriculture, DWR, and the University of California Cooperative Extension Service.

Existing Land Use. A breakdown of crop patterns is the first step in developing estimates of existing and future agricultural water needs. Agricultural land use practices in Napa County were analyzed to identify crop-mix and crop acreage. Significant detail of Napa County agricultural development was made available from a DWR land use survey conducted in 1987 (DWR Land Use Study #88-62). DWR conducts such surveys for California counties approximately every seven years. The maps and data are developed from aerial photographs, supported by frequent spot field checks for accuracy. The survey separates land use into agricultural, native, urban, and recreational classes, with further division within each class. The agricultural class includes ten subclasses, of which Napa County has five:

- Vineyard
- Pasture
- Grain
- Deciduous
- Truck Crops



EXISTING (1989) SUBAREA IRRIGATED AGRICULTURE
NAPA COUNTY, CALIFORNIA

FIGURE 3-8

Because of the dominant presence of vineyards in Napa County, pasture, grain, deciduous, and truck crops were assigned to one group, previously identified as Other Irrigated Agriculture. The land use survey also identifies whether the crop is irrigated or not. By identifying the irrigated acreage for each crop, water requirements can be estimated based on water use characteristics shown in Table 3-2.

As of 1987, the North Napa Valley Subarea contained nearly 70 percent of all developed vineyard land in Napa County (or 21,240 acres). Development is concentrated on the Napa Valley floor, with additional vineyards recently spreading to the hillsides and smaller upper elevation areas such as Chiles and Foss Valleys. Other irrigated agriculture is relatively small, occupying less than 2 percent of the developed irrigated agricultural land in this subarea (or 320 acres).

The eastern portion of Napa County, designated as the Lake Berryessa Subarea, supports a mixture of vineyard and other irrigated agriculture. Existing vineyards are currently limited primarily to Pope and Capell Valley, totaling 1995 acres in 1987. Other irrigated agriculture is approximately 1115 acres.

In the South Napa Subarea rapid vineyard development has occurred in the Carneros Valley, with additional vineyards spread thinly among the Jameson and American Canyon areas, and Wooden and Gordon Valleys. Total lands occupied by vineyards in 1987 was 7630 acres, with 1010 acres devoted to other irrigated agriculture.

Characteristics of Vineyard Water Requirements. In general, irrigated agricultural land requires enough applied water to satisfy the consumptive use requirements not met by precipitation (the consumptive use of a crop is the amount of water required to satisfy the evapotranspirative demands of the crop including evaporation loss from crop foliage and adjacent soils). Annual water requirements for vineyards are unique, however, and consist of three distinctive water use components: (1) irrigation; (2) frost protection; and (3) heat protection. A summary of these applied water demands for each particular crop is given in Table 3-2.

Vineyard irrigation varies geographically and annually depending on climatic conditions. The water requirements for irrigation are commonly expressed in units of acre-feet per acre. Based on a review of previous investigations and consultation with Advisory Committee panel members, an applied water requirement for each subarea was estimated (see Table 3-2). It was assumed that this water requirement was constant over a given subregion.

During the 1970s, not all vineyards were irrigated, depending mostly on grower preference (Metcalf and Eddy, 1973). However, the increased demand for higher yielding vineyards

TABLE 3-2

UNIT WATER REQUIREMENTS BY CROP CATEGORY

Crop Category	Average Annual Crop Water Demand (Ac-Ft/Ac/Yr) North Napa Valley[1]	South Napa[1]	Lake Berryessa[1]	Crops Included[2]
Vineyard[3]				Black and White grapes
Irrigation	0.50	0.40	0.60	
Frost Protection	0.33	0.33	0.33	
Heat Protection	0.17	0.17	0.17	
Total	1.00	0.90	1.10	
Pasture				
Irrigation	4.00	4.00	4.00	Alfalfa, Mixed Pasture, Irrigated Native Pasture
Grain				
Irrigation	1.70	1.70	1.70	Oats, Wheat, Barley
Deciduous				
Irrigation	2.00	2.00	2.00	Apples, Apricots, Bushberries Citrus, Prunes, Nut Crops
Truck Crops				
Irrigation	1.70	1.70	1.70	Flowers and Nursery

(1) Other than Vineyards, the Average Annual Crop Water Demand was assumed constant for each subarea.

(2) Incidental crops not included are Subtropical Fruits and Field Crops - irrigated acreage was insignificant.

(3) Average Annual Crop Water demand is assumed to be the same for Black and White grapes.

coupled with improved irrigation technology has resulted in a majority of vineyards utilizing irrigation water. For purposes of this study, irrigated vineyards acreage was based on irrigated vineyard lands identified by the DWR Land Use Study #88-62.

Between March 15 and May 15, potential frost conditions in the low-lying valleys threaten vineyard development. To combat this problem, sprinkler systems have been installed, and to a lesser extent other systems such as wind machines are also used. Sprinkler systems accomplish the task by coating the leaves, shoots, and clusters with a thin layer of ice which holds the enclosed area at 32°F, as the surrounding temperature continues to drop. A review of previous investigations indicated that water requirements for frost protection varied dramatically from year to year. A rate of 55 gpm per acre has been reported (Metcalf and Eddy, 1973). There is no general agreement of the average number of hours of frost protection required per year. Based on consultation with Advisory Committee members, an agreement of an average 32 hours per year was reached. This translates to approximately .33 acre-feet per acre required annually for frost protection. It was also assumed that frost protection was only a requirement in the low lying-valleys of the North Napa Valley and Lake Berryessa Subareas; the South Napa Subareas proximity to coastal climatic conditions prevents frost from occurring in this region.

The need of water for heat protection occurs primarily in August, to prevent damage to maturing crops for high summer temperatures. The purpose of the water, also commonly applied by sprinkler systems, is to create a cooling action by its evaporative processes. For purposes of this study it was assumed that previous estimates of .17 acre-feet per acre was required on an annual basis. And like frost protection, heat protection was assumed only to be required in the North Napa Valley and Lake Berryessa Subareas.

The three components of water requirements for vineyards in Napa County are based on average annual estimates. The sum of these components represents the total annual water requirement per acre of vineyard, as presented by subarea in Table 3-2. These estimates of water consumption were based on existing (1989) irrigation practices. Currently irrigation is accomplished with sprinkler or drip systems. Trends indicate that conversion to the drip system is occurring throughout Napa County (Farm Bureau, 1990). However, differences in water requirements for sprinkler systems and of drip systems are marginal. Since no significant changes in irrigation practices were foreseen, the total applied water consumption factor was assumed to apply to future conditions.

Characteristics of Other Irrigated Agriculture. Water requirements for the other irrigated agricultural lands consist only of irrigation water used to satisfy the needs of crop consumptive use. Each of the crop classes in this category (pasture, grain, deciduous, and truck crops) has an irrigation-applied water requirement published by DWR (DWR Bulletins

113-3 and 113-4). These factors are presented in Table 3-2, and are assumed to be constant for all of Napa County. Like vineyard irrigation practices, no significant changes in water use practices are expected that would warrant an adjustment to future irrigation water consumption factors.

Existing Agricultural Water Use. The annual water use of a crop can be determined by multiplying the unit water requirement by the irrigated acreage of that crop. A rate of 1.25 acre-feet per acre per year has been previously developed for vineyard crops, and most recently used in the District's 1988 application for supplemental Central Valley Project (CVP) water. Our analysis indicates a net annual average vineyard water requirement of 1.0 acre-feet per acre for North Napa Valley Subarea, and 1.1 acre-feet per acre for Lake Berryessa Subarea, and .9 acre-feet per acre for South Napa Subarea. Applying the factors shown in Table 3-2 to the acreage shown in Figure 3-3 results in a total vineyard requirement of 27,400 acre-feet in 1989 and 7,650 acre-feet for Other Irrigated Agriculture (see Figure 3-2).

FUTURE WATER NEEDS

Water needs to the year 2020 have been determined for Napa County and three subareas: North Napa Valley, South Napa, and Lake Berryessa. The conditions and assumptions relative to future land use and population growth were reviewed in Advisory Committee meetings held throughout the study. The future water need projection made under these conditions and assumptions is referred to as the Baseline Projection. Because of the uncertainty involved in making any projection, alternatives to the Baseline Projection were also developed and are called Alternative Scenario 1 and Alternative Scenario 2. The purpose of these alternatives is to provide a range of likely future water needs, accounting for the possibility of variations in water use characteristics, population growth, and land use development.

The year 2020 was requested by the County as the planning horizon for this study. The 30-year period, from 1990 to 2020, represents a reasonable period for planning and implementing any measures to bring the County's water needs and supplies into balance.

ABAG and CDOF population projections and the Napa County General Plan, along with the community General Plans, were used to establish the population and acreage of specific land use categories to the year 2020. The demand at year 2020 and at five year increments from 1990 were established through application of the unit consumption factors for municipal, industrial, and rural water needs, and the unit water requirement for agriculture.

The conditions underlying the baseline projection and the two alternative scenarios are summarized below. Refer to Table 3-3 for a summary of the characteristics.

Conditions of Baseline Projection

The conditions agreed upon for projecting water needs for Napa County to the year 2020 are described for each water use category below.

Municipal/Industrial and Rural Water Needs. Municipal/industrial and rural water needs were calculated using per capita use estimates (gallons per capita per day) and projected population data. Estimates of per capita use were developed from an analysis of production and population data collected for the historical period 1985 to 1989. Population projections were obtained from ABAG and the CDOF (see Figure 3-9). The following conditions are a result of deliberations carried out with the Advisory Committee panel:

- Characteristics of current water use estimates (i.e. per capita estimates based on an average of the calculated annual per capita use for the historical period 1985 through 1989) were assumed to represent characteristics of future water use conditions.

- The proportionate use of the municipal components (residential, commercial, and public) remains unchanged for the duration of the study period.

- The production data collected for each municipality represents all contracted use (i.e. no major unmetered uses or illegal uses). (It is noted that other uses not metered include fire protection, miscellaneous city use, and system losses).

- Projected population estimates (based primarily on sphere of influence boundaries designated by LAFCOM) are consistent with populations served according to municipal water district boundaries.

Irrigated Agricultural Water Needs. Irrigated agricultural water needs were calculated using irrigation-applied water requirements (acre-feet per acre) and land use acreage for each crop type. Estimates of irrigation-applied water requirements were based on a thorough review of previous investigations focusing on crop water use in the region and recommendations from Advisory Committee members. Existing irrigated crop acreage was determined from a DWR land use survey conducted for Napa County in 1987 (DWR Land Use Study #88-62). Future irrigated crop acreage was determined from the Napa County 1989-2005 General Plan Land Use Map. Figure 3-10 depicts future acreage for vineyard

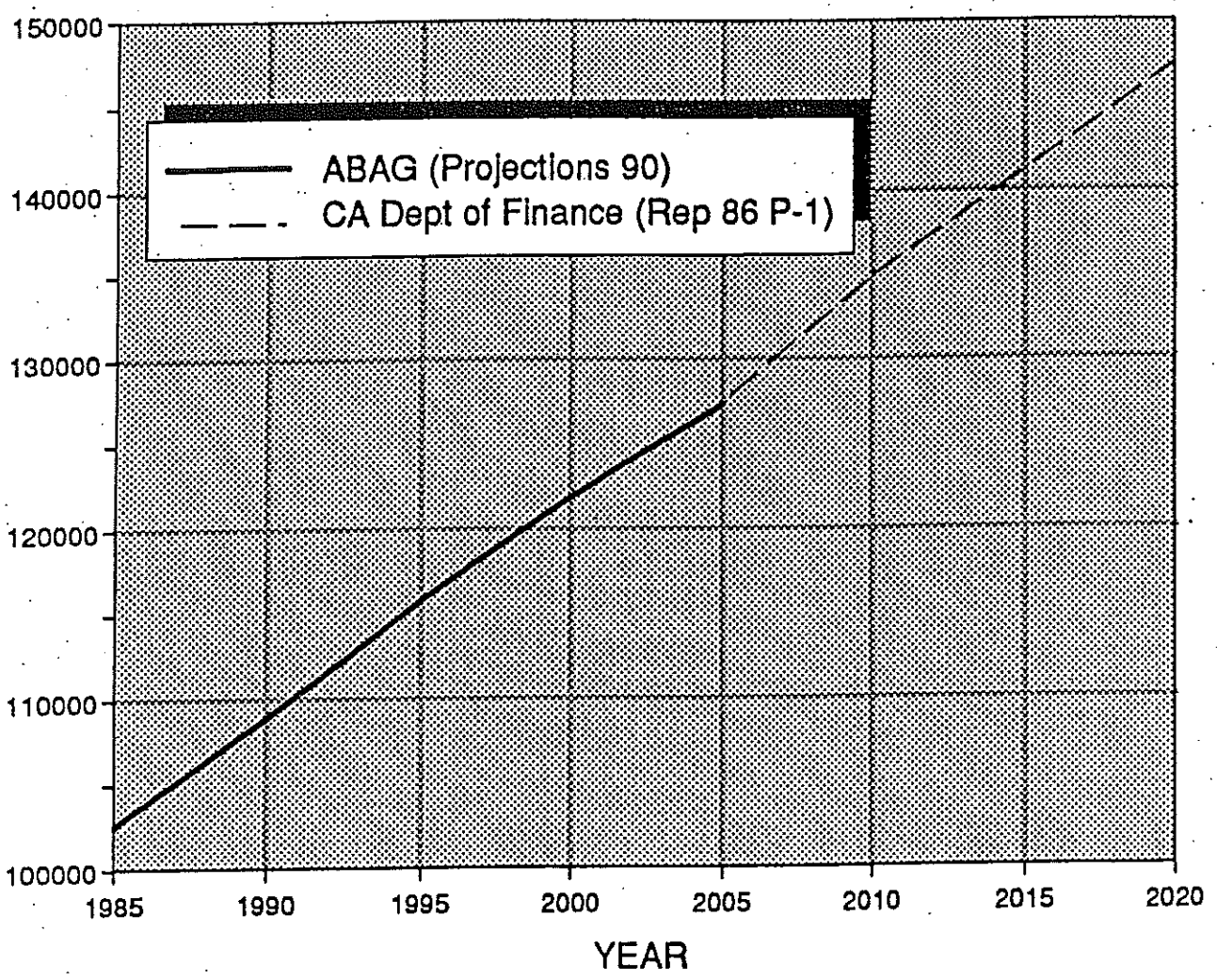
TABLE 3-3

NAPA COUNTY WATER NEEDS SCENARIO CHARACTERISTICS

Characteristics	Baseline Projection	Alternative Scenario 1	Alternative Scenario 2
PER CAPITA (gpcd)			
Calistoga	151	136	151
St. Helena	233	209	233
Yountville	223	201	223
Napa	179	161	179
American Canyon	164	148	164
Angwin	135	135	135
Remainder	150	150	150
VINEYARD WATER REQUIREMENTS (ac-ft/ac/yr) (1)			
Frost Protection	0.33	(2)	0.33
Heat Protection	0.17	(2)	0.17
IRRIGATED VINEYARD LAND USE ACREAGE (1)			
South Napa Subarea			
1990	8121	8121	8121
2005	10581	10581	13041
2020	13041	13041	13041
Napa Valley Subarea			
1990	22181	22181	22181
2005	26883	26883	26883
2020	31586	31586	31586
Lake Berryessa Subarea			
1990	2236	2236	2236
2005	3443	2236	5611
2020	4650	2236	8986
POPULATION			
Napa County			
1990	108900	108900	108900
2005	127350	127350	138900
2020	147500	147500	169900

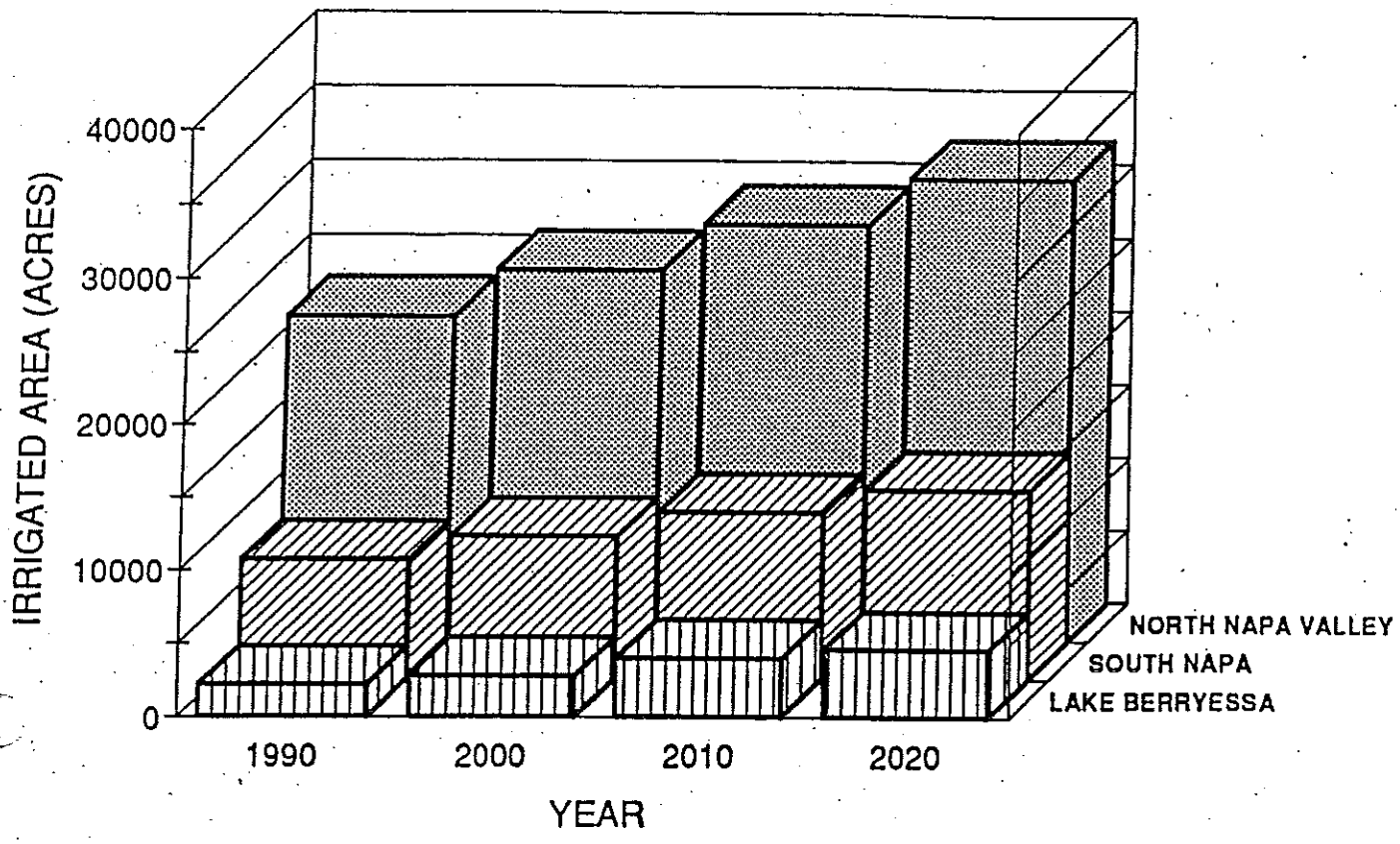
(1) For Alternate Scenarios 1 and 2, the Other Irrigated Agriculture water requirements and land use acreage are the same as the Baseline Projection (see Table 3-2 and Figure 3-3). Vineyard irrigation requirements, also not shown, are not changed for the analysis of Alternative Scenarios 1 and 2 (see Table 3-2).

(2) Conversion from sprinkler systems to wind machines is assumed to occur linearly at a rate such that in the year 2020 sprinkler systems for frost and heat protection are used on 50 percent of the vineyard lands in the North Napa Valley and Lake Berryessa Subareas, with the remaining lands in these subareas utilizing wind machines and other alternatives.



**HISTORICAL AND PROJECTED POPULATION,
NAPA COUNTY, CALIFORNIA**

FIGURE 3-9



PROJECTED IRRIGATED VINEYARD ACREAGE BY SUBAREA, NAPA COUNTY, CALIFORNIA

FIGURE 3-10

lands by subarea. For purposes of this study, it is assumed that the area dedicated to Agricultural Resource would be fully developed as vineyards by 2020 for the South Napa and North Napa Valley, and 50 percent developed in the Lake Berryessa Subarea (special treatment in the Lake Berryessa subarea is a result of restrictions in water availability and recommendations by the Advisory Committee). Vineyard land development was assumed to occur at a linear rate from 1987 to 2020. Acreage devoted to other irrigated crops is assumed to remain constant in each subarea for the duration of the planning period. Irrigated vineyard area, as designated by the DWR 1987 Napa County Land Use Study (Study #88-62), represents lands requiring frost and heat protection (North Napa Valley and Lake Berryessa Subareas only), as well as irrigation. The irrigation-applied water requirement for vineyards is the same over a given subarea. The irrigation-applied water requirement for Other Irrigated Agriculture is the same over the entire county for a given crop type.

Frost and Heat Protection Water Needs. Frost and heat protection of vineyards, assumed to be required in the North Napa Valley and Lake Berryessa Subareas only, is most commonly accomplished with the use of sprinkler systems or wind machines. Application rates for sprinkler systems are based on a thorough review of previous investigations and recommendations from Advisory Committee members. A review of existing vineyard land use indicated that much of the future vineyard development in these subareas will occur on hillsides, regions generally requiring little or no protection from frost and heat. It was assumed that 50 percent of the future land developed as vineyards in the North Napa Valley and Lake Berryessa Subareas will not require frost and heat protection. This is based on a comparison of DWR land use survey maps (DWR, 1987) together with USGS topographic maps and soil classifications identified in the Napa County Soil Survey (Soil Conservation Service, 1977).

Conditions of Alternative Scenario 1

Alternative Scenario 1 incorporated potential changes in water use patterns due to conservation activities and reduction in land use development. The departure from the conditions stated in the Baseline Projection for each water use category is described below.

Municipal/Industrial and Rural Water Need. The communities of Calistoga, Yountville, Napa, and American Canyon have developed water management plans in an attempt to improve overall water conservation. Given full implementation of these plans, water savings in the municipal and industrial sectors are estimated in the range of five to fifteen percent. Since it is not known to what extent these plans have been executed, it was assumed that the per capita estimate for the municipal/industrial water use categories is reduced by ten percent for the incorporated communities and American Canyon. The water demands were

then calculated using the population projections from the Baseline Projection. This reduction does not apply to any of the rural communities in Napa County (refer to Table 3-3). It should be noted that the ten percent reduction in water use is in addition to the five percent reduction inherent in the per capita estimates previously discussed. It was assumed that no reductions in the rural and industrial categories would occur from conservation; because of their relatively small magnitude, any change would be minimal.

Irrigated Agricultural Water Needs. Most vineyard development in the Lake Berryessa Subarea is expected to occur in Pope Valley (Napa County General Plan, November 1986). However, because of extremely limited water rights in this subarea, water needed to support this growth may not be available. Therefore, it was assumed that the estimated vineyard acreage for 1990 in the Lake Berryessa Subarea will remain unchanged for the duration of the study period. The South Napa and North Napa Valley Subareas follow the conditions stated in the Baseline Projection (refer to Table 3-3).

Frost and Heat Protection Water Needs. From numerous discussions with experts involved in the Napa Valley wine industry, a recent trend of conversions from sprinkler systems to wind machines for frost and heat protection has been observed. One key factor contributing to this change is water availability. In regions where frost and heat protection are required (primarily the valley areas of the North Napa Valley and Lake Berryessa Subareas) as much as one-half of the total annual vineyard water requirement may be used for this purpose alone. To evaluate this potential change in agricultural water use characteristics, it was assumed the conversion will occur at a rate such that in the year 2020 sprinkler systems for frost and heat protection are used on 50 percent of the vineyard lands in the North Napa Valley and Lake Berryessa Subareas, with the remaining vineyard lands in these subareas utilizing wind machines.

Conditions of Alternative Scenario 2

Alternative Scenario 2 was developed to focus on the possibility of increased population growth and land use development from those rates stated previously for the Baseline Projection. The departure from the Baseline Conditions for each water use category is described below.

Municipal/Industrial and Rural Water Needs. As part of the planning process, the Napa County General Plan has reported estimates of projected population growth through the year 2000. There is some discrepancy between these projections and those developed by ABAG and the CDOF, the General Plan estimating a greater projected population. Hence, as a part of this scenario, the 1980-2000 growth rates used in the General Plan were used to calculate the population projections (it was assumed that these growth rates remain in effect through

2020). The water demands were then calculated using the per capita estimates from the Baseline Projection (refer to Table 3-3).

Irrigated Agricultural Water Needs. Based on discussions with experts in the Napa Valley wine industry, it is possible that the Carneros area will grow at a faster pace than any other region in Napa County. Several reasons support this observation, including: less expensive land; abundance of good quality land; and frost and heat protection are not usually required. Therefore, acreage designated as Agricultural Resource in the South Napa Subarea is assumed to be fully developed as vineyards by 2005, with vineyard land development occurring at a linear rate from 1987 to 2005. It was also assumed that the entire area in the Lake Berryessa Subarea designated as Agricultural Resource by the Napa County General Plan would be fully developed as vineyards by the year 2020. Vineyard development in the North Napa Valley Subarea followed the conditions previously stated in the Baseline Projection (refer to Table 3-3).

Frost and Heat Protection Water Needs. Frost and heat protection water needs follow the conditions stated in the Baseline Projection.

Baseline Projection Water Needs

The municipal, industrial, and rural projected water needs are presented for each community in Table 3-4. As stated earlier, the municipal and rural projections are based on derived average annual per capita estimates and projected population data. The industrial component was separated and treated independently (refer to Table 3-1 for further explanation of projected industrial water needs).

The annual projected water needs by water user category are presented in Table 3-5. Projected water needs were grouped by each subarea and totaled for Napa County. Figures 3-11 through 3-14 depict the projected water needs graphically. From the figures it is apparent that the South Napa Subarea contains the majority of the municipal and industrial water use (which accounts for approximately 65 percent of the total water use in this subarea). On the contrary, water use in the North Napa Valley and Lake Berryessa Subareas is dominated by agricultural requirements.

As can be seen in Figure 3-14, the change in composition of future water uses is relatively small from existing conditions. Currently municipal and industrial water uses are approximately 32 percent of total, rural seven percent, and agricultural requirements accounting for the remaining 61 percent. Future conditions indicate that municipal and industrial use will require approximately 34 percent, rural six percent, and agricultural 60 percent of the total water needs for Napa County in the year 2020.

TABLE 3-4

MUNICIPAL AND INDUSTRIAL WATER NEEDS
NAPA COUNTY, CALIFORNIA

AREA OF USE	1989	1990	1995	2000	2005	2010	2015	2020
CALISTOGA								
Municipal	670	745	810	930	1070	1130	1185	1240
Industrial	245	245	250	260	270	275	275	275
ST. HELENA								
Municipal	1285	1495	1755	1835	1940	2055	2155	2250
Industrial	440	440	440	440	440	440	440	440
YOUNTVILLE-TOWN								
Municipal (1)	420	450	490	515	540	570	595	625
Industrial	0	0	0	0	0	0	0	0
YOUNTVILLE-V.H.								
Municipal (1)	450	450	450	455	460	460	460	460
Industrial	0	0	0	0	0	0	0	0
NAPA								
Municipal	12405	13135	13940	14540	14900	15795	16540	17285
Industrial	655	690	735	765	785	830	870	910
AMERICAN CANYON								
Municipal	1430	1325	1455	1580	1765	1870	1960	2050
Industrial	266	266	266	266	266	266	266	266
ANGWIN AREA								
Munipical	620	630	675	725	770	815	855	895
Industrial	0	0	0	0	0	0	0	0
RURAL (2)								
Municipal	3150	3155	3205	3355	3525	3735	3910	4090
Industrial	---	---	---	---	---	---	---	---

(1) Yountville was separated into two components:
Town - water use within the Town Limits
V.H. - Water use by the Veterans Home

(2) Includes rural population and winery use.

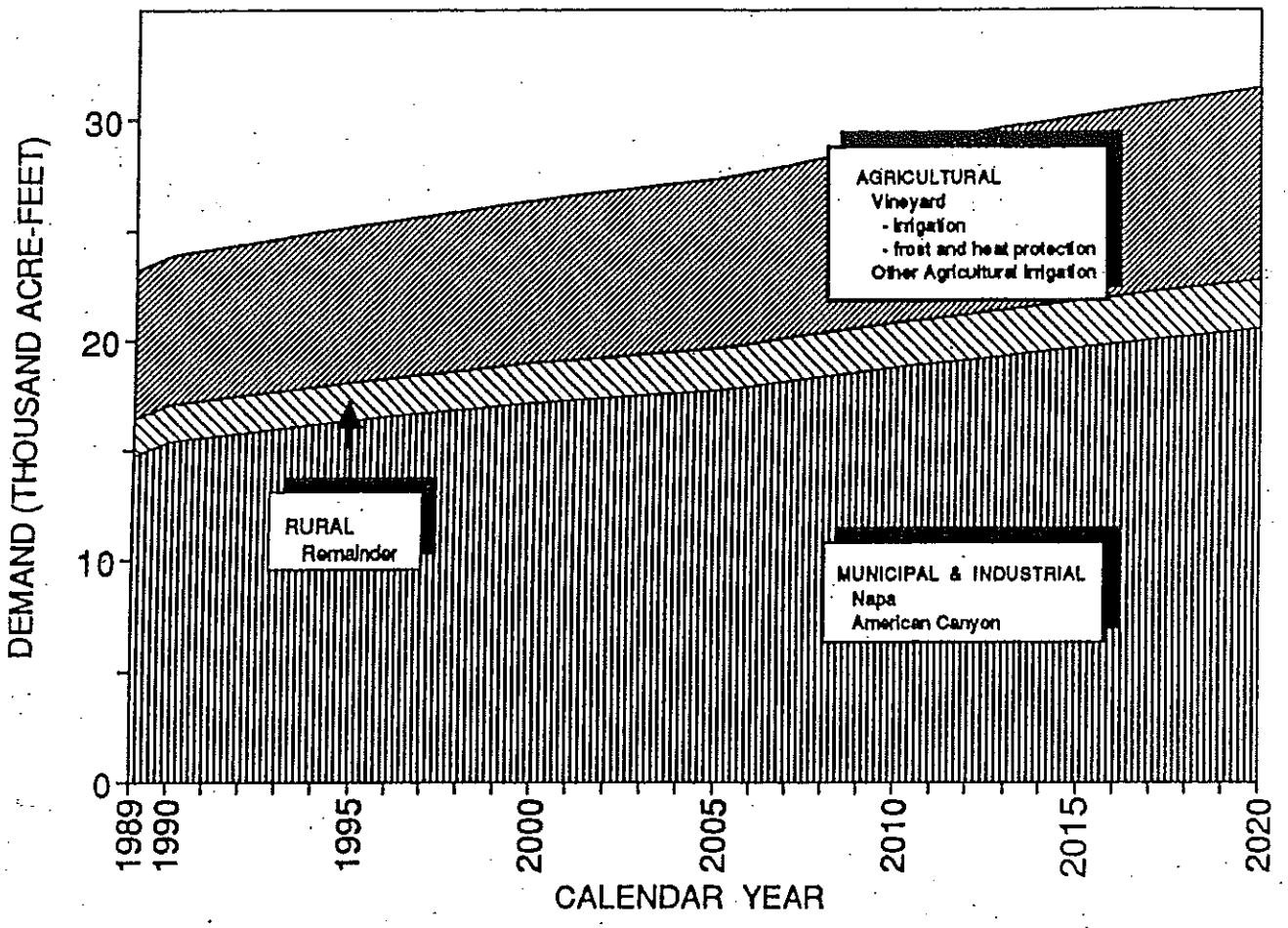
TABLE 3-5

ANNUAL PROJECTED WATER NEEDS BY WATER USER CATEGORY
NAPA COUNTY, CALIFORNIA

WATER USE CATEGORY	1989	1990	1995	2000	2005	2010	2015	2020
NORTH NAPA VALLEY SUBAREA								
Municipal[1]	2825	3140	3505	3735	4010	4215	4395	4575
Industrial	685	685	690	700	710	715	715	715
Rural	1976	1988	2056	2168	2285	2422	2536	2651
Vineyard	21867	22181	23356	24532	25708	26883	28059	29235
Other Irrigated Agriculture	797	797	797	797	797	797	797	797
Subtotal	28150	28791	30404	31932	33510	35032	36502	37973
SOUTH NAPA SUBAREA								
Municipal	13835	14460	15395	16120	16665	17665	18500	19335
Industrial	921	956	1001	1031	1051	1096	1136	1176
Rural	1702	1705	1732	1811	1903	2017	2112	2207
Vineyard	3183	3248	3576	3904	4232	4560	4888	5216
Other Irrigated Agriculture	3506	3506	3506	3506	3506	3506	3506	3506
Subtotal	23147	23875	25210	26372	27357	28844	30142	31440
LAKE BERRYESSA SUBAREA								
Municipal	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0
Rural	95	95	96	101	106	112	117	123
Vineyard	2372	2460	2802	3144	3486	3828	4170	4512
Other Irrigated Agriculture	3359	3359	3359	3359	3359	3359	3359	3359
Subtotal	5826	5914	6257	6604	6951	7299	7646	7994
NAPA COUNTY								
Municipal	16660	17600	18900	19855	20675	21880	22895	23910
Industrial	1606	1641	1691	1731	1761	1811	1851	1891
Rural	3773	3788	3884	4080	4294	4551	4765	4981
Vineyard	27422	27889	29734	31580	33426	35271	37117	38963
Other Irrigated Agriculture	7662	7662	7662	7662	7662	7662	7662	7662
Subtotal	57123	58580	61871	64908	67818	71175	74290	77407

Notes:

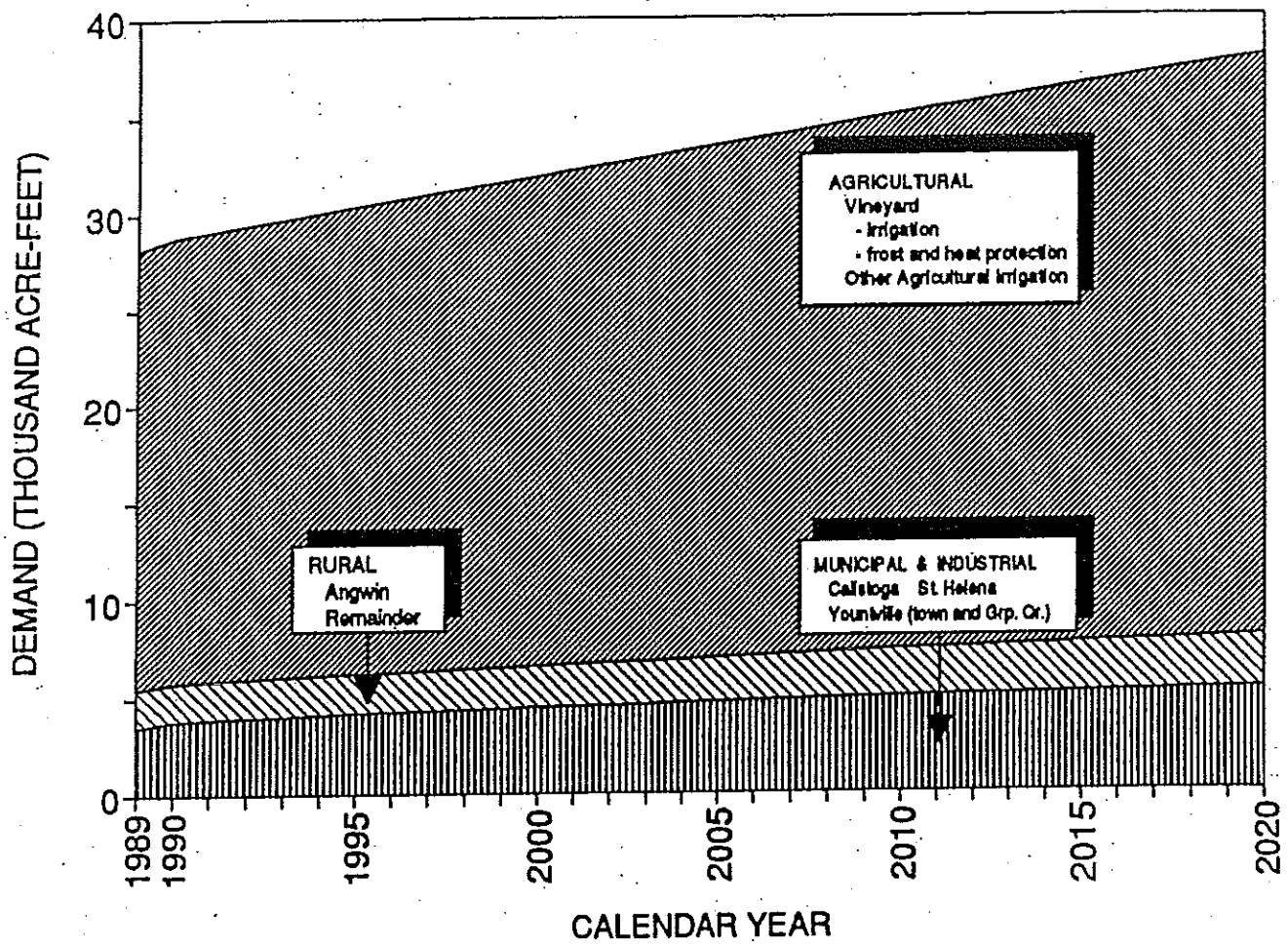
1) Includes Veterans Home at Yountville



PROJECTED WATER NEEDS - SOUTH NAPA SUBAREA, NAPA COUNTY, CALIFORNIA

FIGURE 3-11

JMM



PROJECTED WATER NEEDS - NORTH NAPA SUBAREA, NAPA COUNTY, CALIFORNIA

FIGURE 3-12

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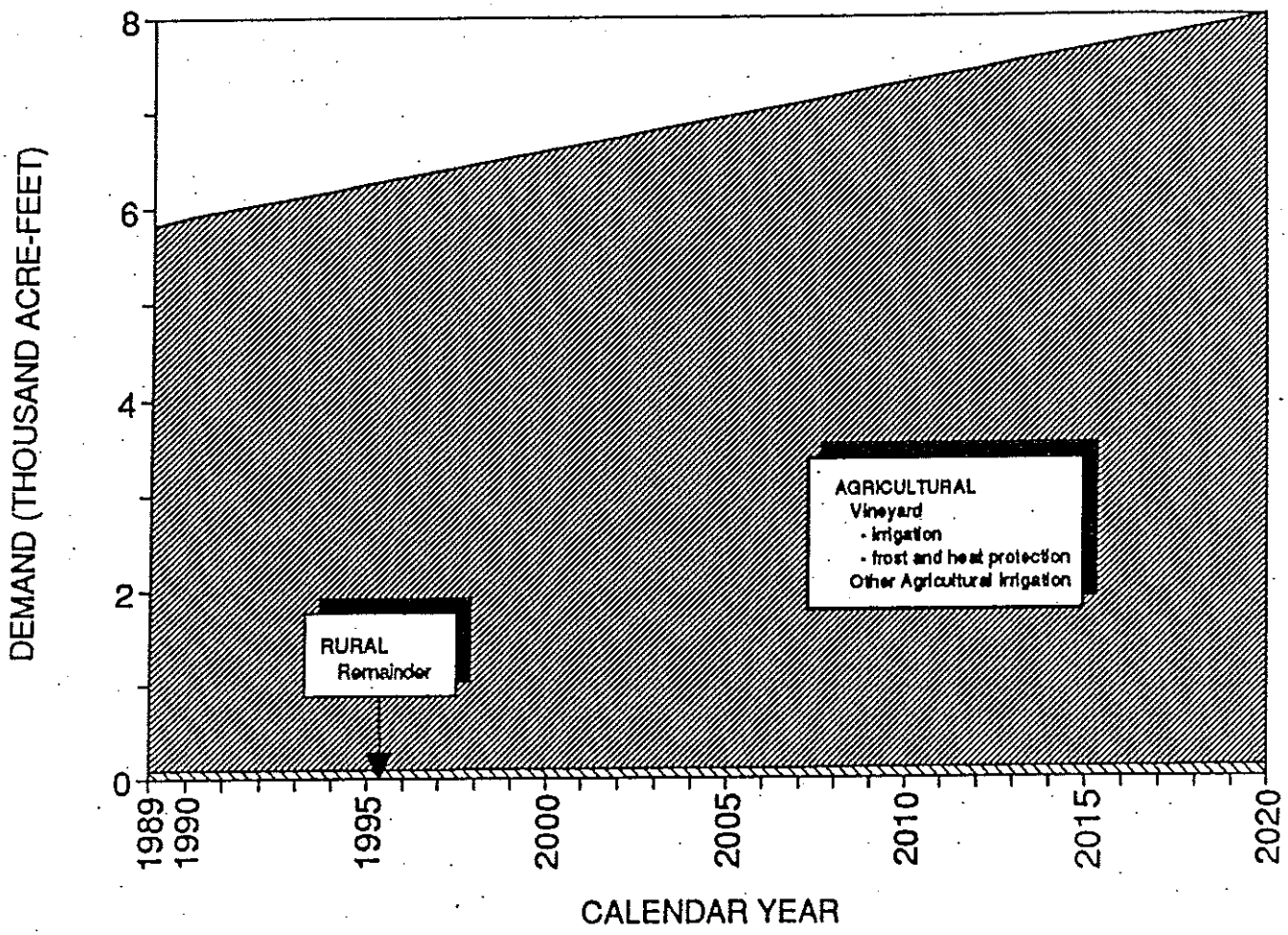
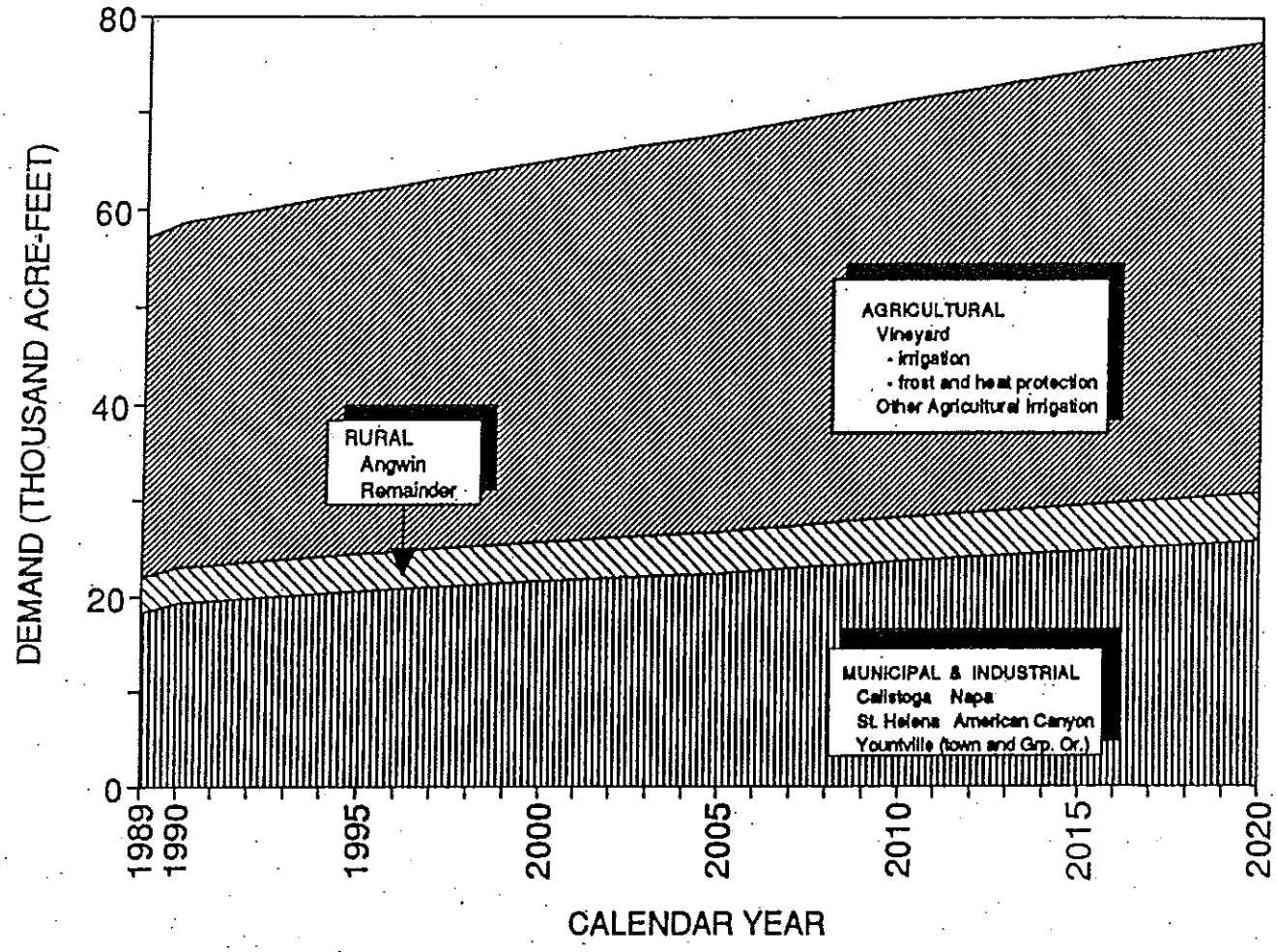


PROJECTED WATER NEEDS - LAKE BERRYESSA SUBAREA, NAPA COUNTY, CALIFORNIA

FIGURE 3-13

JMM



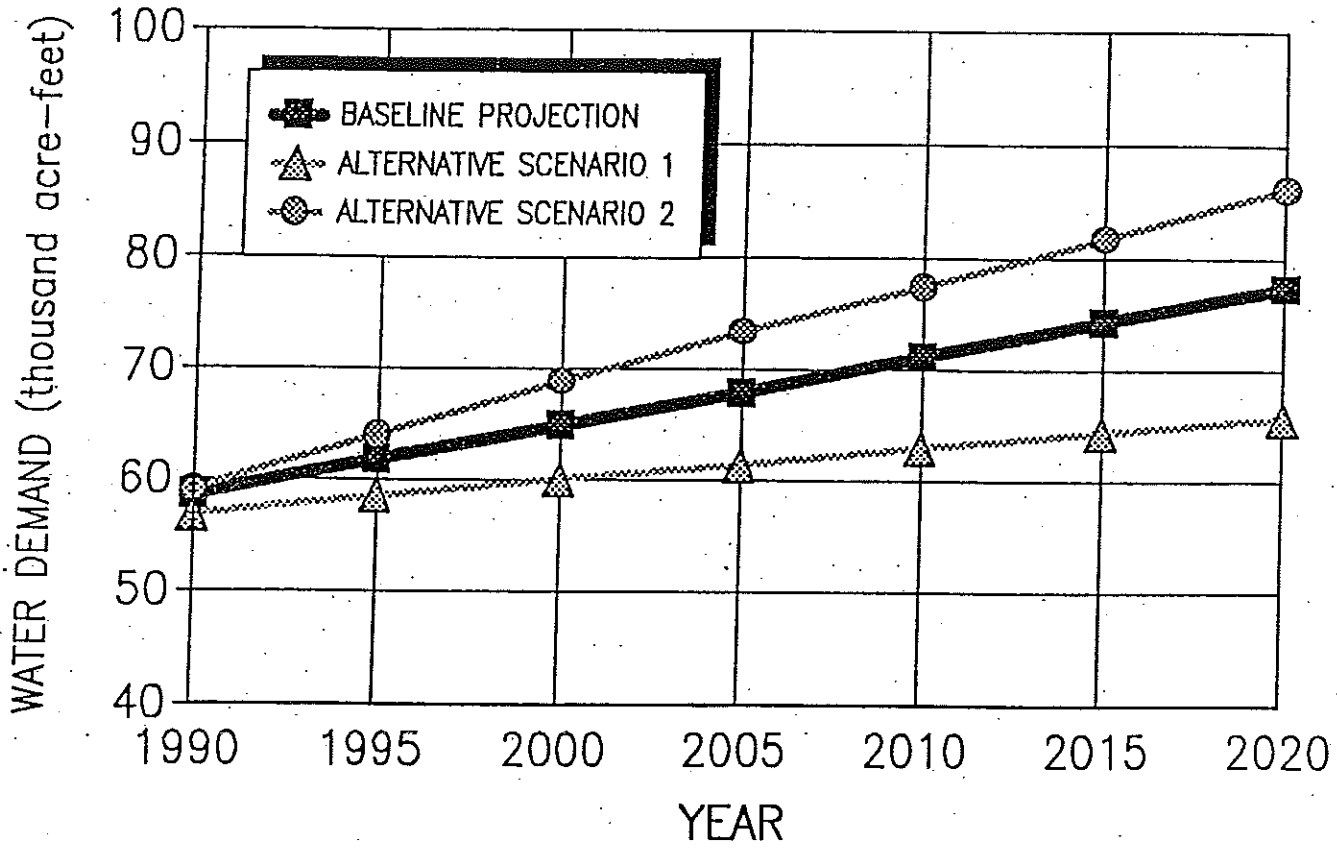
PROJECTED WATER NEEDS - NAPA COUNTY, CALIFORNIA

FIGURE 3-14

Alternative Scenario Water Needs

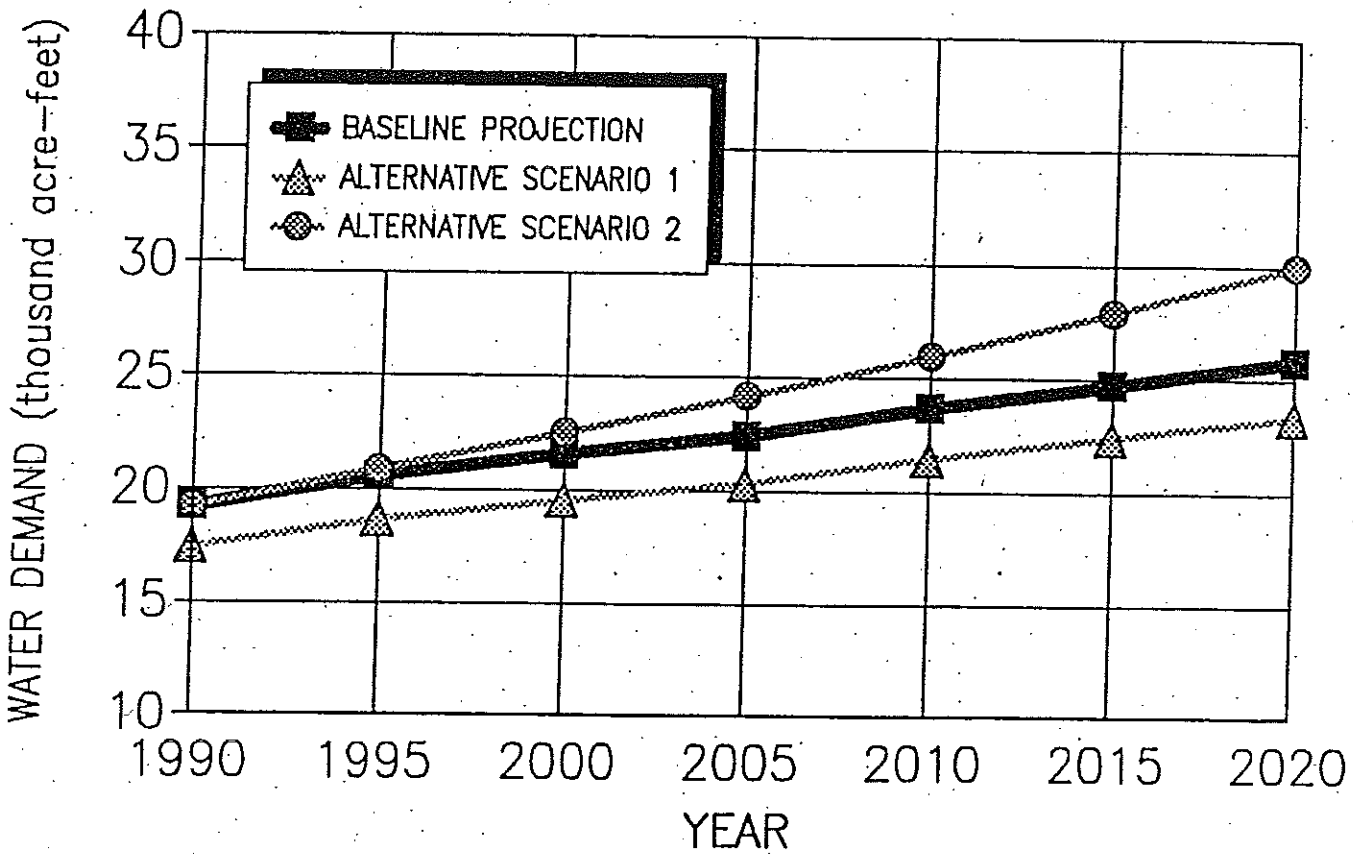
The impacts of potential changes in future water use characteristics, population projections, and land use development, from those used in the Baseline Projection, are reflected in Figures 3-15 through 3-17. Alternative Scenario 1 would result in a reduction of approximately fifteen percent in total water needs for Napa County by the year 2020. This is due primarily to the changes in vineyard water use practices, and to a lesser extent the increased water conservation effort by municipalities.

Alternative Scenario 2 shows a potential for an increase of projected water needs from the Baseline Projection of approximately 11 percent. This increase is due to the accelerated population growth (see Figure 3-16) and the additional land use development (see Figure 3-17).



TOTAL PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA

FIGURE 3-15



MUNICIPAL AND INDUSTRIAL PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA

FIGURE 3-16

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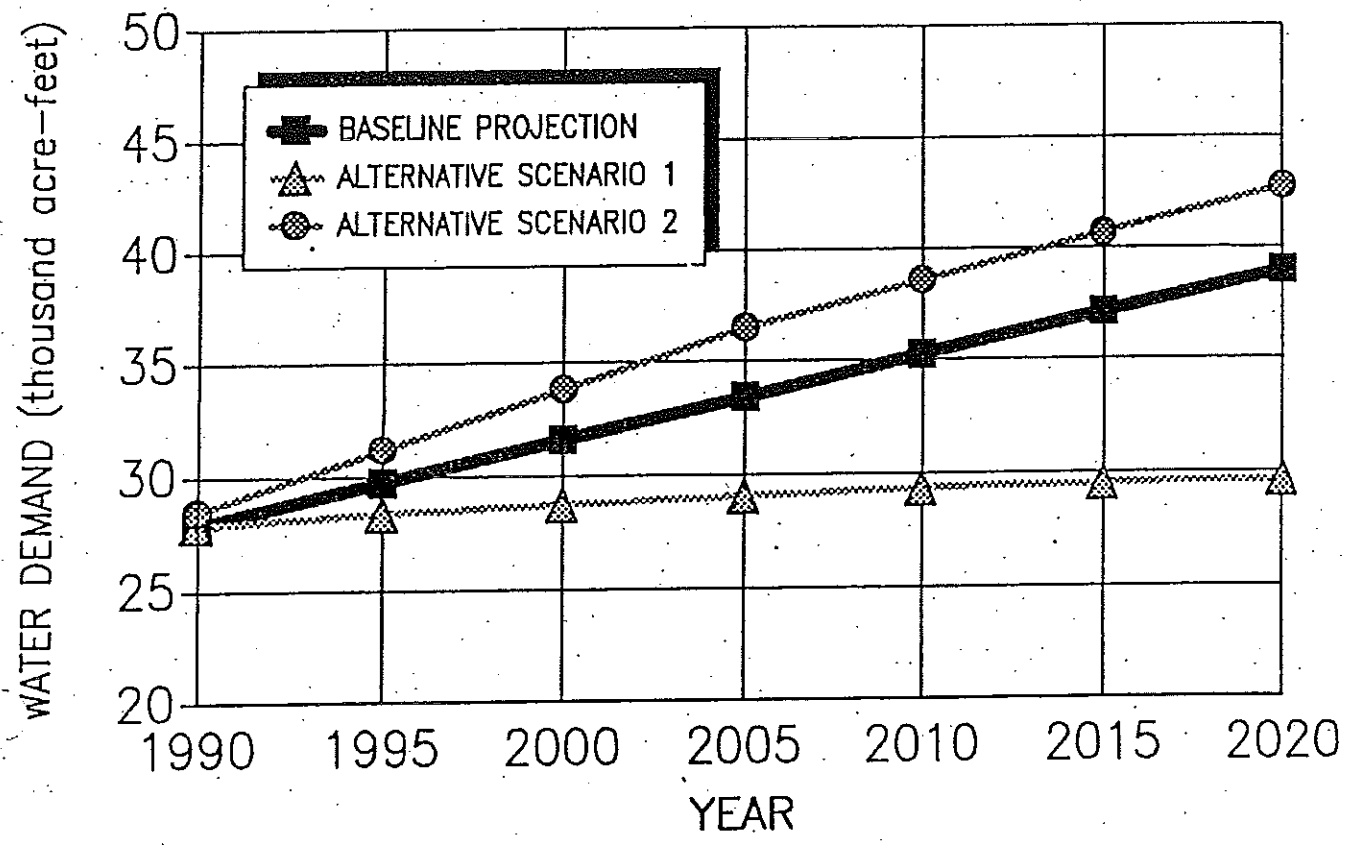

VINEYARD PROJECTED WATER NEEDS OF THE BASELINE PROJECTION AND ALTERNATIVE DEMAND SCENARIOS - NAPA COUNTY, CALIFORNIA

FIGURE 3-17

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SECTION 4

WATER QUALITY

This section discusses the quality of surface and groundwaters of Napa County. Data sources are described first. Standards for drinking water and requirements for industrial and agricultural water uses of Napa County are summarized next. This is followed by a review of the historical and existing quality of surface and groundwaters of Napa County. The review is limited to inorganic and physical parameters exceeding the drinking water standards, and requirements for industrial and agricultural supply.

DATA SOURCES

Water quality data were obtained from the California Department of Health Services (DOHS), California Department of Water Resources (DWR), and published reports. Available data for different source waters varied considerably. Where data for source water was limited or unavailable, raw water quality measurements at the treatment plants were used.

The quality of Bell Canyon Reservoir water is described using six raw and six treated water samples collected between September 1974 and May 1990. Rector Reservoir water quality is based on three raw and five treated water samples obtained between January 1986 and July 1987. Kimball Reservoir water quality is based on two raw and ten treated water samples measured between May 1982 and March 1990. The quality of Lake Hennessey and Milliken Reservoir waters were characterized from average monthly raw and treated samples measured at the respective treatment plants. At the Hennessey Water Treatment Plant, seventy five monthly measurements of average values were recorded between January 1983 and July 1990, and at the Milliken Water Treatment Plant, during the same period, forty monthly measurements were recorded. Between December 1985 and May 1986, the Milliken plant was not in service.

The quality of North Bay Aqueduct water was obtained from average monthly raw and treated samples measured at the Jameson Water Treatment Plant. Sixty three monthly measurements were recorded between November 1983 and July 1990.

Lake Berryessa water quality was described from Putah Creek measurements recorded at Winters, Yolo County, by DWR between 1985 and 1987.

Water quality data for the Napa River was obtained from DWR, consisting of 216 measurements made at St. Helena between December 1951 and April 1989.

Napa County groundwater quality data was obtained from USGS and DWR reports. Much of the available information on Northern Napa, Milliken-Sarco-Tulucay, Carneros and Putah Creek groundwaters was collected between January 1948 and July 1972.

USER QUALITY REQUIREMENTS

Water quality requirements, in general, depend upon the potential beneficial use of water. Napa County's current water demand (1989) generated by municipal, industrial and agricultural uses is estimated to be 57,100 Ac-Ft/Yr. Other beneficial uses of Napa County surface waters include recreation, fish spawning and warm fresh water habitat as well as migration route and temporary environment for anadromous fish species. In this report, however, only water quality issues related to municipa, industrial and agricultural uses are described. Municipal demand constitutes about 29 percent of the total water demand; industrial demand about 3 percent; and agriculture about 61 percent. Surface water, including from the local reservoirs and imported water, supplies more than 95 percent of the total municipal and industrial demand. Surface water from the local reservoirs and Napa River also supplies about 40 percent of the total agricultural demand. Groundwater supplies less than 5 percent of the municipal and industrial demand and about 60 percent of the agricultural demand.

Quality Requirements for Municipal Supply

Table 4-1 lists the primary and secondary water quality standards for inorganic and physical parameters in drinking water supplies established by DOHS. Primary standards have been established as Maximum Contaminant Levels (MCLs) for parameters that are known to adversely affect human health and are enforceable by law. Secondary standards are set as recommended concentration limits for some parameters and are based mainly on aesthetic considerations.

Primary drinking water quality standards have been exceeded for turbidity in raw waters of all local reservoirs as well as the North Bay Aqueduct, and for nitrates in the Napa River and groundwaters of the Northern Napa, and Carneros basins. Secondary drinking water quality standards have been exceeded for color, odor, iron, and manganese in various surface and groundwater sources.

Quality Requirements for Industrial Supply

Quality requirements for industrial water vary over a wide range depending on the type of industry and the industrial process or equipment installed in a particular facility. Because the variance is so great it is unlikely that most domestic supplies will be of the proper quality without further treatment. Drinking water standards would apply to the wine-making industry. Table 4-2 lists values for selective water quality parameters that may be of relevance to other Napa County industries.

TABLE 4-1

CALIFORNIA DRINKING WATER QUALITY STANDARDS

Parameter	Unit	California Title 22 Primary MCL(1)	California Title 22 Secondary (2)
Physical/Aesthetic			
Color	unit	-	15
Corrosivity	-	-	relatively low
Odor	TON	-	3
pH	unit	-	-
Specific Conductance	µmho/cm	-	900
Turbidity	TU	1	-
Total Dissolved Solids	mg/l	-	500
Inorganic Chemicals			
Aluminium	mg/l	1	-
Arsenic	mg/l	0.05	-
Barium	mg/l	-	-
Cadmium	mg/l	0.01	-
Chlorides	mg/l	-	250
Chromium (total)	mg/l	0.05	-
Copper	mg/l	-	1
Fluoride	mg/l	1.4-2.4(3)	-
Iron	mg/l	-	0.03
Lead	mg/l	0.05	-
Manganese	mg/l	-	0.05
Mercury	mg/l	0.002	-
Nitrate (as NO3)	mg/l	45	-
Selenium	mg/l	0.01	-
Silver	mg/l	0.05	-
Zinc	mg/l	-	5

Note: (1) Standards are enforceable
(2) Standards are recommended
(3) Temperature dependent

TABLE 4-2

SUMMARY OF INDUSTRIAL WATER QUALITY PREFERENCE

Parameter	Preferred Value
Chlorides (mg/l)	200
Color (color units)	25
Iron (mg/l)	0.3
Bicarbonate (mg/l)	480
Manganese (mg/l)	1
Nitrate (mg/l)	8
Total Dissolved Solids (mg/l)	150
Total Hardness (mg/l)	120

* Interpreted from California Department of Water Resources (1989: 8)

In addition to the parameters that exceed the drinking water standards, total dissolved solids and total hardness values in various surface and groundwaters exceed the preferred industrial water quality levels.

Quality Requirements for Agricultural Supply

Water quality constraints for agriculture are generally less stringent than those for municipal supply, and as such, agricultural water quality requirements, rather than standards, have been established for irrigation. Since Napa County agriculture is dominated by grape growing, only the water quality requirements for irrigation of vineyards are discussed. Table 4-3 lists the water quality requirement for irrigation for vineyards. The suitability of water for irrigation depends upon the effects of chemical constituents in the water on the plants and the soil. Permissible salt concentrations for irrigation water depend on the salinity tolerance of the plant, soil types, climatic conditions, and irrigation practices.

Potential water quality constraints for agricultural supply in Napa County include high levels of dissolved solids, boron, nitrate, sodium, and chloride.

SOURCE QUALITY ISSUES

Table 4-4 lists the concentration range for parameters that have exceeded the drinking, industrial or agricultural water quality requirements in the local reservoirs of Napa County and the North Bay Aqueduct. Raw water quality data for local reservoirs including Hennessey, Milliken, Rector, Bell Canyon, and Kimball, and for the North Bay Aqueduct, indicate that the following parameters have exceeded drinking water quality standards at different times: turbidity, color, odor, iron and manganese. In some of these sources even the industrial preference levels for total dissolved solids and total hardness have been exceeded.

Table 4-5 lists the concentration range for parameters that have exceeded the drinking, industrial or agricultural water quality requirements in Lake Berryessa, Napa River and four groundwater basins in Napa County. The constituents listed in Tables 4-4 and 4-5 are elaborated below with regard to each surface and groundwater source.

Turbidity

Turbidity is attributed to suspended and colloidal material such as microorganisms, organic debris, silica or other mineral substances, clay or silt. Turbidity reduces the clarity of the water and diminishes the penetration of light. It is commonly analyzed

TABLE 4-3

WATER QUALITY REQUIREMENTS FOR IRRIGATION OF VINEYARDS

Parameter	Value		
	No problems	Increasing problems	Usually unsatisfactory
Total Dissolved Solids (mg/l)	0 - 500	500 - 2000	2000+
Sodium (mg/l)	0 - 69	69 - 184	184+
Sodium Adsorption Ratio	0 - 6	6 - 9	9+
Chlorides (mg/l)	0 - 106	106 - 284	284+
Bicarbonate (mg/l)	0 - 76	76 - 152	152+
Boron (mg/l)	0 - 1	1 - 3	3+
Nitrate-Nitrogen (mg/l)	0 - 5	5 - 30	30+
Biochemical Oxygen Demand (mg/l)	0 - 10	10 - 20	20+
pH	6.5 - 8.4		
Coliform, Most Probable Number	2.2*		

* For sprinkler irrigation of produce.

Source: University of California, Agriculture Extension Service

Table 4-4

Water Quality* in Local Reservoirs and North Bay Aqueduct

Source	Hennessey	Milliken	Kimball	Rector	Bell Canyon	NBA
Parameter						
Turbidity (TU)	3 - 26	2.3 - 18	8 - 11	0.5 - 8	1.6 - 2.5	2 - 68
Color (color unit)	0 - 100	2.5 - >70	20 - 35	35 - 50	1 - 30	2 - 77
Odor (TON)	2 - 4	<3**	3 - 6	<3**	1 - 8	<3 - 8
Iron (mg/l)	0 - 0.49	0.05 - 1.63	<0.1 - 0.83	0.09 - 0.65	0.1 - 0.61	<0.3**
Manganese (mg/l)	0.01 - 1.2	0.01 - 0.15	0.01 - 0.055	<0.05**	<0.05**	0.01 - 0.63
Hardness (mg/l)	100 - 147	<120**	83 - 150	37 - 42	21 - 125	90 -186
Total Dissolved Solids (mg/l)	<150 - 180	<150**	100 - 180	46 - 150	61 - 220	<150 -283

* Only concentration ranges of parameters exceeding beneficial use requirements are listed

** All records below stated value

Table 4-5

Water Quality* in Lake Berryessa, Napa River and Napa County Groundwater

Source			Groundwater Basins			
	Lake Berryessa	Napa River	Northern Napa	Milliken-Sarco Tulocay	Carneros	Putah Creek
Parameter						
Iron (mg/l)	-	-	0 - 5.1	0 - 67	-	-
Hardness (mg/l)	139 - 178	33 - 182	0 - 315	-	-	-
Nitrates (mg/l)	-	0.44 - 53	0.06 - 50	-	>45	-
Total Dissolved Solids (mg/l)	170 - 262	<150	98 - 1000	500 - >1000	500 - >2000	>2000
Sodium (mg/l)	8 - 23	4 - 36	7.7 - 644	-	-	-
Chloride (mg/l)	4 - 20	4 - 45	50 - 300	-	-	-
Boron (mg/l)	0.1 - 0.3	0.05 - 1.9	4.2 - 32	>1	-	1 - 10
Sodium Adsorption Ratio	-	0.4 - 1.3	1 - 56	-	-	23.6

* Only concentration ranges of parameters exceeding beneficial use requirements are listed

\- Records not available

by measuring the amount of light scattered by particulate matter, higher turbidity readings, measured as turbidity units (TU), indicate an increase in particulate matter and light scattering, and a corresponding decrease in clarity.

High turbidity levels in drinking water pose a potential health risk and are aesthetically undesirable, causing consumer dissatisfaction. Turbidity can interfere with disinfection- the particulate matter, which causes turbidity, shielding bacteria and viruses from destruction by the disinfecting agent. Water-borne microorganisms, if not destroyed by disinfection, are capable of causing gastroenteritis, infectious hepatitis or other diseases.

Turbidity also degrades the aesthetic quality of drinking water. Most consumers judge their water supply initially by taste and appearance. Turbidity reduces the clarity of water and makes it aesthetically less desirable. Also, particulates associated with turbidity may adsorb or be comprised of organic material which has undesirable tastes or odors. When particulate material settles in distribution reservoirs it can later be decomposed or resuspended, either of which can intensify tastes and odors.

The DOHS requires that surface supplies exposed to significant sewage hazard or significant recreational use shall receive, as a minimum, pretreatment, filtration and disinfection, and that filtered water turbidity be maintained at less than 0.5 TU, as compared to surface supplies not exposed to microbiological contamination, where a standard of 1 TU applies.

All monthly average turbidity levels in raw waters of Hennessey, Milliken and Jameson Water Treatment Plants (North Bay Aqueduct) exceeded 0.5 TU, and they ranged between 3 and 26 TU, 2.3 and 18 TU, and 2 and 68 TU, respectively. All monthly average turbidity levels in treated waters of each plant was below 0.5 TU.

Turbidity levels in two raw water samples from Kimball Reservoir were 8 and 11 TU. Turbidity levels in four treated samples were less than 0.5 TU; in two treated samples between 0.5 and 1 TU; and in one treated sample it was 8.7 TU. The high turbidity level noted in the last sample may have been because it was taken from a faucet that was not used often. This sample also had high iron concentration and color values.

Three raw water samples from Bell Canyon Reservoir had turbidity levels between 1.6 and 2.5. One treated water sample exceeded the 1 TU level (2.2 TU), another one was between 0.5 and 1 TU (0.71 TU), and two others were below the 0.5 TU level.

One raw sample from Rector Reservoir had a turbidity level greater than 1 TU (8 TU) and another raw sample was below 0.5 TU. Two treated water samples exceeded the 1 TU level (1.6 and 2.5 TU).

Color

Color in water results from the presence of metallic ions such as iron and manganese, or the presence of organic material such as humus or peat, plankton, and weeds. The DOHS recommends a drinking water standard of 15 color units. Although aesthetically color may be objectionable, it does not pose a health hazard.

In Hennessey, Milliken and Jameson Treatment Plants, color levels in the raw water ranged between 0 and 100 color units, 2.5 and over 70 color units, and 2 and 77 color units, respectively. Drinking water standards in raw waters of these plants were exceeded twenty eight, twenty seven and twenty nine times, respectively. Color values in all treated samples of the three plants were below the standard.

Two raw water samples from Rector Reservoir had values of 35 and 50 color units. All five treated samples met the standard.

Two raw water samples from Kimball Reservoir had values of 20 and 35 color units. Eight treated samples had color levels below the standard. High color value (30 color units) in one particular sample may be attributed to infrequent use of the faucet from which the sample was obtained.

Raw water samples in Bell Canyon Reservoir had values between 1 and 30 color units. Two samples had values of 20 and 30 color units. Color levels in all treated samples were below the standard.

Odor

Odor is an important aesthetic quality of water. Its intensity is measured as the "threshold odor number" (TON). For drinking supplies, the recommended threshold odor number is 3 units. At the Hennessey Treatment Plant, odor values in the raw water ranged between 2 and 4 TON, and exceeded the recommended standard four times. At Jameson Treatment Plant, the standard was exceeded once at 8 TON. All treated samples at both Hennessey and Jameson Treatment Plants had odor values below the standard.

Drinking water quality standard for odor was exceeded in one raw water sample from Bell Canyon Reservoir, and in one raw and two treated water samples from Kimball Reservoir.

Iron and Manganese

High levels of iron in water imparts an unattractive appearance and taste. High concentrations of manganese result in disagreeable taste and discolors laundry. Iron and manganese concentrations can be caused by anaerobic conditions resulting from reservoir stratification. The DOHS recommended drinking water standard for iron and manganese are 0.3 mg/l and 0.05 mg/l, respectively.

Iron concentrations in raw waters of Hennessey and Milliken Treatment Plants were between 0 and 0.46 mg/l, and 0.05 and 1.63 mg/l, respectively. Drinking water standards in raw waters of these two plants were exceeded two and four times, respectively. All the treated samples met the drinking water standards.

In raw waters of Bell Canyon Reservoir, iron concentration ranged from less than 0.1 to 0.61 mg/l, and the standard was exceeded twice. All treated samples met the standards.

One raw water sample from Kimball Reservoir had iron concentration of 0.83 mg/l. All treated samples, except one, had values below the drinking water standard. The high iron concentration of 1 mg/l in one treated sample was attributed to the infrequently-used faucet.

In raw waters of Rector Reservoir, iron concentration ranged from 0.085 to 0.65 mg/l, the standard was exceeded once. All treated samples met the standards.

Northern Napa groundwaters exhibit high iron concentrations. Four wells northwest of St. Helena had iron concentrations from 0.88 to 5.1 mg/l. One well south east of St. Helena had an iron level of 3.8 mg/l. One well, measured in 1915, north of the Milliken-Sarco-Tulucay basin, had an iron level of 67 mg/l, and another well in the northern part of Milliken-Sarco-Tulucay basin contained an iron concentration of 15 mg/l.

Manganese concentrations in raw waters of Hennessey, Milliken and Jameson Treatment Plants ranged from 0.01 to 1.2 mg/l, 0.01 to 0.15 mg/l, and 0.01 to 0.63 mg/l, respectively. Drinking water standards at these plants were exceeded forty eight, eleven and twenty five times, respectively. At the Hennessey plant, manganese levels in treated water samples exceeded the standard nine times. At Milliken and Jameson plants, all treated samples had manganese values below the standard.

All of the raw and treated samples collected from Kimball and Bell Canyon waters had manganese values below the standard. Raw water from Rector Reservoir had manganese levels ranging from less than 0.05 to 0.27 mg/l. They exceeded the drinking water standards twice. All of the treated samples met the standard.

Hardness

Hardness is a term applied to the soap-consuming power of a water. Any substance that will form an insoluble curd or scum with soap causes hardness. In natural water, hardness is caused mainly by calcium and magnesium ions. Other ions which cause hardness such as iron, manganese, copper, barium, lead or zinc, are normally present in trace quantities and do not contribute significantly to hardness. Hardness is traditionally reported in milligrams per liter as calcium carbonate.

Although hardness is not regulated in drinking water supplies, the historical concern has been its aesthetic and economic impact. According to Davis and DeWeist (1966), water hardness, measured as calcium carbonate, can be classified as follows: up to 60 mg/l classified as soft; between 60-120 mg/l as moderately hard; between 120-180 mg/l as hard; and greater than 180 as very hard. Moderately hard levels require consumers to use more soap and detergent, even with the use of synthetic detergents. Hardness can also lead to the formation of scale in plumbing fixtures, mainly in boilers and other heat exchange equipment, and the precipitation of scum in laundry equipment and cooking utensils. Thus, higher hardness levels would require consumers to spend more in purchase of cleaning materials and repair or replacement of plumbing or hot water heating equipment. In industrial supplies, in general, a hardness level of 120 mg/l or less is preferred.

Hardness in the raw water of Hennessey, Milliken and Jameson Water Treatment Plants ranged from 100 to 147 mg/l, below 120 mg/l, and 90 to 186 mg/l, respectively. The 120 mg/l hardness level was exceeded forty six and forty three times at Hennessey and Jameson plants, respectively.

Bell Canyon and Rector Reservoir waters are soft. Hardness in Kimball Reservoir water is between 69 and 150 mg/l. The 120 mg/l level was exceeded twice.

Lake Berryessa water exceeds the 120 mg/l level all the time. Hardness values range between 139 and 178 mg/l.

Hardness levels in the Napa River are between 33 and 182 mg/l. Eighty six samples exceeded 120 mg/l level and two samples exceeded 180 mg/l level.

Hardness values in the Northern Napa groundwater basin ranges between 0 and 315 mg/l. Seventeen wells had levels above 120 mg/l.

Nitrates

Nitrates are common contaminants in surface and groundwaters in many rural communities in California and are becoming increasingly widespread because of agricultural activities and disposal of sewage on or below the land surface. Nitrates can enter the groundwater through either the conversion of naturally-occurring or introduced organic nitrogen or ammonia. The primary drinking water quality standard for nitrates is 45 mg/l as nitrate (10 mg/l as nitrogen). Excess nitrates cause methemoglobinemia in infants (the blue baby syndrome). Nitrates are converted to nitrites in the intestines and inhibit the body's ability to ingest oxygen. Water quality requirements for irrigation of vineyards as well as for industrial supply espouse more stringent nitrate limits than drinking water standards. In irrigation supplies, nitrate levels exceeding 5 mg/l up to 30 mg/l cause increasing problems, and values over 30 mg/l are usually unsatisfactory. In industrial supplies, values below 8 mg/l are preferred, and over 30 mg/l are not recommended.

Nitrate levels in the Napa River (reported as nitrogen) range between 0.44 and 53 mg/l as nitrate. Drinking water standards were exceeded once (in May 1962). Forty samples had nitrate levels within the "increasing problem" category for irrigation requirements for vineyards and fifteen fell in the "usually unsatisfactory" category. Thirty seven samples had values above the preferred requirements for industrial supply, and fifteen above the recommended limits.

High nitrate levels in groundwaters have been noted in several areas of Napa County. Nitrate levels in Northern Napa groundwaters (measured between December 1955 and July 1971) ranged from 0.06 to 50 mg/l. Two Northern Napa wells, located northwest of the City of Napa, had levels exceeding the drinking water standard. Six wells had nitrate values that were within the "increasing problem" category for irrigation requirements and above the preferred requirements for industrial supply. In the Carneros basin, 2 wells, one located in the northern part of the basin and the other west of Cuttings Wharf, had nitrate levels above the drinking water standard.

Total Dissolved Solids (TDS)

Surface and groundwater contains a variety of dissolved inorganic constituents as a result of chemical and biochemical interactions with geological materials. The major constituents in TDS - sodium, magnesium, calcium, chloride, bicarbonate, and sulfates, occur in ionic form and normally comprise more than 90 percent of the TDS. The DOHS recommended TDS concentration for municipal supply is 500 mg/l, which is also

the limit for the "no problem" category for irrigation requirements for vineyards. For industrial supply, TDS levels of 150 mg/l or less are preferred.

TDS concentration in the Napa River is between 99 and 256 mg/l. Fifty six samples had concentrations above the preferred industrial supply requirement.

Northern Napa groundwaters have TDS values between 98 and 1000 mg/l. High TDS concentrations (greater than 500 mg/l) are found northwest of Calistoga. Thirty two wells had TDS values above the preferred industrial supply requirements. Groundwaters in the Carneros basin have TDS concentrations between 500 to over 2000 mg/l. TDS concentrations between 500 and 1000 mg/l are found in the eastern and southern boundaries of the Carneros basin. The northeastern part of the basin had values between 1000 and 2000 mg/l. Two wells, one in the eastern part of the basin and another in the southern part of the basin, had values exceeding 2000 mg/l. In the Milliken-Sarco-Tulucay groundwater basin, east of Napa, TDS concentrations range between 500 and 1000 mg/l, and south of Napa, they exceed 1000 mg/l. One well in Pope Valley (in the Putah Creek basin) had TDS levels exceeding 2000 mg/l.

Sodium

Although sodium is not regulated in drinking water supplies, the Environmental Protection Agency (EPA) has recommended that a 20 mg/l be used as a goal for public water systems. The American Heart Association has suggested the same level (20 mg/l) to afford protection to those individuals with heart or kidney disease who require a low sodium diet. In supplies for vineyard irrigation, sodium concentrations above 69 and up to 184 mg/l cause increasing permeability problems, and those above 184 mg/l are usually unsatisfactory.

Northern Napa groundwaters had sodium concentrations ranging from 7.7 to 644 mg/l. Thirty two wells have values above 20 mg/l, the EPA recommended value for public drinking supplies. Eighteen wells had sodium concentrations above 69 mg/l, the increasing problem category for vineyard irrigation, and seven above 184 mg/l, the unsatisfactory category.

Sodium adsorption ratio (SAR) provides an indicator of the salt balance between the major cations (sodium, calcium and magnesium). For irrigation of vineyards, SAR values greater than 6 to 9 could cause permeability problems in shrinking-swelling types of soils. SAR values greater than 9 are usually unsatisfactory for vineyard irrigation. SAR values in Northern Napa groundwaters range from less than 1 to over 56. Eleven wells had SAR values above 6, nine of which had values greater than 9. One well in Pope Valley had a SAR of 23.6.

Chlorides

Chlorides in excess of 100 mg/l impart a salty taste to drinking water. The recommended drinking water standard for chlorides is 250 mg/l. Industrial users prefer a concentration of 200 mg/l or less. For vineyard irrigation, levels above 106 mg/l may cause increasing problems and those above 284 mg/l are usually unsatisfactory.

Groundwaters of Northern Napa have chloride concentrations between 50 and 300 mg/l, with thirteen wells having levels above 106 mg/l, six above 200 mg/l, three above 250 mg/l, and one over 284 mg/l.

Much of Northern Napa groundwater is classified as sodium-chloride waters.

Boron

Boron is an essential element for plant growth but is needed in relatively small amounts. If excessive, boron becomes toxic. The recommended boron level for vineyard irrigation is 1 mg/l; concentrations above 1 mg/l causing increasing problems and those above 3 mg/l are usually unsatisfactory for vineyard irrigation.

Boron levels in the Napa River are between 0.05 and 1.9 mg/l. Concentrations in five samples exceeded 1.0 mg/l.

Boron levels in groundwaters of Napa County are high. They range between 4.2 and 12 mg/l in groundwaters around and north west of Calistoga, and between 1.6 and 32 mg/l in groundwaters west of St. Helena, north of Oakville and North of Yountville. In the Milliken-Sarco-Tulucay basin, especially south and south east of Napa, boron levels exceed 1 mg/l.

Boron levels in three wells in the Putah Creek basin, (in Pope Valley) exceeded 1 mg/l with one well having as much as 10 mg/l.

Boron levels in groundwaters of Napa County are high. They range between 4.2 and 12 mg/l in groundwaters around and north west of Calistoga, and between 1.6 and 32 mg/l in groundwaters west of St. Helena, north of Oakville and North of Yountville. In the Milliken-Sarco-Tulucay basin, especially south and south east of Napa, boron levels exceed 1 mg/l. Boron levels in three wells in the Putah Creek basin, (in Pope Valley) exceeded 1 mg/l with one well having as much as 10 mg/l.

SECTION 5

EXISTING WATER SUPPLIES

Napa County's agriculture and municipalities satisfy their current water needs from five supplies:

- Groundwater
- River Diversion
- Reservoirs
- Imported Water
- Reclamation

In assessing the balance between County water needs and supplies, the quantity and its availability must be considered in determining how effective and reliable a given supply can be. In the case of groundwater, a safe yield estimate must be obtained which represents a long-range amount of pumping that can be sustained by recharge of the groundwater basin. In the case of river diversion, with the focus on the Napa River, the variations of flow, seasonally and year-to-year, must be related to the timing of water need. For the major local reservoirs, the variation of inflow from their respective watersheds and variation of consumption play major roles in arriving at a yield-frequency relationship. For imported water, contract entitlement buildup and dry-period cutbacks are the major considerations. For reclamation, the quality of the treated effluent is a key determinant of usability.

The above existing County water supplies are discussed in detail below.

GROUNDWATER

The objective of this section is to address water supply availability in groundwater basins located in Napa County. Napa County is located within the northern half of the Coast Ranges geomorphic province. In general, the Northern Coast Ranges are composed of marine sedimentary sandstones and shales that have been folded and faulted for millions of years creating the northwest-southeast trending valley-ridge topography. More recently, volcanic activity and erosion have assisted in the landscape process. It is these later geologic events which created the water bearing units of interest in and around the Napa Valley. Many of the faults which originally created the Coast Ranges are not presently active (an active fault has had surface displacement within the last 11,000 years), but some have shown evidence of faulting within the last 2 million years. Some of the faults in Napa County include: Carneros Fault, Cordelia Fault Zone, Green Valley Fault Zone (active), Soda Creek Fault, West Napa Fault Zone (active), Wilson Fault and the Wragg Fault.

Existing Water Supplies

The focus of this analysis is on four key areas with potential for feasible extraction of groundwater. These areas, as shown in Figure 5-1, are: (1) North Napa Valley Groundwater Basin; (2) Milliken-Sarco-Tulucay Groundwater Basins; (3) Carneros; and (4) Lake Berryessa Basin (Pope and Capell Valleys).

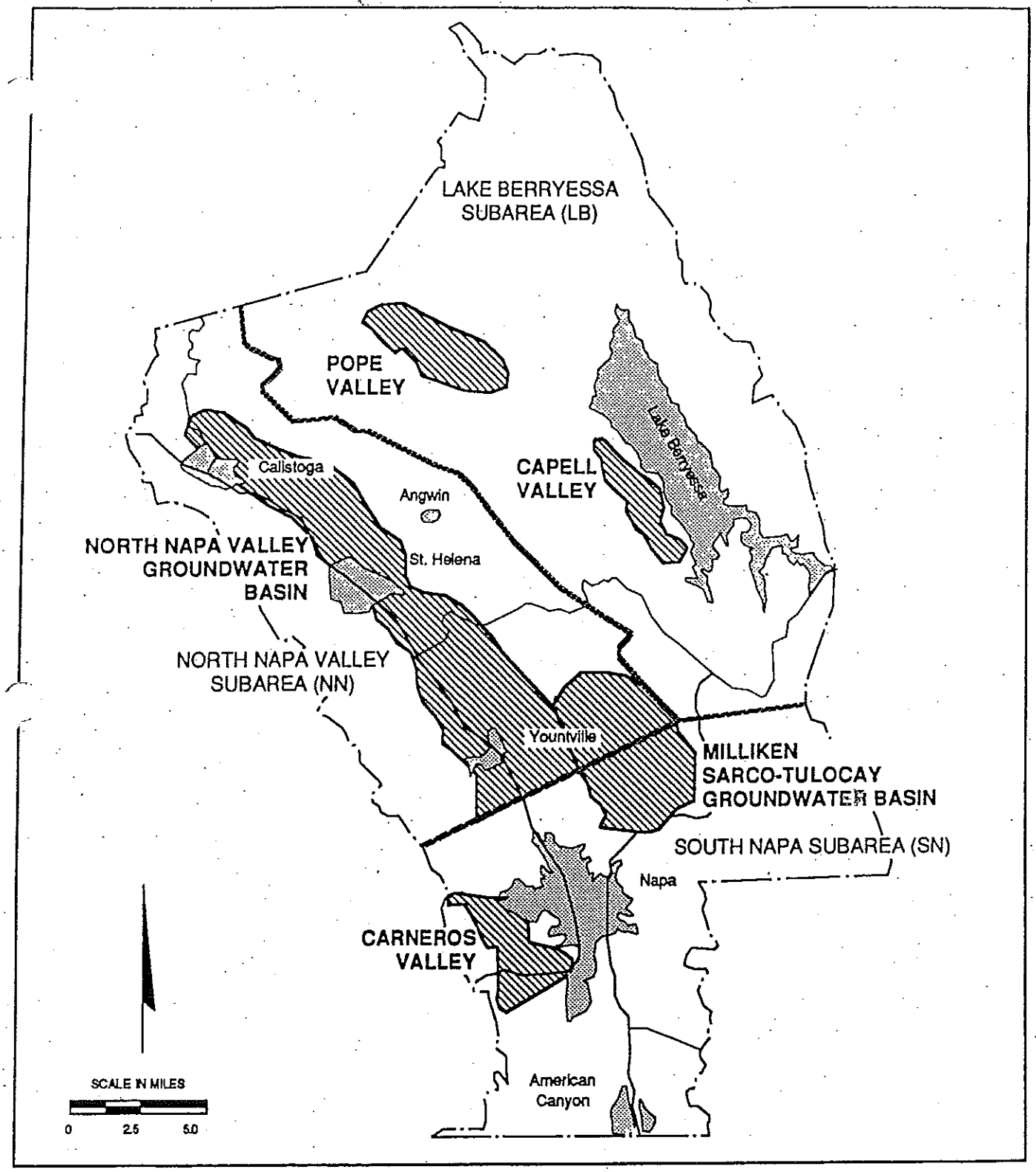
The primary aquifer depended upon in Napa County is that of the North Napa Valley Groundwater basin. Formed by the alluvium found in the Napa Valley east of the City of Napa, and extending north of the City of Calistoga, this aquifer provides water for irrigation and frost and heat protection for the highly valued grapes in the region. To a lesser extent, it is used for domestic purposes as well. Because of the importance of this aquifer as a source of supply, sources of recharge were analyzed facilitating the calculation of the safe yield of the groundwater basin. To validate the recharge estimates, a hydrologic budget was performed as well.

The other basins mentioned above are discussed in less detail. Existing information is reviewed together with additional insight provided by the Advisory Committee panel members, providing a summary of the basin characteristics and the potential water supply.

North Napa Valley Groundwater Basin

Napa Valley is located 40 miles northeast of San Francisco. The North Napa Valley groundwater basin lies beneath the valley floor. The boundaries of the basin, as described by the U.S. Geological Society (USGS) in 1973 (USGS, 1973), extends from Oak Knoll Avenue (just north of the City of Napa) to the northwestern end of the valley just beyond the City of Calistoga. The boundary encompasses approximately 60 square miles of valley floor.

The valley floor is drained by the Napa River which extends longitudinally through the study area, starting in the northwestern section and proceeding south past Oak Knoll to San Pablo Bay. Tributary flows occur along the western and eastern boundaries; the primary regulated watersheds are situated on the east side and consist of Bell Canyon, Conn, Moore, Chiles, and Sage Creeks supplying Lake Hennessey, and Rector Creek. Along the west side there are numerous creeks, mostly unregulated, with a total watershed area of approximately 71 miles adjacent to the study area. Water use in the North Napa Valley region is dominated by agricultural needs, mostly for vineyards established in the basin. Of the total water use in 1989 in this region, 82 percent was needed to support 19,100 acres of land dedicated to vineyards. As discussed in the previous sections, water for vineyards is needed both for irrigation and frost and heat protection. There are small acreages of other agriculture that for purposes of this



GROUNDWATER HYDROLOGIC STUDY AREAS

FIGURE 5-1

analysis were assumed negligible. In addition to agriculture, municipal and industrial needs in the North Napa Valley were 12 percent of the total water use in 1989 and domestic use by the rural population was approximately 6 percent.

The North Napa Valley Groundwater basin has been studied numerous times in the past. The most relevant work of this present study includes four previous investigations: (1) a joint study by the USGS and the California Department of Water Resources (DWR) completed in 1960 involving an analysis of groundwater characteristics in Napa Sonoma Valleys; (2) a U.S. Bureau of Reclamation (USBR) study in 1966 as part of the Knights Valley unit investigation; (3) a study by the Napa County Flood Control and Water Conservation Service in 1972 evaluating the potential for increased groundwater use for vineyard irrigation and frost protection; and (4) the most recent work by the USGS in which North Napa Valley groundwater hydrology was studied in detail and analyzed for its groundwater yielding capabilities (USGS, 1973).

In the Northern Napa Valley Groundwater Basin, the hydrogeologic units of interest include the water bearing Quaternary Alluvium and Pliocene Sonoma Volcanics, and the non-water bearing Cretaceous-Jurrassic Franciscan Formation and Great Valley Sequence.

Most of the valley floor is composed of alluvium which occurs as poorly sorted lenticular stream deposits of sand and gravel surrounded by silts and clays of the floodplain deposits. Alluvial deposits vary in thickness from more than 300 feet in the south end of the Napa Valley near San Pablo Bay to less than 50 feet near Calistoga. The alluvium tends to be thicker in the center of the valley near the Napa River.

The Sonoma Volcanics provide additional water to wells penetrating through the alluvium on the valley floor or located on the foothills surrounding the valley. The Sonoma Volcanics are a thick highly variable series of 4 different volcanic members. Only a tuffaceous member in the upper half of the volcanic deposit yields moderate amounts of water to wells. The Sonoma Volcanics which underlie most of the valley floor are believed to reach up to 2000 feet thick. The entire east side of the valley floor is flanked by the volcanics, as is most of the west side north of St. Helena.

The Franciscan Formation and The Great Valley Sequence flank most of the west side of the valley south of St. Helena. This is important to local groundwater users because these two deposits yield even less water to wells than the adjacent volcanics.

During pre-development conditions, groundwater generally flowed from the valley's edges toward the valley axis, and then south to San Pablo Bay. Some of the faults

located within the valley floor modify these general flow patterns. The Soda Creek Fault is the only fault documented to obstruct the flow of groundwater. It appears to restrict the westward flow of groundwater just north of Milliken Creek, but only during times of low water levels.

Most of the groundwater in the Napa Valley is pumped from the Quaternary Alluvium which is considered the best aquifer in the area. Most water produced from the alluvium is pumped from unconfined aquifers; and the yields from wells depend on the number of gravel beds penetrated and screened by the well. Individual sand and gravel lenses tend to be less than 10 feet thick. Well production averages 223 gpm, but ranges from 50-3000 gpm at a specific capacity of 10 gpm per foot of drawdown. Storage capacity of the alluvium in the north Napa Valley is estimated at 190,000 Acre-Feet.

The Sonoma Volcanics are the other main source of groundwater in and around the Napa Valley. Few wells penetrate the alluvium on the valley floor to pump water from the lower producing volcanic deposits. Water in the Sonoma Volcanics commonly is confined though a few wells actually do produce flowing water. Most of the flowing wells occur near Calistoga, and many of these produce hydrothermal water. Hydrothermal water is described as having a temperature equal to or greater than 20.5°C (69°F). Wells tapping the Sonoma Volcanics produce an average of 32 gpm at a specific capacity of 0.6 gpm/ft of drawdown. No estimate of the storage capacity of the Sonoma Volcanics was found, but one report stated that the 230 square mile Napa Valley Basin contained 300,000 AF of water in all the units between 10-200 feet below the ground surface.

Wells tapping the Franciscan Formation and the Great Valley Sequence yield an average of 19 gpm at a specific capacity of 0.1 gpm/ft of drawdown. Most wells tapping these formations produce less than 10 gpm. The few wells that do produce more water extract it from the highly fractured zone at depth.

The main objective of this analysis was to estimate groundwater yield, which is comprised of groundwater recharge from deep percolation of direct precipitation and irrigation-applied water and other inflows including recharge from neighboring tributaries and subsurface inflows from adjacent areas.

To estimate the groundwater yield of the North Napa Valley Groundwater basin, the individual components of recharge to and discharge from the basin were computed by independent methods. The results were then employed in an analysis of the hydrologic balance represented by the equation of hydrologic equilibrium stating that inflow less

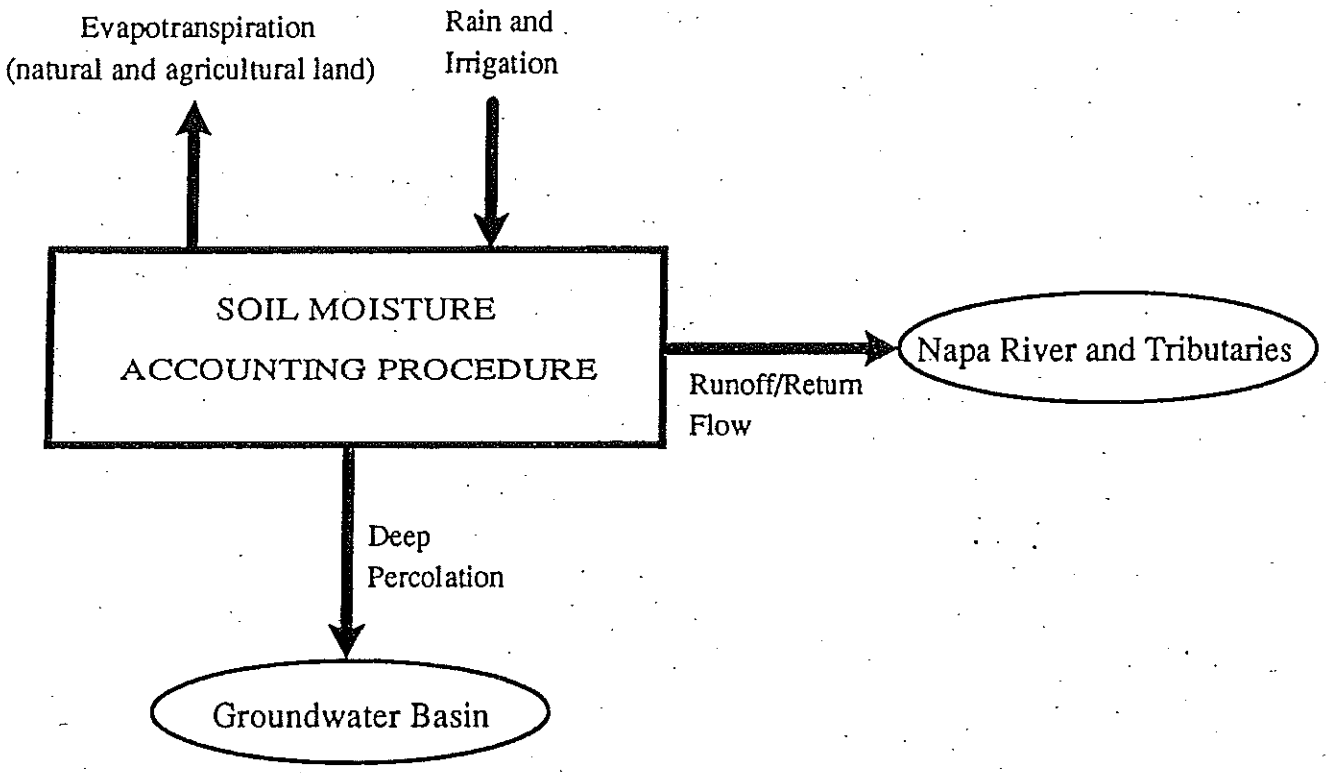
outflow is equal to the change in storage. The estimated change in storage was then compared with known groundwater level data for the purpose of validating or refining the initial estimates of inflow and outflow components. The methodology used in estimating the groundwater inflow and outflow components are discussed further below.

An aquifer may be replenished by several different sources, both natural and artificial. Deep percolation of precipitation, stream flow, or water in lakes and reservoirs exemplifies natural recharge. Seepage from irrigation applied-water and canals, and water purposely applied in spreading grounds or injected via wells can be classified as artificial recharge.

Deep percolation can be calculated by considering the natural processes occurring when precipitation and irrigation-applied water proceed through the hydrologic cycle. The most important factors to consider are surface runoff, evapotranspiration, and soil moisture retention. Deep percolation takes place when water reaching the soil exceeds these factors and infiltrates past the root zone depth, and eventually into the groundwater aquifer below. Recharge also occurs when streams cross regions where the pervious nature of the channel allows seepage to the groundwater system below. The amount of recharge is a function of stream flow, channel characteristics, and soil properties. Another possible source of recharge is from subsurface flow originating in adjacent groundwater systems.

To calculate annual deep percolation for the North Napa Valley Groundwater basin, a soil moisture accounting procedure was employed. This procedure, depicted in Figure 5-2, calculates the deep percolation resulting from precipitation and irrigation-applied water. This is accomplished on a monthly basis by solving a mass balance equation which relates the change in soil water content to precipitation, direct runoff, irrigation-applied water, evapotranspiration (actual), and deep percolation. Direct runoff was computed by the Soil Conservation Service (SCS) runoff curve number method. Curve numbers for the Napa Valley are available in the Soil Survey Report for Napa Valley (SCS, 1977). The curve number is a function of vegetative cover and soil group. Deep percolation is a function of rainfall (in excess of direct runoff) combined with irrigation-applied water (less the return flow) that infiltrates into the soil. As this excess water seeps down, some of the infiltrated water percolates due to gravity, contributing to an increase in groundwater storage, while the remainder is held in the soil moisture zone and subject to evapotranspiration.

The main input data required for this program includes historical monthly rainfall, existing land use acreage and its respective evapotranspiration, average monthly



CALCULATION OF DEEP PERCOLATION IN THE NORTH NAPA VALLEY GROUNDWATER BASIN

FIGURE 5-2

irrigation applied-water, and two soil parameters (SCS curve number and field capacity).

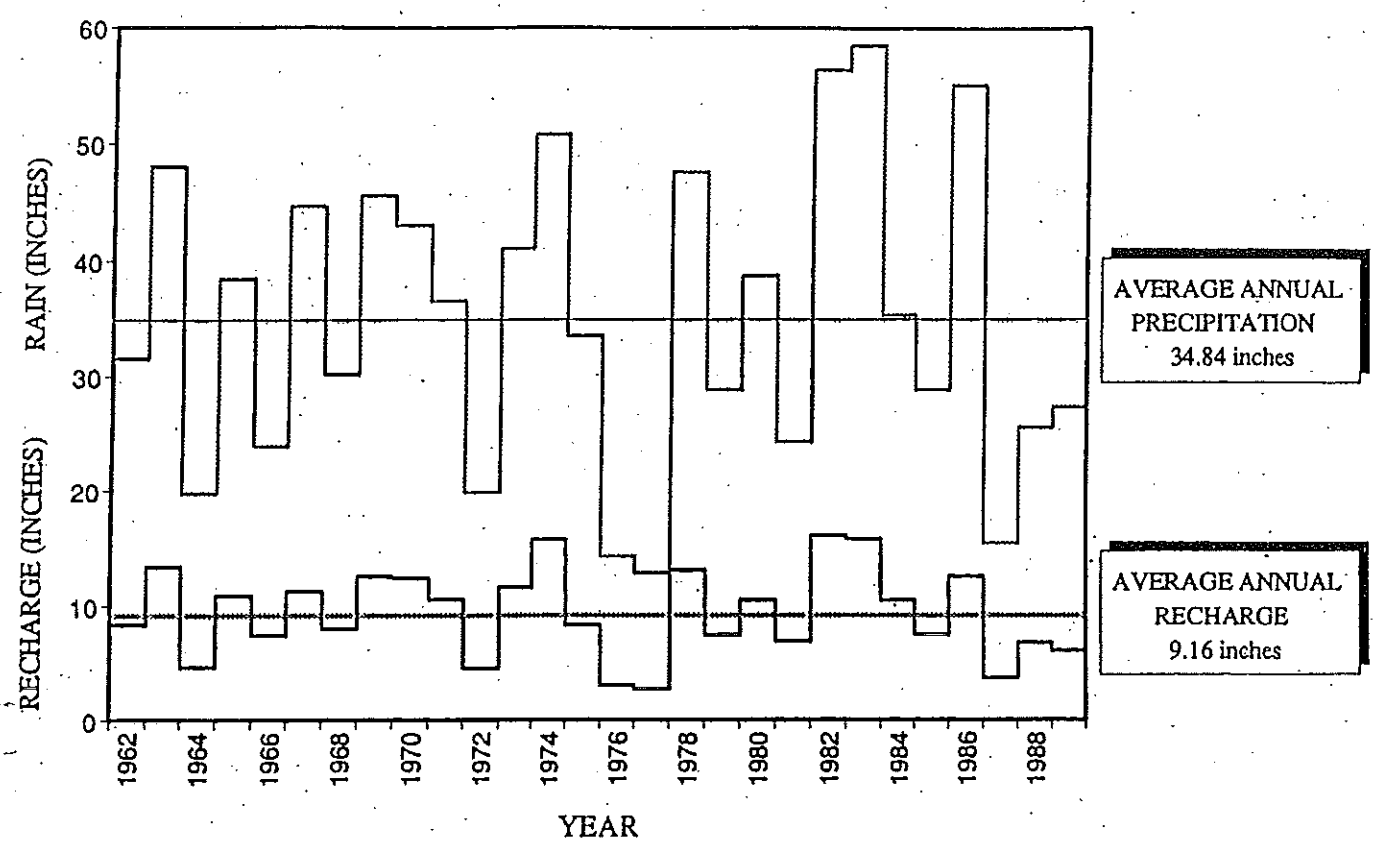
Applying this program to the North Napa Valley resulted in monthly values of deep percolation recharging the groundwater basin from natural, agricultural, and urban areas.

Recharge from the percolation of tributary streamflow is also mostly dependent on precipitation patterns. Percolation occurs as the tributaries enter the basin boundary passing from older impermeable geologic formations to permeable channel deposits in the alluvium. To fully understand the tributary interaction with the underlying groundwater basin on a monthly basis would require a sophisticated modeling approach based on simulation of the hydrologic cycle. For purposes of this study, an estimate of the average annual recharge from the percolation of tributary streams was determined using an average infiltration rate and the total wetted perimeter. The infiltration rate was taken from the Soil Survey of Napa County report (SCS, 1977), and the wetted perimeter was estimated from DWR land use-type classification maps (DWR, 1987).

Subsurface inflow occurs from adjacent groundwater bodies along the periphery of the North Napa Valley Groundwater basin. It is possible to estimate this recharge component using Darcy's Law and information concerning the hydraulic gradient across the adjoining basins. However, USGS reported that this component was relatively insignificant, occurring primarily east and southeast of St. Helena where Sonoma volcanics are known to exist (USGS, 1973). For purposes of this study, the subsurface inflow was taken to be that estimated by USGS in the 1973 investigation.

The estimated annual recharge in inches was plotted along with annual precipitation recorded at St. Helena. This is shown in Figure 5-3. The period chosen for the analysis, 1962 through 1989, is consistent with available well levels monitored by the Napa County Flood Control and Water Conservation District. As was stated earlier, the natural recharge occurring in the North Napa Valley Groundwater basin follows a pattern largely dependent on the precipitation patterns in the basin. Average annual recharge for the entire basin, which consists of deep percolation, tributary recharge, and subsurface inflow, from 1962 to 1989 was approximately 26,800 acre-feet per year.

A groundwater hydrologic budget considers the change in storage of the aquifer as a result of inflows into, and outflows out of, the basin. The change in storage is reflected in recorded well level fluctuations; an estimated change in storage can be computed from the inflow and outflow components and compared to recorded values. This provides a means for validating and refining the estimates of inflow and outflow.



ANNUAL PRECIPITATION AND RECHARGE IN NORTH NAPA VALLEY GROUNDWATER BASIN

FIGURE 5-3

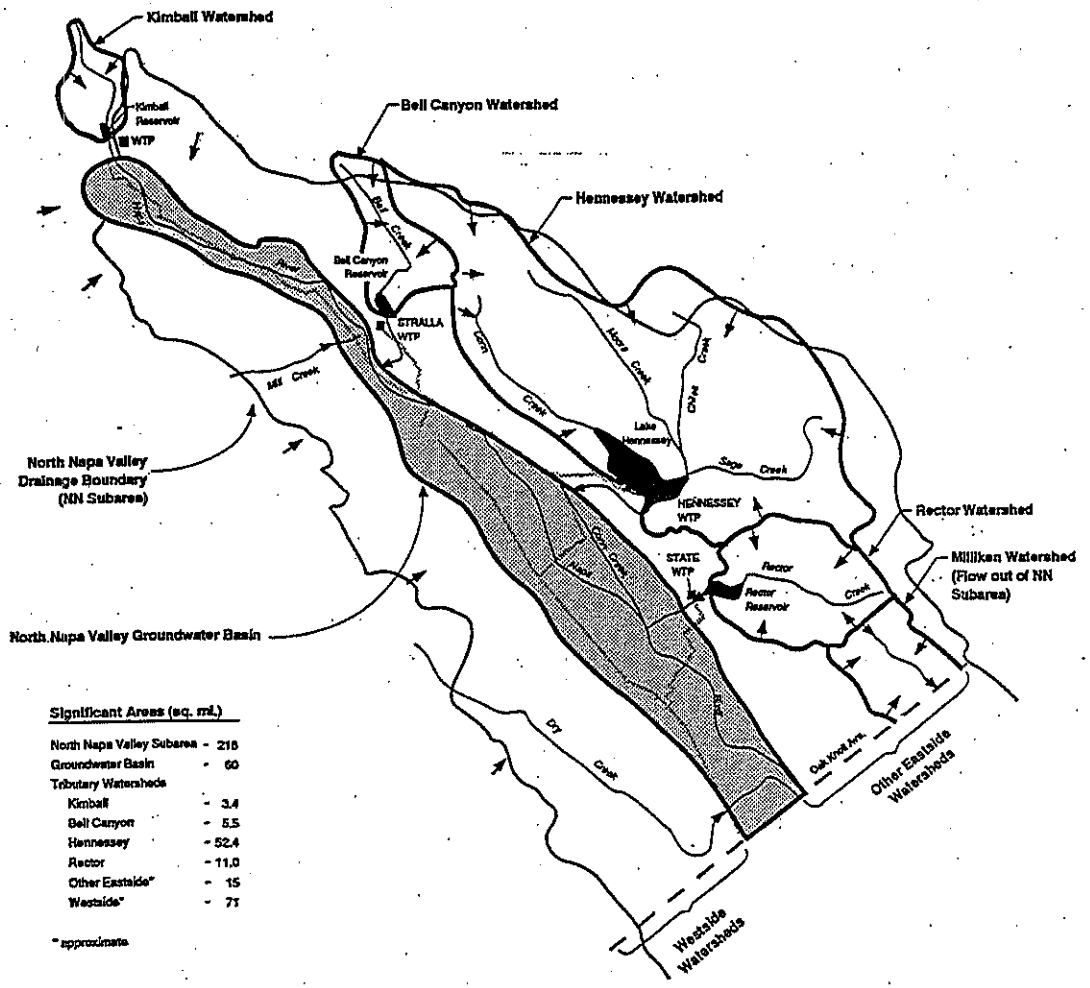
The surface/groundwater system interaction is depicted in Figure 5-4, and below this schematic the inflow and outflow components are shown. Inflow to the basin includes rain, irrigation-applied water, tributary recharge, and subsurface inflow. These components were discussed previously. The unit rate (inches/year) and average volume (acre-feet/year) are given in Table 5-1. These values are averaged over the historical period 1962 through 1989.

Outflow from the North Napa Valley Groundwater basin can be separated into the following categories: groundwater pumpage; net discharge to Napa River; evapotranspiration; irrigation return flow; surface runoff; and subsurface outflow.

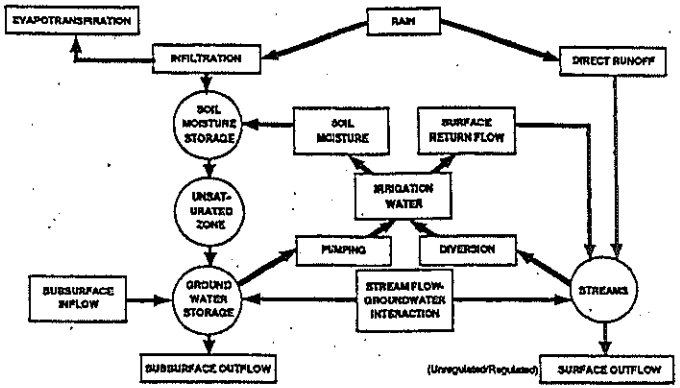
Groundwater pumping for agricultural purposes can be estimated from an analysis of the annual crop consumptive use of applied water and irrigation efficiency. Annual consumptive use of applied water as the portion of crop consumptive use that is met by irrigation water for an average year. The annual consumptive use of applied water was determined from crop acreage data (DWR, 1987) and crop evapotranspiration (DWR, 1975). The annual consumptive use of applied water divided by irrigation efficiency provides an estimate of total agricultural groundwater pumping. Groundwater pumpage for domestic uses was estimated based on historical rural population data in the North Napa Valley and a per capita consumption factor developed in Section 3.

In the 1973 USGS investigation, the Napa River was reported as a gaining stream. On a local scale, some regions of the Napa River may be recharging the aquifer below, and other reaches may gain water from the aquifer. However, an analysis of the recorded streamflow of Napa River at the outlet of the basin (Oak Knoll Avenue) indicates that on an annual average, the Napa River receives a net gain from the groundwater system below. This is reflected graphically in Figure 5-5. This figure indicates that even during months of little or no precipitation, flow persists. It should also be noted that on the average, tributary streams are intermittent. Hence, flows during the dry periods are a result of groundwater discharge. Using baseflow separation techniques, the average annual net gain to the Napa River was determined to be 12,700 acre-feet per year. This is in good agreement with the USGS estimate of 13,200 acre-feet per year.

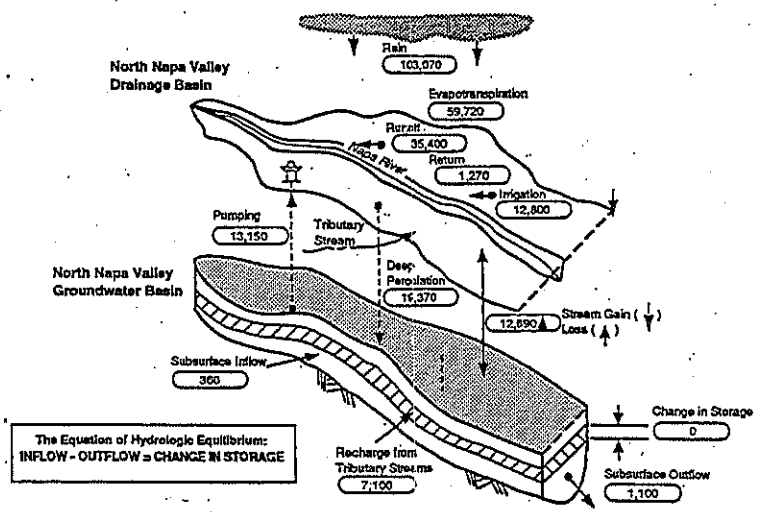
Evapotranspiration, irrigation return flow, and surface runoff are direct outputs from the soil moisture accounting routine shown previously in Figure 5-2. The results are tabulated in Table 5-1 Subsurface outflow can be estimated using the same techniques, employed for calculating subsurface inflow. However, because of the lack of detailed information regarding the hydraulic gradient across the southern boundary, the estimate developed by USGS in 1973 was used.



LOCATION OF GROUNDWATER BASIN AND TRIBUTARY SURFACE WATER INFLOWS



SURFACE/GROUNDWATER SYSTEM INTERACTION



GROUNDWATER BUDGET DURING 1962 TO 1989 (Ac-Ft/Yr)

DETERMINATION OF GROUNDWATER BASIN YIELD

FIGURE 5-4

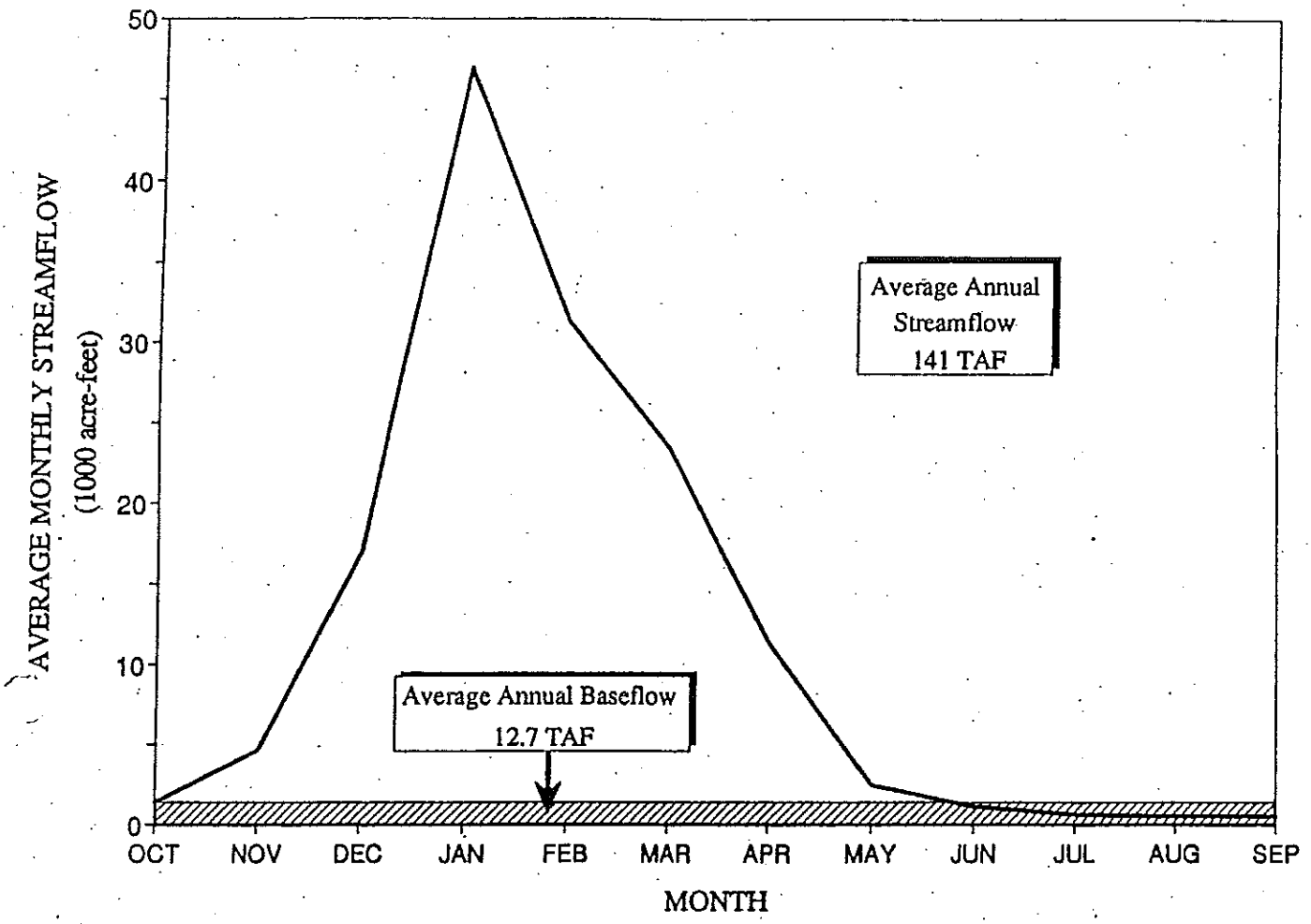
TABLE 5-1

GROUNDWATER HYDROLOGIC BUDGET
NORTH NAPA VALLEY GROUNDWATER BASIN
(PERIOD OF RECORD: 1962 TO 1989)

PARAMETER	UNIT RATE (1) (inches/yr)	AVERAGE VOLUME (acre-feet/yr)
Inflow to Basin		
Rain	34.84	103070
Irrigation-Applied Water	4.33	12800
Tributary Recharge	2.40	7100
Subsurface Inflow (2)	.12	360
Outflow from Basin:		
Evapotranspiration - Natural Land	18.59	22460
Evapotranspiration - Agricultural Land	21.56	34320
Evapotranspiration - Pervious Rural/Urban Land	18.59	2940
Groundwater Pumpage	4.45	13150
Irrigation Return Flow	.43	1270
Surface Runoff - Natural Land	10.58	12780
Surface Runoff - Agricultural Land	13.16	20950
Surface Runoff - Previous Rural/Urban Land	10.58	1670
Net Discharge to Napa River	4.30	12690
Subsurface Outflow (2)	.37	1100
Total for Basin:		
Inflow	41.69	12330
Outflow	41.69	12330
Net Change in Groundwater Storage	0.00	0

(1) Unless land type is specified, unit rate is averaged over entire basin. Basin land use areas are:
Natural Land - 14500 acres
Agricultural Land - 19100 acres
Pervious Rural/Urban Land - 1900 acres

(2) Estimate developed by USGS, 1973.



STREAMFLOW HYDROGRAPH - NAPA RIVER NEAR NAPA
(PERIOD OF RECORD: 1962-1989)

FIGURE 5-5

A complete tabulation of the inflow and outflow components is given in Table 5-1. A review of well level data collected by the County over the period 1962 through 1989 indicates that no net change of storage has occurred. This was reinforced by panel members associated with the Advisory Committee. This indicates that the groundwater basin has been in a state of equilibrium, and has not been exploited beyond the safe yield of the aquifer.

The average annual yield of an aquifer can be equated to the average annual recharge to the groundwater system. However, this definition does not factor in the reliability of the aquifer as a source of supply. If pumping were practiced such that it equalled the average annual recharge, in years of low rainfall the groundwater level would decline. For example, in recent years annual recharge has been less than 50 percent of normal (See Figure 5-3). Pumping according to average conditions would cause serious drawdown resulting in local overdraft and potential failing of wells.

The safe yield of an aquifer is defined as that amount of water that can be pumped from the groundwater which does not result in degradation to the aquifer, (such as poor water quality or causes economic hardship due to failure of wells. With this in mind, the groundwater system was evaluated in much the same way as the surface water reservoirs were in this study. Using historical precipitation recorded in St. Helena for the period 1940 through 1989, the soil moisture accounting routine was employed to estimate monthly deep percolation.

The average annual recharge from tributary watersheds was distributed on a monthly basis by relating it directly to precipitation patterns. The subsurface inflow was assumed to be constant annually and distributed equally over the months. The sum of these three components provided recharge to the groundwater basin on a monthly basis. This recharge is equivalent in definition to the inflow associated with a surface water reservoir. The criteria used in operating the groundwater reservoir was to ensure that shortages occurred no more than one year over the simulated 50 year period. Using RESSIM (discussed further in the reservoir safe yield section), a safe yield that provides reliable groundwater extraction was determined to be 22,500 acre-feet per year. This estimated safe yield resulted in a shortage of six percent in 1950; the late 1940s experienced low rainfall and was the critical period of the simulated planning horizon.

Milliken-Sarco-Tulucay Creeks Area

The Milliken-Sarco-Tulucay Creeks Basin was specifically defined by the USGS in an investigation conducted in the later 1970s (USGS 1977). The area, approximately 15

square miles, is located adjacent to the City of Napa along the eastern boundary of the Napa Valley floor. The area is distinguished from the Napa Valley because of its high-yielding Sonoma Volcanics east of the Soda Creek Fault. The heaviest precipitation occurs in the upper Milliken Creek basin. The area is drained primarily by Milliken, Sarco, and Tulucay Creeks. The 1977 USGS investigation estimated surface water outflow at an average of 24,100 acre-feet per year. However, records of streamflow were only available for several years in the 1970s. The primary use of water is for domestic and agricultural purposes. In addition, two golf courses report the use of well water. Groundwater availability was evaluated in two studies by the USGS, one published in 1960 and the more recent in 1977. The first study was of a regional nature considering the entire Napa Valley; the 1977 study focused only on this area and investigated the groundwater hydrology in detail.

In the Milliken-Sarco-Tulucay Creeks area, both the Sonoma Volcanics and alluvium yielded water to wells. Geographic location of the well dictates the source of water. The largest groundwater reserves exist east of the Soda Creek Fault in the Sonoma Volcanics. West of the Soda Creek Fault, alluvium is the primary source of groundwater. The fault is a normal fault, down-dropped to the west with as much as 700 feet of vertical displacement. The water-bearing characteristics of the alluvial aquifer were described in the section on North Napa Valley so they will not be repeated. The description of the water-bearing properties of the Sonoma Volcanics is similar to that previously mentioned in the North Napa Valley section, but there are some additions.

As before, the tuffaceous deposits are the most permeable unit in the Sonoma Volcanics. In this area, the specific yield of the tuff is estimated at 4 percent. Although the tuff is continuous throughout the area east of the Soda Creek Fault, the tuff in the Milliken and Sarco Creeks area is not believed to be hydraulically connected to the tuff near Tulucay Creek. A high point in the underlying impermeable material splits the continuous tuff into two subbasins. The north subbasin contains the Milliken and Sarco Creeks, and the southern basin contains Tulucay Creek. In the Milliken-Sarco Creek area, sedimentary deposits of low permeability previously described as the Huichica Formation overlie portions of the more permeable tuff. It is estimated that 196,000 Acre-Feet of water is stored in the Sonoma Volcanics in the 15 square mile area around the Milliken-Sarco-Tulucay Creeks area between 10- 500 feet below the ground surface. Of this, only 20,000 Acre-Feet is considered to be economically feasible to extract.

Natural recharge to the underlying groundwater formations is reported to occur primarily from Milliken, Sarco, and Tulucay Creeks, and geologic outcrop areas.

Subsurface inflow is reported to occur from Wild Horse Valley east of the area (USGS, 1977). Groundwater is primarily obtained from the Sonoma Volcanic Formations, a confined aquifer. Wells generally penetrate this aquifer at depths of 100 feet or greater. The average annual natural recharge was estimated at 5,400 acre-feet per year; the natural discharge was estimated at 2,650 acre-feet per year; and the pumping in 1977 was estimated to be 3,000 acre-feet (USGS, 1977). The USGS reported a gradual decline of the groundwater level occurring under these conditions. For purposes of this report it was assumed that the yield of the groundwater in this area is equivalent to the total recharge of 5,400 acre-feet per year. This number should be used with caution, however, since pumping at this rate would cause an initial significant drawdown possibly requiring wells to be deepened. Ideally, the aquifer would again stabilize when equilibrium was met. In addition, the safe yield is most likely less than this amount.

Carneros Area

The Carneros Valley is located in the southwestern portion of Napa County. The Carneros region has seen tremendous growth in vineyard acreage in recent years due to its prime suitability for providing high quality vine grapes. The primary surface water source is Carneros Creek which crosses through the Carneros Valley in a south by southeast direction. Carneros Creek is approximately 12 square miles; no streamflow records were available for Carneros Creek, but it has been reported as being ephemeral. Agricultural and domestic water needs rely primarily on surface water diversions and, to a lesser extent, pumping of groundwater.

Very little information is available concerning the hydrology of the Carneros Valley. The valley floor was described as Pleistocene terrace deposits and Recent alluvium with some Pleistocene Huichica Formation flanking the sides of the south end of the valley. A later report incorporates the terrace deposits into the alluvium.

The Huichica Formation contains fluvial deposits of gravel, silt, sand, and clay with an interbedded tuff. The basal 200-300 feet of the formation contains reworked pumice from the underlying Sonoma Volcanics. The Huichica Formation attains a maximum thickness of about 900 feet, but no information is available for the Carneros Valley area. The limited information available describes the Huichica Formation as having a low permeability with well yields less than 5 gpm. Extended pumping of wells screened in this unit often require several days to fully recover.

The younger alluvium, including the previously mentioned terrace deposits, are generally thin with much of their volume above the saturated zone. This unit also has

a low permeability. Available information stated that only a few wells tap this unit, and no additional well information was available.

Precipitation in the area is similar to the City of Napa, and is estimated to be approximately 23 inches. Natural recharge to the underlying groundwater formations is reported to occur primarily from geologic outcrop areas (mostly in the hillsides bordering he Carneros Valley) and infiltration from streambeds where they cross the geologic formations (USGS 1960). No extensive studies of the region concerning groundwater availability have been conducted, making accurate determination of the safe yield difficult. According to the Advisory Committee, there are reports of recent successful well development in this area. For purposes of this report, based on an assessment of existing geologic formations, the safe yield of the groundwater is estimated at less than 300 acre-feet per year.

Putah Creek Basin

Two regions in the Putah Creek Basin were of interest in this study: (1) Pope Valley; and (2) Capell Valley. Pope Valley is located west of the north portion of Lake Berryessa. It is drained by Pope Creek and Maxwell Creek and has an average annual precipitation of approximately 34 inches. Water is required primarily for agricultural purposes (vineyards and other irrigated agriculture). Direct diversion of surface is a key source, and pumping of groundwater is also practiced. Capell Valley, located in the southern most area of the upper Putah Creek watershed, is drained primarily by Capell Creek with some additional minor tributaries. Precipitation in this region averages approximately 31 inches. Like Pope Valley, the soil and climate conditions provide a very suitable environment for vineyard development. Previous investigations of groundwater hydrology in this area are contained in two key reports: (1) a reconnaissance report by DWR in 1962 which investigated the upper Putah Creek basin; and (2) a report on water supply alternatives prepared by the County in 1977.

Limited information is available regarding the hydrogeology of this area. Most of the information is from a reconnaissance level investigation. This report is only interested with the part of the Putah Creek Basin in Napa County. Within the Putah Creek Basin, only the alluvium is considered a significant water bearing deposit. Within Napa County, only the Pope Valley and the Capell Valley are large enough to be described here.

Stream development in the Pope Valley has been limited to small creeks with low flows. The lack of large streams prevented thick accumulations of alluvium from being deposited on the valley floor. This resulted in a limited groundwater storage capacity

in the alluvium of the Pope Valley. The only other source of groundwater in the Pope Valley comes from a pervious unit in the Sonoma Volcanics near Aetna Springs.

Most of the groundwater extracted in the Pope Valley comes from the alluvium The alluvium averages 25-30 feet thick and consists of silty clayey sands and gravel. With an assumed specific yield of 3 percent, the alluvium in the basin is estimated to contain 7000 Acre-Feet of water. Infiltration of winter precipitation recharges the basin. With most wells yielding less than 100 gpm, there is little opportunity for additional groundwater development.

Like the Pope Valley, the Capell Valley is also a structural basin surrounded by Pre-Cretaceous marine rocks. The thin alluvium cover on the valley floor is estimated to store only 700 Acre-Feet of water. No wells in the valley produce more than 15 gpm. Water in the alluvium is stored in small local sand and gravel lenses limiting well yields to less than 15 gpm. A few wells tap the fractured Pre-Cretaceous rocks that surround the valley. These wells yield 10-12 gpm with a drawdown of about 100 feet. Little opportunity exists for further development of groundwater in the Capell Valley.

Groundwater resources in the Pope and Capell Valleys are relatively limited. It was reported by DWR that the best source of groundwater is in the shallow alluvium and to some extent the Sonoma Volcanics along the hillside of the valley floor. Pope Valley has been estimated to have approximately 7,000 acre-feet of usable storage. Capell Valley has a less well defined alluvial aquifer from which groundwater can be extracted. It has been estimated that less than 700 acre-feet of storage exist in this region. Historically, well yields in Pope Valley have been limited to less than 100 gpm, while in Capell Valley well yields greater than 15 gpm are rare. These low yields are due to the nature of the alluvium, consisting of silt and fine grain sands derived from adjacent hillsides. In a memorandum released by DWR in 1980, a groundwater yield estimate was reported as 400 acre-feet per year for Pope, Capell, and Chiles Valleys combined (DWR, 1980). For purposes of this study, it was assumed that the safe yield for Pope and Capell Valleys was less than 400 acre-feet. Further revision of this estimate was not possible given the available information.

A summary of the estimated safe yields and usable storage of the groundwater supplies discussed above is provided in Table 5-2.

RIVER DIVERSION

The Napa River, which flows through the entire Napa Valley, from its uppermost northwestern end above Calistoga, to San Pablo Bay, offers a potential for direct

TABLE 5-2

SUMMARY OF GROUNDWATER BASIN SUPPLY

Basin	Safe Yield (acre-feet/yr)	Usable Storage (acre-feet)
North Napa Valley GWB	22500	190000
Milliken-Sarco-Tulucay GWB	<5400	20000
Lake Berryessa Basin (Pope and Capell Valleys)	< 400	7700
Carneros Area	< 300	<3000

diversion for the prime valley vineyards located between Highway 29 and the Silverado Trail. As a review of Napa River flows at Oak Knoll Avenue for the period 1962 to 1989 indicates (See Figure 5-5), a well-defined seasonal pattern is present, with flows predominantly occurring in the period December through March and minimum flows in the summer and early fall. Yearly variations are significant as can be seen from Table 5-3, and consecutive dry years, are not uncommon, as is the case in the current four-year drought period. Water quality may impact divertability in the winter due to high turbidity.

Without storage, river diversion capability is mainly determined by the match of seasonal variation of water need and river flow. For vineyards there are three water uses:

- Irrigation
- Frost Protection
- Heat Protection

Although some irrigation may occur in the winter, the months May to September form the principal irrigation season. Frost protection by sprinklers is generally needed between mid-March and mid-May, while heat protection by sprinklers would occur most likely during July and August. Clearly there is no real match between seasonal supply and need variation, except for some potential for frost protection. A 1973 estimate by Metcalf and Eddy ("Napa County Water Resources Development Study-Phase II") put the spring frost season Napa River diversion at approximately 2,000 Ac-Ft above St. Helena and 4,500 Ac-Ft above Oak Knoll Avenue with an 80 percent reliability, assuming a 60 percent capture rate and a 10 cubic feet per second fish release. The 1973 Metcalf and Eddy analysis of Napa River diversions also determined that 10,000 Ac-Ft/Yr could be obtained from the river if storage were constructed in Spring Valley (10,000 Ac-Ft) and from on-site vineyard reservoirs (3,000 Ac-Ft), assuming some portion of this reservoir storage is unavailable due to carryover storage or is supplied from groundwater. Review of the more extensive Napa River flow data for the period 1960-88 shows that mid-March to mid-May flows available for frost protection probably do not exceed 10,000 Ac-Ft/Yr during the drier years.

RESERVOIRS

Local County reservoirs include five major facilities serving basically municipal drinking water needs. These facilities including the City of Napa's Milliken Reservoir and Lake Hennessey; the State of California's Rector Reservoir; St. Helena's Bell Canyon Reservoir; and Calistoga's Kimball Reservoir. Lake Berryessa, owned by the U.S.

TABLE 5-3

MONTHLY FLOW, 1960-88, NAPA RIVER NEAR NAPA

						Frost Protection		Irrigation		Heat Protection			
Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Year Total
1960	44	82	192	2306	42620	19910	4211	1708	308	12	0	0	71393
1961	0	261	3066	6935	14490	9826	3667	1447	201	0	0	0	39893
1962	0	209	4719	3918	56880	34080	4187	1377	208	2	0	0	105580
1963	20770	1680	14020	31350	59830	22840	51620	6891	1697	320	105	96	211219
1964	449	6129	2116	16160	3546	2089	1101	320	149	23	0	4	32086
1965	40	3527	60250	77930	9110	3854	16290	3209	736	191	218	119	175474
1966	146	3362	8069	53500	25870	7976	2785	1055	206	24	36	12	103041
1967	26	7734	37040	101000	23190	32720	42240	7377	3306	1120	274	187	256214
1968	298	443	3275	26150	35560	27320	5792	1664	373	156	165	63	101259
1969	224	591	19680	114400	90900	32300	7236	2596	986	396	219	41	269569
1970	344	487	31320	164300	28490	22500	4070	1525	345	111	64	66	253622
1971	118	12840	74870	28100	6760	14370	6315	2307	807	276	136	177	147076
1972	189	481	5378	5147	8795	3463	2110	829	146	12	0	34	26584
1973	437	7816	9594	100000	69240	35520	6657	2412	569	136	97	156	232634
1974	233	36630	31980	60470	16730	69090	30710	4005	1400	838	474	496	253056
1975	415	444	1979	2844	56860	60740	12410	3574	1184	561	306	397	141714
1976	631	815	682	650	374	1242	889	151	6	0	3	10	5453
1977	35	71	45	179	24	160	12	0	0	0	0	0	526
1978	0	4472	14370	95830	45450	44080	13190	3906	1119	502	266	182	223367
1979	155	278	358	18726	35907	18006	6568	3406	783	371	250	154	84963
1980	759	1268	12762	72372	93484	28924	6558	2627	862	345	242	202	220405
1981	174	207	4835	21766	9966	13433	4527	1580	421	135	169	86	57300
1982	445	32042	81185	90227	56776	49801	79973	5673	2307	1063	562	639	400694
1983	699	14707	31781	74152	101025	160069	22867	13948	3108	1192	581	450	424581
1984	722	30249	90823	19363	9072	9789	3492	2065	803	341	281	222	167221
1985	371	10570	6466	4433	21758	10343	5560	1872	686	252	215	252	62779
1986	310	815	3019	13290	227501	75019	7092	2786	970	525	315	320	331962
1987	295	301	475	1248	11329	11959	2744	1027	345	211	132	60	30127
1988	84	301	14284	28043	4505	1802	1395	1099	459	159	108	76	52316
Total	28413	178813	568635	1234791	1166041	823226	356267	82437	24490	9274	5218	4502	4482107
Average	980	6166	19608	42579	40208	28387	12285	2843	844	320	180	155	154555
Maximum	20770	36630	90823	164300	227501	160069	79973	13948	3306	1192	581	639	424581
Minimum	0	71	45	179	24	160	12	0	0	0	0	0	526

Bureau of Reclamation, is the key feature of eastern Napa County. Numerous smaller reservoirs or ponds exist throughout the County, including those in the Angwin and eastern valley (Pope, Chiles, Capell) areas. Lake Curry, whose supply goes to the City of Vallejo, is not considered part of Napa County's supply. The supplies available from the reservoirs are discussed below under three headings:

- Major Municipal Reservoirs
- Lake Berryessa
- Miscellaneous Reservoirs

Major Municipal Reservoirs

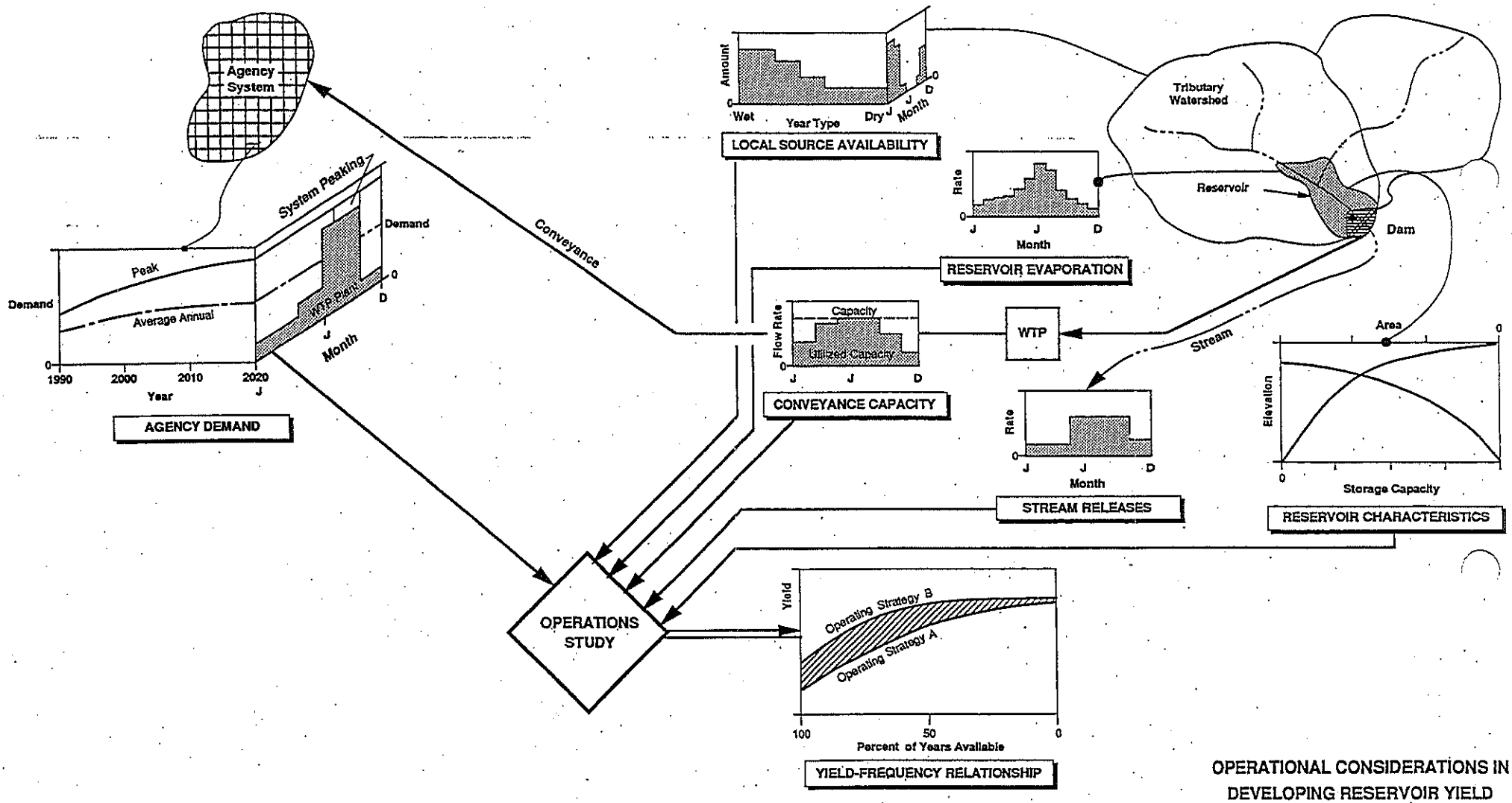
An analysis was conducted for each of the five major municipal reservoirs in Napa County to determine the firm surface water yield and develop yield-frequency curves (See Figure 5-6). The reservoirs studied were Lake Hennessey, Milliken Reservoir, Rector Reservoir, Bell Canyon Reservoir, and Kimball Reservoir. The reservoirs are located in the mountains on the east and north sides of the Napa Valley.

The yield analysis provides a measure of the water quantity available from each reservoir, and the reliability of that supply under varying hydrologic conditions. The timing and volume of the natural seasonal streamflow is different from year to year because of varying seasonal weather conditions. The availability of water may not coincide with the seasonal timing of municipal and agricultural demands. Thus, the function of a reservoir is to redistribute the streamflow with respect to time so that water demands can be satisfied on a dependable long term basis.

The yield of a reservoir is that amount of water that can be reliably supplied to meet demands over time. The firm yield of a reservoir is defined as the amount of water that can be supplied, without any shortage, during a specific critical time interval, usually the driest period of years on record.

The yield analysis was divided into two tasks. The first task was to extend the existing streamflow record in order to analyze the operation of each reservoir over a longer hydrologic period. The second task was to use the streamflow values, developed in task one, as input to a reservoir simulation model in order to evaluate the yield of each reservoir under varying hydrologic conditions.

Streamflow Generation. Of the five reservoirs in the analysis, historical reservoir inflow data was available only for a 10 year period for Lake Hennessey. This inflow data, for the period 1980 to 1989, was too short a period of record to allow an adequate analysis



OPERATIONAL CONSIDERATIONS IN DEVELOPING RESERVOIR YIELD

FIGURE 5-6

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under a range of different hydrologic conditions. In order to provide a longer period of record that includes a wider variety of tributary streamflows for the yield analysis, the 10 years of historical inflow data for Lake Hennessey was used to calibrate a Runoff Simulation Model (RUNOFF), and generate streamflows for the period of available rainfall data between 1940 and 1989.

The RUNOFF model was used to generate the extended streamflow record because it performs a soil moisture accounting and unsaturated flow simulation for the watershed based on actual historical rainfall data. Standard rainfall-streamflow correlation techniques were inadequate due to the number of variables affecting the generation of runoff, including soil type and antecedent soil moisture conditions. Input data for the RUNOFF model includes monthly precipitation data for the period of record from a rain gauge representative of the watershed. Monthly average evaporation and evapotranspiration data and an appropriate Soil Conservation Service (SCS) curve number are also required. The SCS curve represents the runoff potential of the watershed based on soil group, vegetative ground cover, and amount of impervious area in the watershed. Model output includes direct runoff from the watershed, evapotranspiration, and groundwater flow for each month in the simulation period.

Precipitation data was obtained from rain gauges at Napa, Angwin, and Calistoga and adjusted to represent rainfall in each watershed. The Napa gauge was used to generate the streamflows for the Milliken and Rector Reservoirs, and the Angwin gauge was used for Lake Hennessey and Bell Canyon Reservoir. The Calistoga gauge was used for Kimball Reservoir streamflow.

Average monthly evaporation data was obtained from DWR Bulletin 73-79, "Evaporation From Water Surfaces in California". This data, for a Type A evaporation pan in Yountville-Gamble, was adjusted to a free water surface by applying a pan coefficient of 0.74. This data was assumed to be representative of the evaporation at each of the five reservoir locations. Average monthly evapotranspiration data representative of the natural vegetative cover in the watersheds was taken from DWR Bulletin 113-3, "Vegetative Water Use In California". SCS curve number 82 was selected based on the hydrologic soil group, vegetative cover, and amount of impervious area contained in the watersheds.

The RUNOFF model was calibrated using historical streamflow data for the Lake Hennessey watershed for the period 1980 to 1989. Based on similar physical characteristics between the reservoir watersheds, the calibrated model was then used to generate streamflows for the watersheds tributary to each reservoir for the period of record between 1940 and 1989. Streamflow from the watershed tributary to Kimball

Reservoir was generated for the period 1949 to 1989 due to the shorter record of rainfall data available at the Calistoga rain gauge.

Table 5-4 presents a summary of the streamflows generated for each of the five reservoirs. The table includes the watershed drainage area and the maximum, average, and minimum yearly inflow for each reservoir.

Reservoir Yield Analysis. The yield analysis provides a measure of the quantity of water available from a reservoir and the reliability of that supply under varying hydrologic conditions. The Reservoir Simulation Model (RESSIM) was used to evaluate the yield of each of the five reservoirs based on the 50 years of monthly streamflow generated by the RUNOFF model.

The Reservoir Simulation Model was adapted from the SIMYLD2 model developed in 1972 by the Texas Water Development Board. RESSIM is a computer program designed to simulate the monthly operation of a reservoir subject to a sequence of reservoir inflows and demands. The model can also determine the maximum firm yield of the reservoir for the period of inflow record. RESSIM accounts for reservoir inflow, evaporation, releases, spills, and changes in storage on a monthly time step. The model incorporates a reservoir operating rule and allows the user to specify the desired amount of water held in storage at the end of each month.

For each reservoir yield analysis, input data for RESSIM included the monthly streamflow record generated for each of the reservoirs along with the same average monthly evaporation data used with the RUNOFF model. Reservoir capacity versus surface area data was obtained from reservoir capacity curves for each reservoir. Monthly reservoir storage goals were approximated based on a general monthly operations rule curve that was applied to each reservoir.

The monthly municipal demand distribution for each reservoir was taken from work done in the Water Needs Analysis (Section 3) of this study. The demand distribution was based on an analysis of monthly water production data for the period 1985-1989. Table 5-5 shows the monthly demand distribution used for each reservoir.

The yield analysis was conducted without allowing water transfers between water suppliers in order to determine the yield and supply reliability of each reservoir on an individual basis. For both Lake Hennessey and Milliken Reservoir, water rights documents and operational records were reviewed to evaluate the effect of water rights and instream-flow requirements on reservoir yield and reliability.

TABLE 5-4
RESERVOIR INFLOW SUMMARY

Reservoir	Drainage Area (Sq. Mile)	Annual Inflow (AF/YR)		
		Maximum	Average	Minimum
Milliken	9.6	14,154	3,656	0
Rector	11.0	13,800	3,354	0
Lake Hennessey	52.4	82,890	19,692	0
Bell Canyon	5.5	12,166	3,133	4
Kimball	3.4	8,904	2,817	3

TABLE 5-5
MONTHLY MUNICIPAL DEMAND DISTRIBUTION
(Percent of Annual)

Reservoirs	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Milliken	5.2	4.9	5.8	7.4	10.1	12.0	13.1	12.1	9.8	8.3	5.9	5.5
Rector	4.2	5.3	4.9	6.5	9.7	14.0	11.0	11.4	11.1	8.9	5.9	5.1
Lake Hennessey	5.2	4.9	5.8	7.4	10.1	12.0	13.1	12.1	9.8	8.3	5.9	5.5
Bell Canyon	4.5	4.3	5.4	7.6	10.0	12.1	13.2	13.4	10.7	8.4	5.5	4.7
Kimball	6.6	6.1	6.9	7.8	9.2	10.4	11.7	10.9	8.8	7.9	6.7	6.9

Note: Percentages based on 1985-1989 production data.

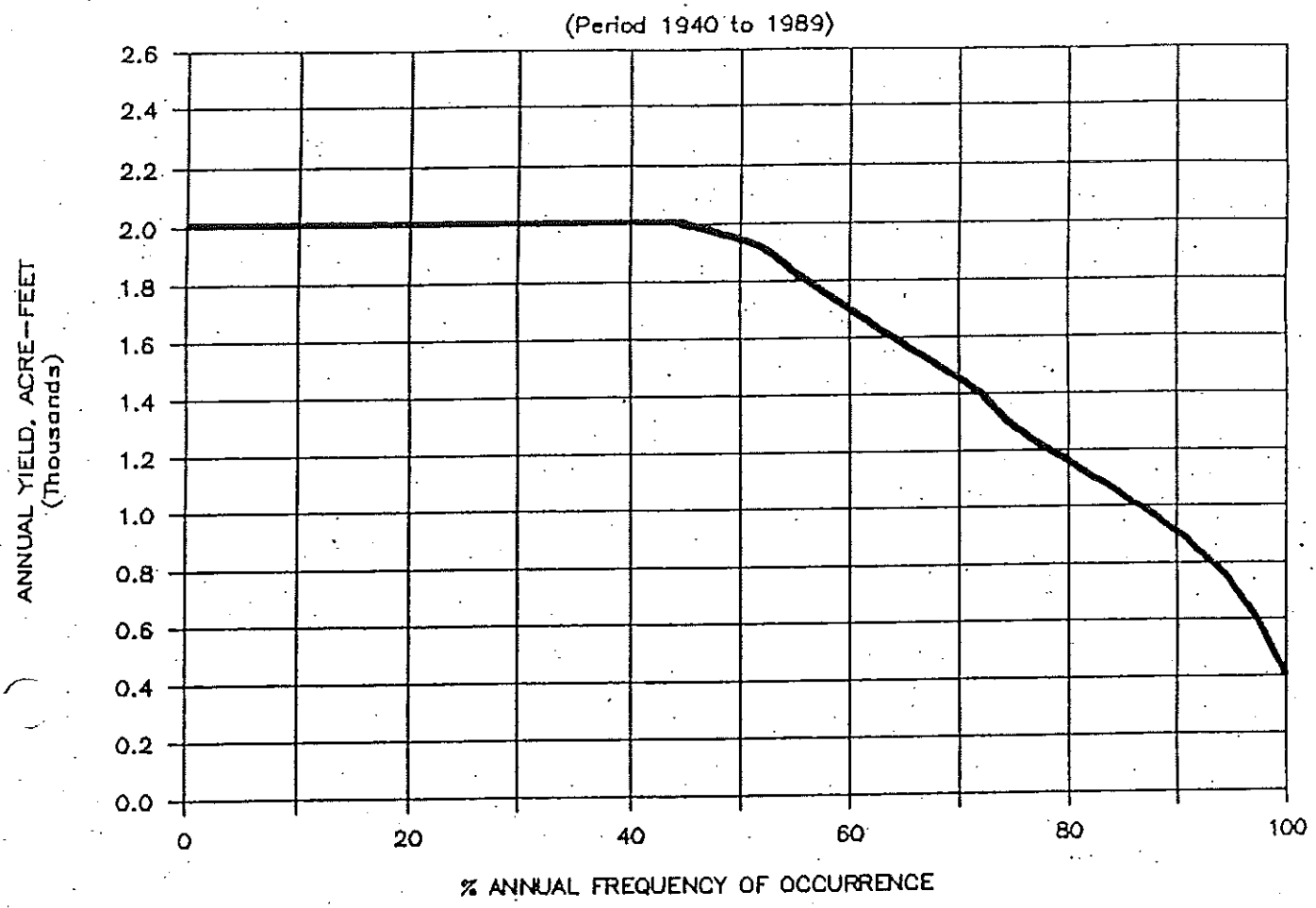
For this study, firm yield was defined as the reservoir yield that could be supplied for the 50 years of record, between 1940 and 1989, without any shortage. The Kimball Reservoir analysis used a 40 year period of record, from 1949 to 1989, due to the shorter period of data available at the Calistoga rain gauge. Thus, the firm yield for each reservoir is the largest annual volume of water that can be supplied during the driest critical period in the historical record, without any shortage.

The yield frequency curve developed for each reservoir is shown in Figures 5-7 through 5-11. The shape of each curve is a function of the annual streamflow, reservoir storage capacity, and the water supply demand distribution. The frequency curves provide an estimate of the reliability of each reservoir for different levels of annual yield. The frequency curve shows the percent of the time that a given level of annual yield can be supplied, without any shortage, based on the period of record for the RESSIM simulations. The firm yield is shown as the annual yield that can be supplied 100 percent of the time. As an example, Milliken Reservoir can supply a yield of 1,150 acre-feet per year 80 percent of the time. This means that there were 10 years out of the 50 year simulation period when this yield could not be met. The firm yield for Milliken Reservoir or the yield that could be supplied 100 percent of the time, in all 50 years without any shortage,is about 400 acre-feet.

The firm yield of the smaller reservoirs with little carry-over storage, such as Kimball and Bell Canyon, was determined by the short, but very dry period from 1976-1977, whereas the firm yield for Lake Hennessey, the largest reservoir at 31,000 acre-feet, was determined by the longer drought period from 1945-1949. The longer drought period used up the carry-over storage that allowed Lake Hennessey to provide a larger reliable quantity of water during the 1976-1977 drought.

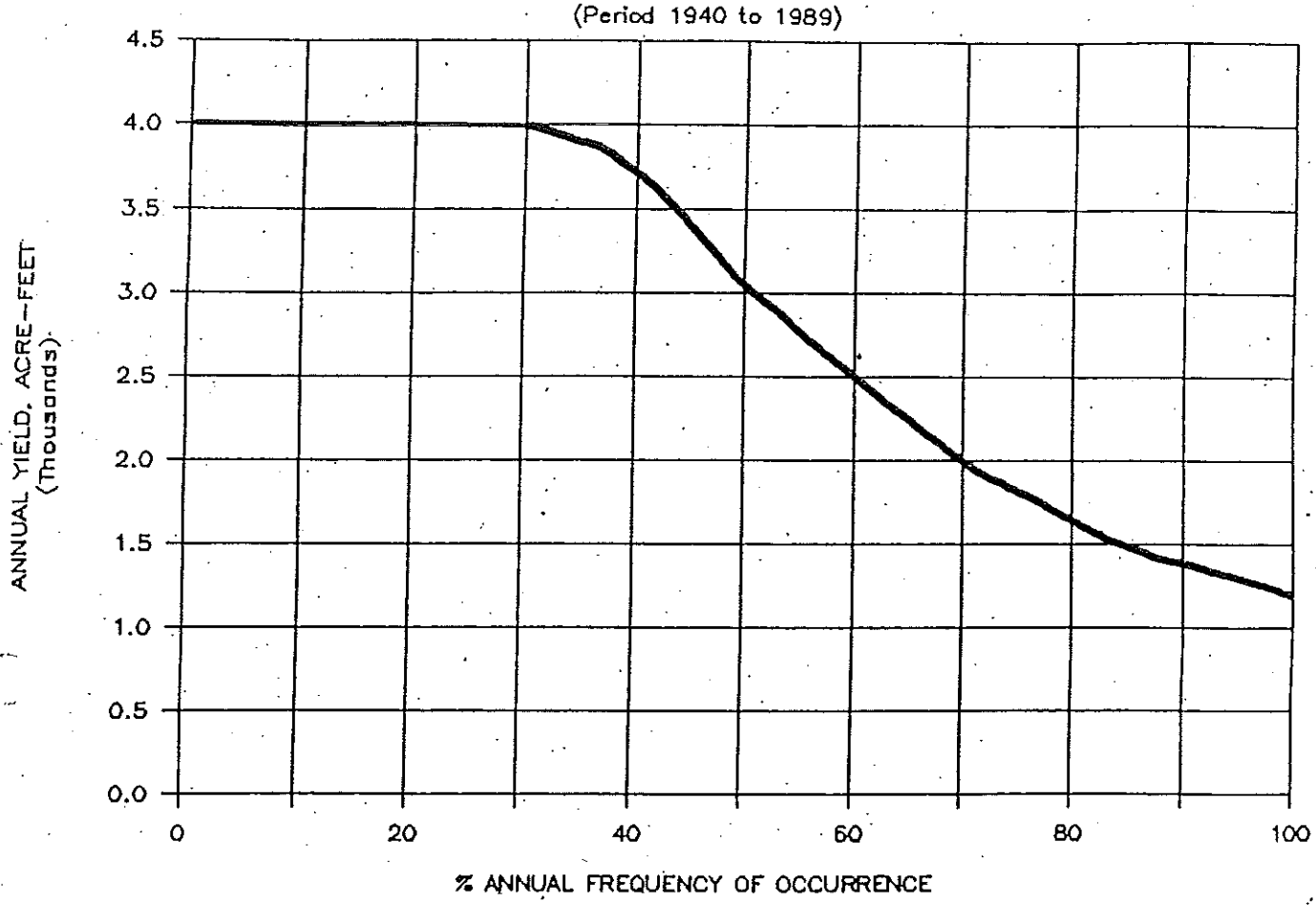
Table 5-6 presents a summary of the results of the yield analysis for each of the five reservoirs. The table includes the reservoir storage capacity and reservoir yield reliability levels at 50, 80, 90 and 100 percent. The firm yield is shown in the 100 percent column and represents the yield that can be supplied every year without shortage based on the reservoir simulations for the period of record. The reservoir storage utilized in the yield analysis does not include surcharge storage created by flashboards in the spillway. Flashboard use is regulated by the State Division of Safety of Dams and would only be allowed late in the rainy season to avoid any danger from storms.

The reservoir yields shown in Table 5-6 are significantly lower than the yields estimated in previous studies. Since the background data and period of record used for these previous estimates are unknown, it is impossible to make any kind of valid comparison.



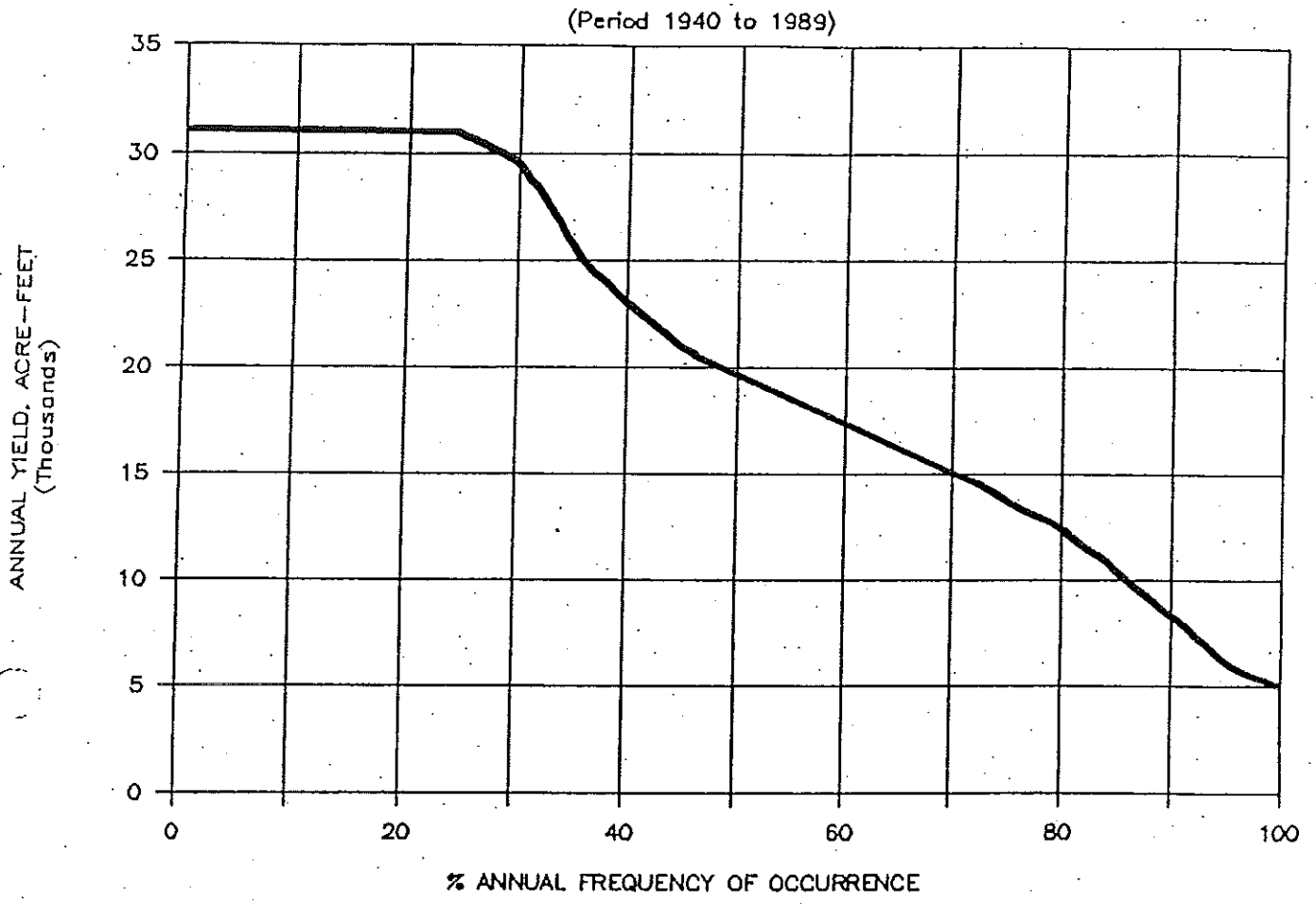
MILLIKEN RESERVOIR ANNUAL YIELD

FIGURE 5-7



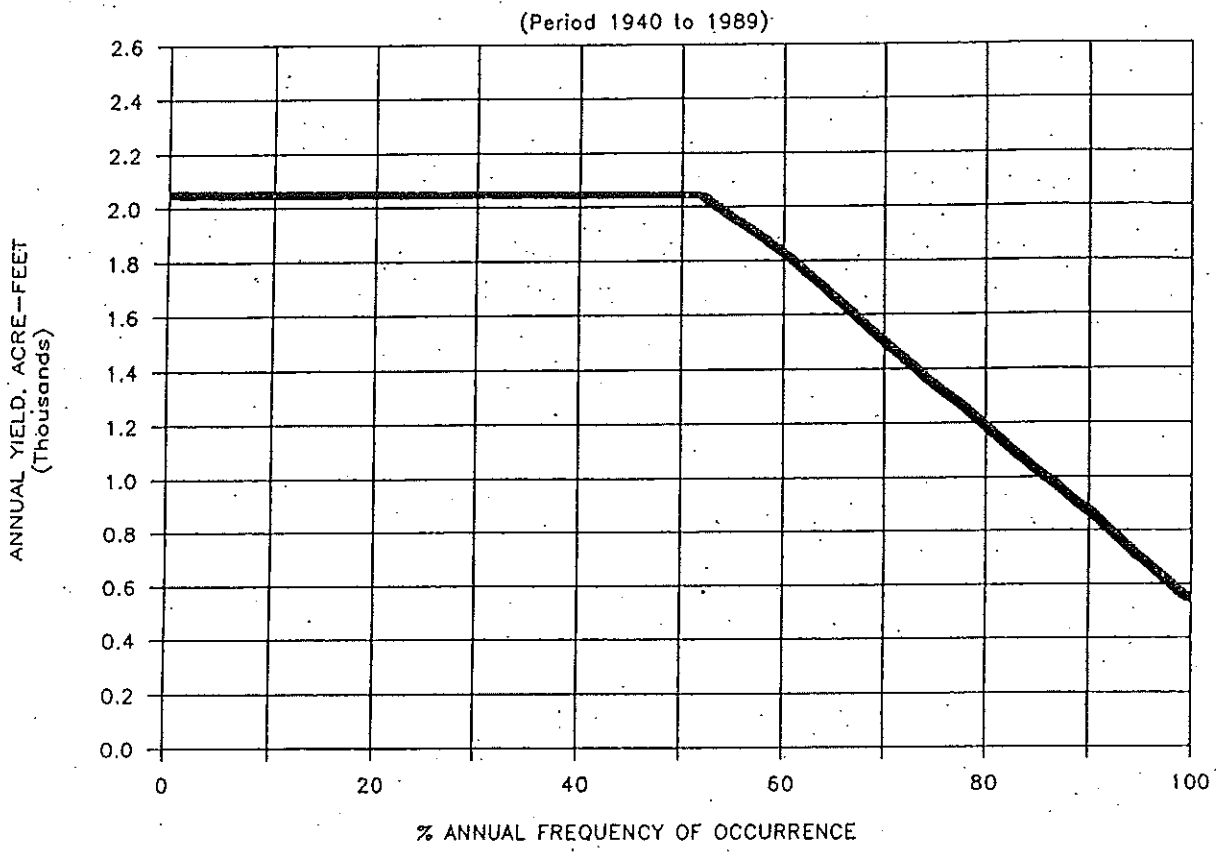
RECTOR RESERVOIR ANNUAL YIELD

FIGURE 5-8



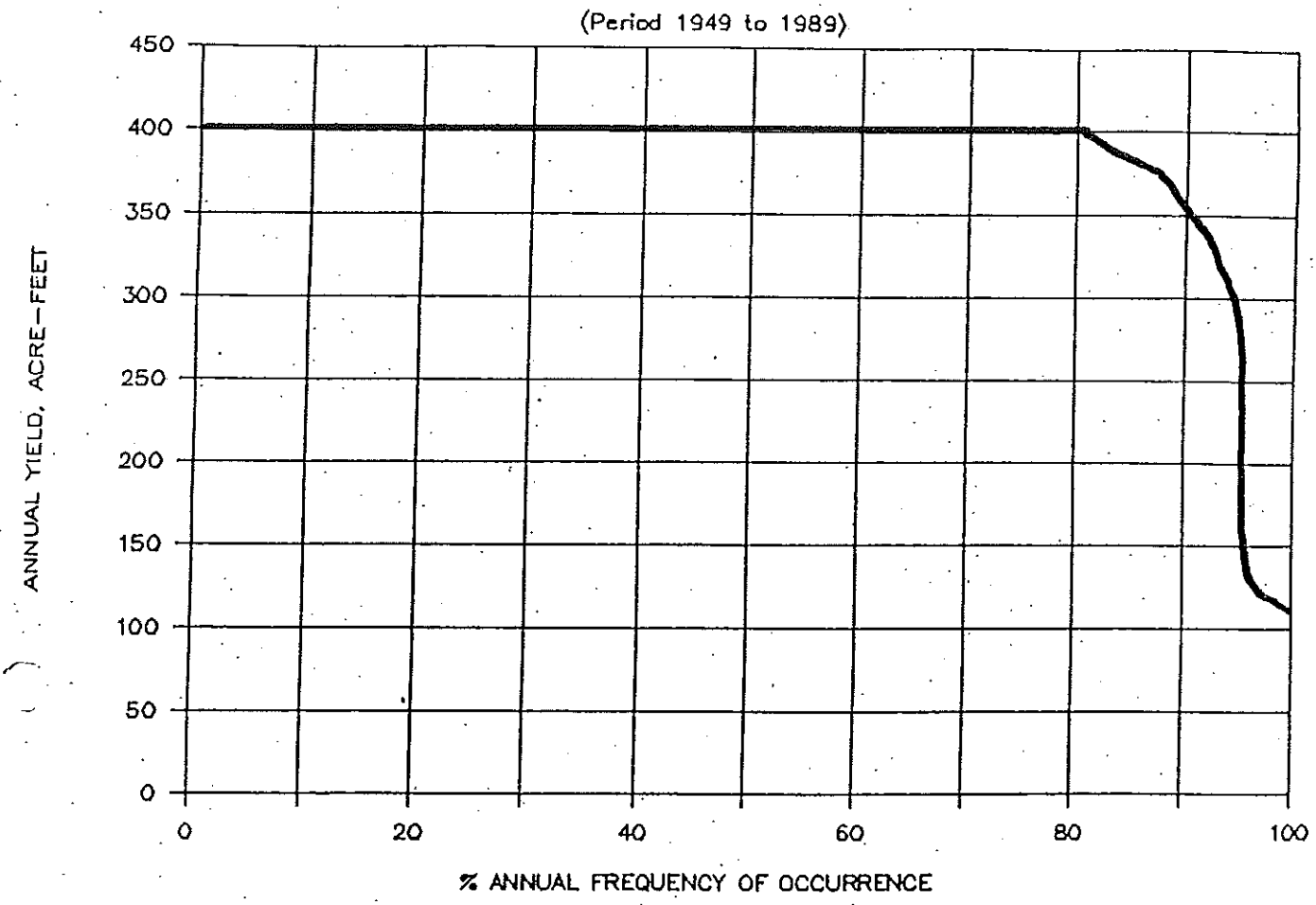
LAKE HENNESSEY ANNUAL YIELD

FIGURE 5-9



BELL CANYON RESERVOIR ANNUAL YIELD

FIGURE 5-10



KIMBALL RESERVOIR ANNUAL YIELD

FIGURE 5-11

TABLE 5-6
RESERVOIR YIELD ANALYSIS SUMMARY

Reservoir	Storage Capacity (AF)	Reservoir Yield Reliability (AF/YR)[1]			
		100%	90%	80%	50%
Milliken	2,000	400	900	1,150	1,950
Rector[2]	4,000	1,200	1,400	1,650	3,000
Lake Hennessey	31,000	5,000	8,300	12,000	19,500
Bell Canyon	2,050	530	870	1,200	2,050
Kimball[3]	335	110	350	400	400

(1) Reservoir yield was computed for a range of reliability levels. Firm yield (yield that can be supplied every year without any shortage) is shown in the 100 percent column. Other columns show the percent of the time the specific yield can be supplied, based on the period of record 1940-1989.

(2) Rector provides 325 Ac-Ft/Yr of yield to the Town of Yountville; the remainder to the State for the Veterans Home and Napa State Hospital.

(3) Kimball yields and average inflow based on period 1949-1989.

But the probable primary differences are that the RESSIM model allows a much more detailed level of analysis then was used previously, and that the present analysis was based on an extended streamflow record that included three major droughts that were not previously analyzed. These three droughts include the periods 1945-1949, 1976-1977, and 1987-1989.

Lake Berryessa

In the eastern part of Napa County, the 1.6-million-acre-feet Lake Berryessa dominates the landscape. This 15-mile-long reservoir was created in the 1950s by the U.S. Bureau of Reclamation by constructing Monticello Dam which is located at the junction of Napa, Solano, and Yolo Counties. The lake itself is entirely within Napa County. On March 7, 1955, the Bureau of Reclamation entered into a 40-year contract with the Solano County Flood Control and Water Conservation District for Lake Berryessa's full yield of 247,000 Ac-Ft/Yr for agricultural and municipal and industrial water. To deliver that water, Solano County residents constructed the required regulating reservoirs, canals, pipelines, and pumping stations. The key water users are farmers and such municipalities as the City of Fairfield and Vacaville. At the time of construction of Lake Berryessa, the California State Water Resources Control Board said that an Upper Putah Creek "depletion reservation" of 33,000 Ac-Ft/Yr must be set aside from the 247,000 Ac-Ft/Yr yield for future use upstream of the lake-namely for Lake and Napa Counties, and further required a downstream release of an additional 20,000 Ac-Ft/yr.

The key issue with water rights is that such rights are often reserved only as they relate to a proposed beneficial use implemented within a date specified by the Board. Over the years, the water need has developed in Solano County so that today it is actually using some of the Upper Putah Creek "depletion reservation". Of that 33,000 Ac-Ft/yr reservation, Lake County was allocated 7,500 Ac-Ft/yr for the proposed Dry Creek Dam, a project that has not been built. The State now has applications for some 80,000 Ac-Ft/Yr of the unused portion of the "depletion reservation".

Solano County's growth and presence of a delivery system from Lake Berryessa have facilitated its use of the unused portion of the reservation. It is permitted to do so by the Board on a year-to-year basis. In 1993, when the permit goes to license, and actual beneficial use has to be demonstrated, Solano County could most likely point to its needs and capability to deliver that water through an existing distribution system. However, the State Board would consider Lake, Napa, and Yolo Counties' protests in making any decision, and would prefer that a negotiated allocation of the unused water be achieved between the counties. An agreement between Napa County and Solano

County now provides that 1,500 Ac-Ft of Lake Berryessa water will be available for lakeside use. The desire of Solano County to purchase Monticello Dam from the Bureau has further complicated the water rights issue in that the Bureau would prefer that such an unresolved issue be taken care of before any potential sale which must be approved by Congress. As a result, negotiations were begun in 1988 between Napa and Solano Counties, with Napa requesting 15,000 Ac-Ft/Yr, and in 1989 with Lake County which requested 10,000 Ac-Ft/Yr. In the case of Napa County, Solano offered approximately 10,000 Ac-Ft/Yr. During the 1988 Napa election period, talks between the two counties were put on hold after three new supervisors were elected to the Napa board. In February 1989, the board voted to go back to the negotiating table. At this time, the water rights issue has not been resolved.

The issue was further complicated by recent legal action of several Solano County agencies who are requesting court adjudication of the Putah Creek water supply.

As a Napa County supply, water would most likely be restricted to use within the lake's watershed, a consideration that was incorporated in establishing the Lake Berryessa Subarea (LB) boundaries for the current water resource study. Key users of this water would be residents and visitors of Lake Berryessa, and irrigation of vineyards such as in Pope and Capell Valley from storage of winter stream flows in the upper Berryessa watershed.

The amount of Lake Berryessa water that will be permanently available to Napa County is indeterminate at this time.

IMPORTED WATER

Napa County is a contractor with the State of California Department of Water Resources for water for municipal and industrial water from the State Water Project via the North Bay Aqueduct. This facility derives its water from the Delta at Barker Slough and delivers it to cities in Solano County via conduit and then by supplemental pumping into the Jameson Canyon area of southeast Napa County. For many years, an interim supply source was provided from Lake Berryessa via the Putah South Canal until the recent completion of Phase II of the aqueduct. The master water supply contract between the County and the State was signed on December 19, 1963 with subsequent amendments revising contract repayment and entitlement buildup.

The current contract buildup schedule is shown in Table 5-7, derived from Contract Amendment No. 12 of February 11, 1986. The entitlement culminates with a total of 25,000 Ac-Ft/Yr in the year 2021, allocated as follows:

Contractor	Entitlement (Ac-Ft/Yr)
City of Napa	18,800
American Canyon CWD	5,200
Town of Yountville	500
City of Calistoga	500
Total	25,000

The City of St. Helena is not a participant in the contract.

A plot of the entitlement (Figure 5-12) shows an approximate linear buildup to year 2020 (24,900 Ac-Ft/Yr) from year 1990 (6,745 Ac-Ft/Yr). The current (1990) allocation among the County water supply entities is Napa (4,000), American Canyon CWD (2200), and Yountville/Calistoga (545). The contract states that the specified water quantities are based on a "minimum project yield" defined as an ultimate dependable State Water Project supply of 4,230,000 Ac-Ft/Yr (when all required facilities are in place). The contract also provides for "allowable reduction" in the contract quantity due to drought, with agricultural cutbacks coming first in an amount up to 50 percent in any one year, and additional cutbacks distributed equally among agricultural and municipal and industrial users. (Thus a 65 percent agricultural use cutback translates to a 15 percent municipal and industrial use cutback.) Napa County's contract is for municipal and industrial use exclusively.

The reliability of the North Bay Aqueduct water supply thus comes down to two issues:

- the potential cutbacks during droughts
- the inability of the State to deliver its ultimate contract entitlement with current State Water Project Facilities.

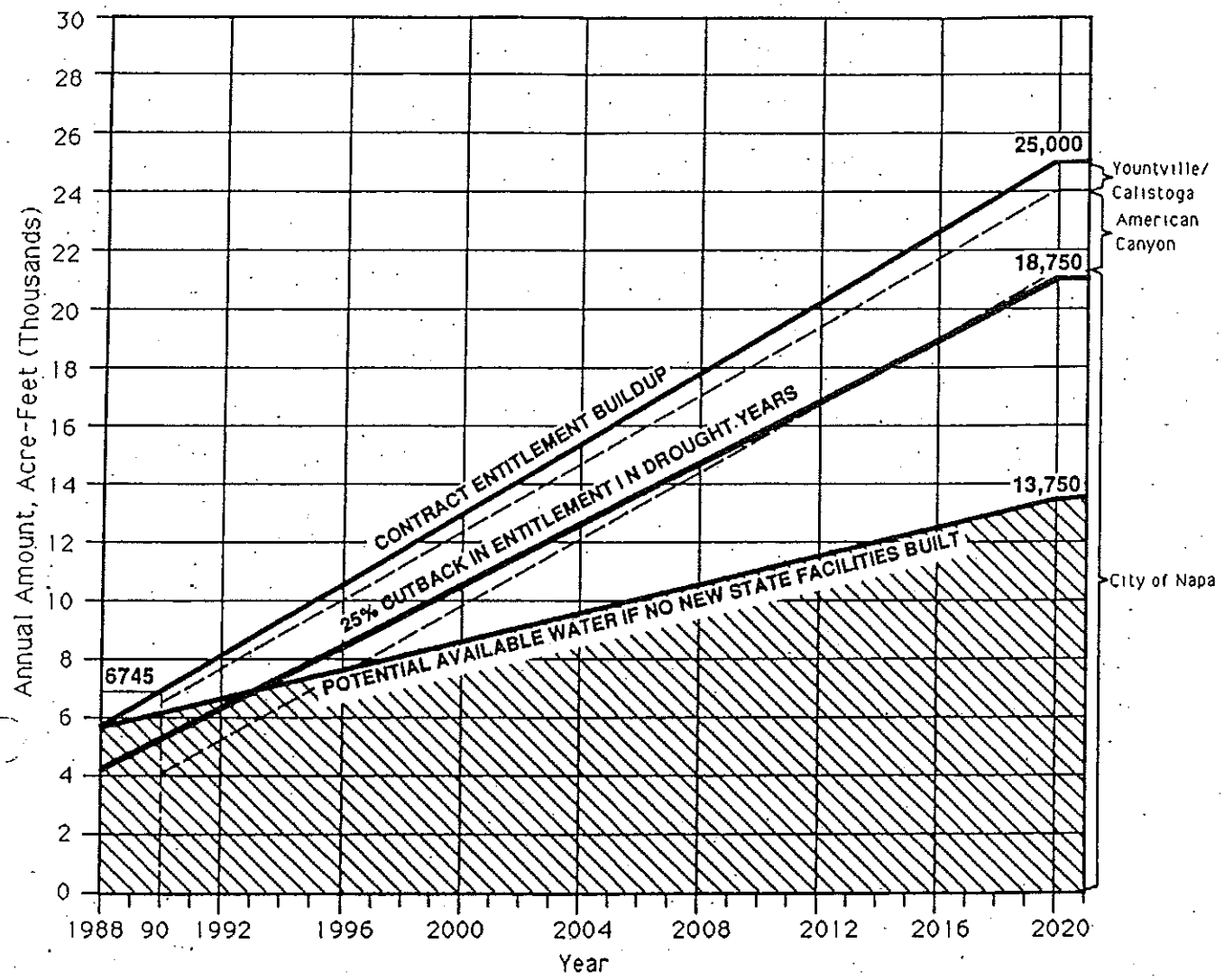
If we look at Figure 5-12, then it can be said that if State facilities are built (such as additional Banks Pumping Plant units, Delta channel modifications, Los Banos Grandes, Kern Water Bank, etc.), then in any year, the entitlement for that year can be reduced due to drought, such as the current four-year period (1987-90). Such cutbacks have been kept to a maximum of about 10 percent for municipal and industrial users, such as in 1977. It is conceivable that such cutbacks could approach 25 percent (when

TABLE 5-7

NORTH BAY AQUEDUCT ENTITLEMENTS
NAPA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Year	Total Annual Amount (Acre-Feet)
1988	5,745
1989	6,195
1990	6,745
1991	7,290
1992	7,840
1993	8,490
1994	9,135
1995	9,780
1996	10,425
1997	11,065
1998	11,710
1999	12,330
2000	13,050
2001	13,665
2002	14,185
2003	14,800
2004	15,400
2005	16,000
2006	16,450
2007	17,000
2008	17,650
2009	18,200
2010	18,750
2011	19,400
2012	19,950
2013	20,600
2014	21,250
2016	22,500
2017	23,100
2018	23,700
2019	24,300
2020	24,900
2021	25,000*

NOTE: * and each succeeding year thereafter for the term of the contract as a maximum entitlement.



NORTH BAY AQUEDUCT CONTRACT BUILDUP

FIGURE 5-12

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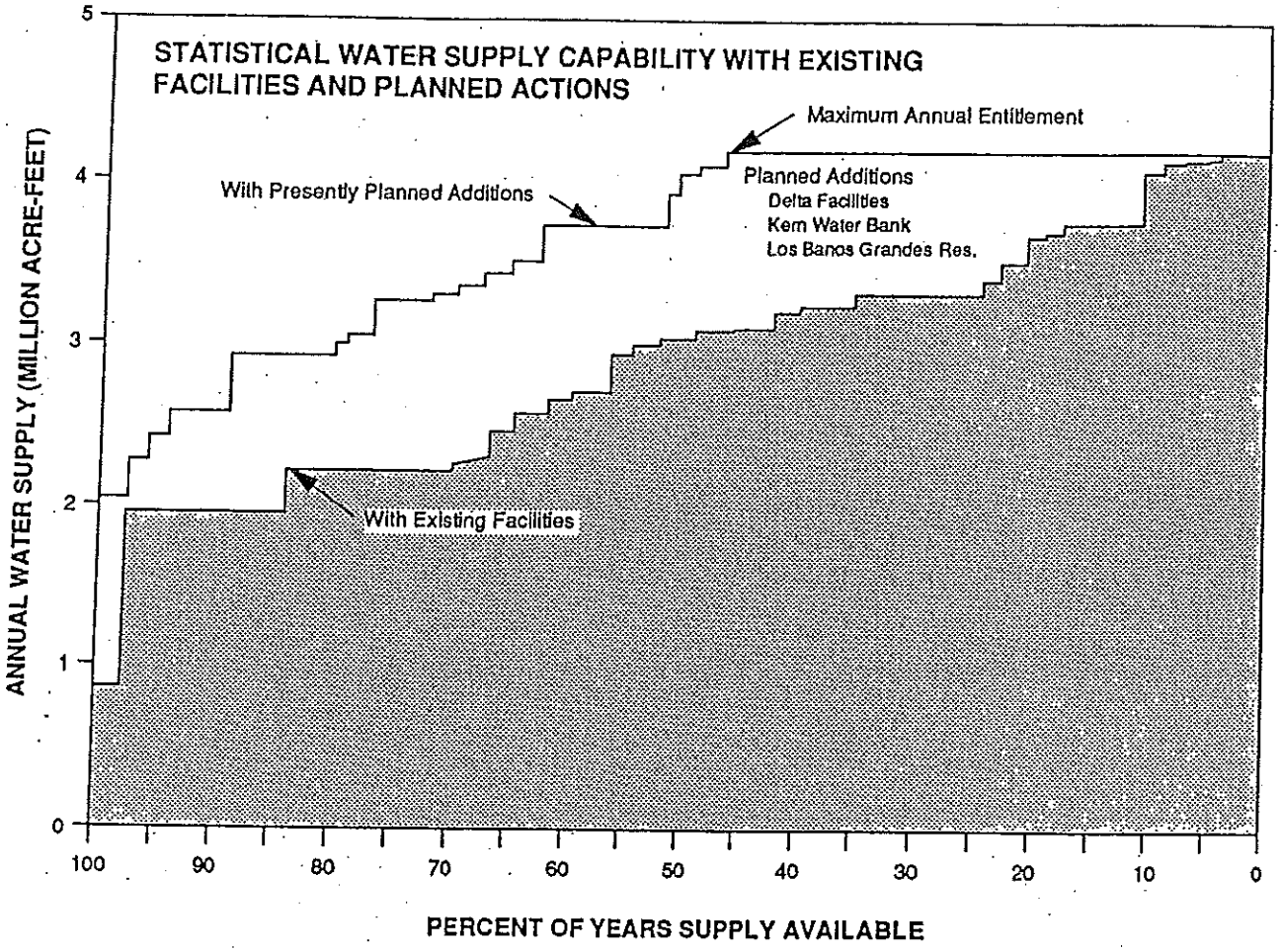
agriculture is cut back by 75 percent). So in any year, depending upon uncontrollable hydrologic events (rainfall), the County's supply could be cut back to 75 percent of its entitlement for that year.

The second aspect of reliability can also be shown on Figure 5-12. The State has said that with current State Water Project Facilities it is capable of delivering a dependable yield of 2,300,000 to 2,400,000 Ac-Ft/Yr, approximately 55 percent of its contracted-for ultimate dependable yield of 4,230,000 Ac-Ft/Yr. What this means is that if the State builds no new project facilities it would have to cut back its deliveries by 45 percent of ultimate contract entitlement. If distributed uniformly to all State water contractors, then Napa County could count on only 13,750 Ac-Ft/Yr of its 25,000 Ac-Ft/Yr contract. The situation could possibly be even slightly worse since Sierra "area of origin" Counties' water rights might further reduce the State project's supplies. Because municipal and industrial demand has not built up as rapidly as originally envisioned (slower growth and conservation), cutbacks of contract entitlement are not yet imminent. As demand grows, however, the State Water Project reliability will further deteriorate from its current level of 65 percent (percent of years supply is available, according to Figure 5-13), a level which is not acceptable for any municipality dependent on such a source as its only supply.

It should be pointed out that surplus water has been and would be available in the future during wetter years, with North Bay Aqueduct delivery capacity becoming the chief limitation.

RECLAMATION

Reclamation of municipal wastewater effluent is currently being accomplished in Calistoga, Yountville, and at Napa Sanitation District plants. For Calistoga and Yountville, turf areas such as parks, sport fields, and a golf course are being irrigated by approximately 200 and 300 Ac-Ft/Yr of treated effluent, respectively. The Sanitation District currently disposes approximately 1600 Ac-Ft/Yr of effluent by irrigation of 590 acres of ranch pasture in the Soscol area during the summer months. The District's current reclamation practice is very restricted as to use due to the level of wastewater treatment provided - oxidation ponds, with no additional disinfection. The key reason for current reclamation here is due to an annual Napa River effluent discharge prohibition between May 1 and October 31.



SOURCE: DWR BROCHURE (1989) "THE CALIFORNIA STATE WATER PROJECT"

NORTH BAY AQUEDUCT SUPPLY RELIABILITY

FIGURE 5-13

SECTION 6

BALANCING WATER NEEDS AND SUPPLIES

The goal of the current water resources study is to find the best mix of supplies that can satisfy the County's water needs to the year 2020. The study's effort has focused on estimating the likely range of water needs through development of a baseline projection and alternative demand scenarios. The water needs projection methodology is well documented in this report and based to the greatest extent possible on local and regional planning agency land use and population estimates. On the supply side, this study has strived to establish the reliability of the individual supplies - groundwater, river diversion, reservoirs, and imported water. This reliability aspect points up that all supplies vary in availability by season (month) and by year. Such supply variation can be unpredictable to a large degree depending on weather. Yet, long-term historical records of rainfall and streamflow make statistical analysis possible that gives some indication of what supplies are available in the future. With longer and longer historical records, more extreme hydrologic events become incorporated, and the supply reliability estimate becomes somewhat better. In other cases, such as the imported water from the North Bay Aqueduct and the Lake Berryessa supply, both hydrologic and political factors impact supply availability. For example, construction of additional State Water Project facilities to insure that Napa County's full, ultimate contract entitlement becomes available, depends on the outcome of the Bay-Delta Hearings being conducted by the California State Water Resources Control Board, environmental organizations, State and Federal fisheries policies, the north-south water controversy, governmental actions, voter approval of initiatives and bonds, etc. Yet one can arrive at some estimate of the range of water supply availability and consider that in balancing water needs and supplies.

WATER NEED/SUPPLY RELATIONSHIP

The balancing of water needs and supplies must be approached from several levels:

- By User
- By Subarea
- County-wide

The user assessment is necessary based on individual reliability requirements, as well as water quality concerns.

The subarea assessment is necessary based on legal requirements-Lake Berryessa "depletion reservation" for "reasonable beneficial use within the watershed of Putah Creek above said reservoir", and on obtaining economic supplies based on proximity to user. As an example of the latter, Napa River diversions and groundwater in the North Napa Valley Basin made available to vineyards in the Napa Valley.

Balancing Water Needs and Supplies

The County-wide assessment is necessary since State and Federal water contracts and water rights often are placed into county hands for allocation to in-county water supply entities. The county acts as the umbrella organization, minimizing the number of potential contracts with the State or Federal government. Such is the case with the North Bay Aqueduct contract and the recent request for supplemental Central Valley Project water from the Bureau of Reclamation. It is also the case with the Lake Berryessa water, where Napa County has been involved in agreements and negotiations to resolve the water supply issues.

Using the water need projections presented in Section 3, and existing supply availability as discussed in Section 5, water need/supply relationships were developed for individual water users, subareas, and Napa County as a whole, as shown in Table 6-1 and Figure 6-1. The key assumptions underlying these relationships are summarized below.

- **Water Needs**

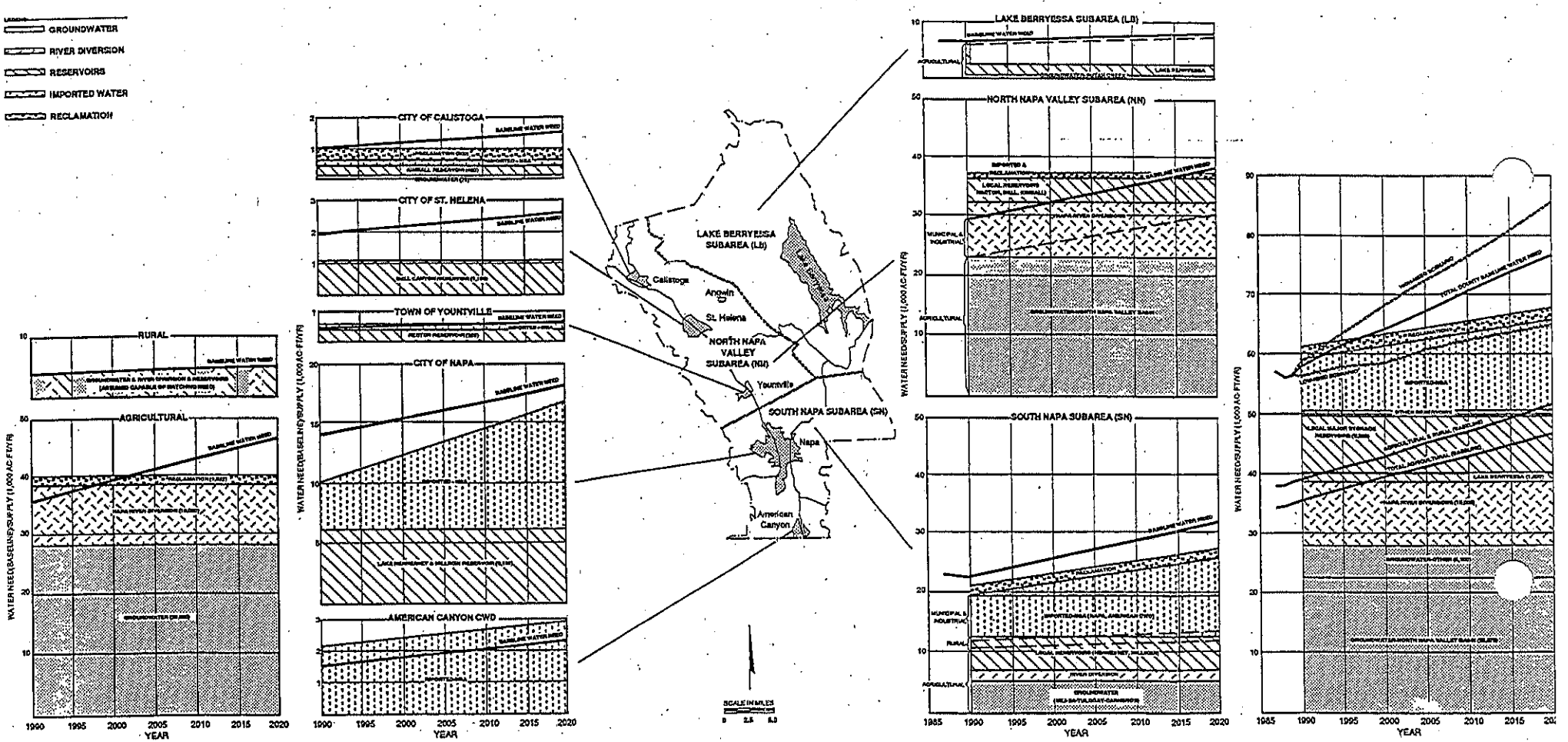
  - Total County baseline water need projection for the period 1990 through 2020 with breakdown by user-agricultural (total crop requirement for vineyards and other), rural, and municipal and industrial. The alternative demand scenarios for total County water need are also shown.

  - Subarea baseline water need projection for the same period and breakdown by user.

- **Water Supplies**

  - Supplies are "stacked" from bottom to top in the following order: groundwater, river diversion, reservoirs, and imported supply, in order to correspond to water need "stacking" and allow review of need/supply balance by user.

  - The groundwater supply shown in Figure 6-1 represents safe yield, which is that amount of pumping that can be sustained in the long term based on natural basin recharge. Pumping extractions may be more in certain years, but would have to be balanced by reduced pumping in other years. The allocation to subarea and safe yield is as follows:



RURAL & AGRICULTURAL WATER NEED/SUPPLY BALANCE

MUNICIPAL & INDUSTRIAL WATER NEED/SUPPLY BALANCE

NAPA COUNTY MUNICIPALITIES AND SUBAREAS

SUBAREAS

NAPA COUNTY (ALL SUBAREAS)

WATER NEED/ SUPPLY RELATIONSHIPS

FIGURE 6-1

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TABLE 6-1
NAPA COUNTY WATER NEED/SUPPLY RELATIONSHIP

Water User	Baseline Water Need (Ac-Ft/Yr) 1990	1995	2000	2005	2010	2015	2020	Safe/Firm Yield from Existing Water Supplies: Ground-Water	River Diversion: Napa	River Diversion: Others	Reservoirs: Municipal	Reservoirs: Berryessa	Reservoirs: Misc.	Imported (NBA) 1990	Imported (NBA) 2020	Reclamation	Total 1990	Total 2020	Supply-Need (Ac-Ft/Yr) 1990	Supply-Need (Ac-Ft/Yr) [illegible]
North Napa Valley (NN) Subarea																				
Municipal & Industrial (M&I) Calistoga	990	1060	1190	1340	1405	1460	1515	75	0	0	400	NA	0	272	275	200	947	950	-43	-565
St. Helena	1935	2195	2275	2380	2495	2595	2690	0	0	0	1200	NA	0	0	0	0	1100	1200	-835	-1490
Yountville	450	490	515	540	570	595	625	0	0	0	325	NA	0	272	275	0	597	600	147	-25
Subtotal M&I	3375	3745	3980	4260	4470	4650	4830	75	0	0	1925	0	0	544	550	200	2744	2747	-631	-2083
Rural[(1)]	2438	2506	2623	2745	2882	2996	3111	*	*	*	875	NA	*	NA	NA	0	—	—	—	—
								22500*	10,000*								35175	35175	9762	2034
Agricultural-Vineyard	22181	23356	24532	25708	26883	28059	29235													
Agricultural-Other	797	797	797	797	797	797	797													
Agricultural-Total	22978	24153	25329	26505	27680	28856	30032	*	*	*	1500**	NA	*	NA	NA	300	—	—	—	—
Total for Subarea NN	28791	30404	31932	33510	35032	36502	37973	22575	10000	0	4300	0	0	544	550	500	37919	37922	9128	-51
South Napa (SN) Subarea																				
Municipal & Industrial (M&I) City of Napa	13825	14675	15305	15685	16625	17410	18195	0	0	0	6150	NA	NA	4000	10285	0	10150	16435	-3675	-1760
American Canyon	1591	1721	1846	2031	2136	2226	2316	0	0	0	NA	NA	NA	2200	2860	0	2200	2860	609	544
Subtotal M&I	15416	16396	17151	17716	18761	19636	20511	0	0	0	6150	0	0	6200	13145	0	12350	19295	-3066	-1216
Rural	1705	1732	1811	1903	2017	2112	2207	*	*	*	NA	NA	*	NA	NA	0	—	—	—	
								5700*	1000**	500**			500**				9300	9300	841	-1629
Arigcultural-Vineyard	3248	3576	3904	4232	4560	4888	5216													
Agricultural-Other	3506	3506	3506	3506	3506	3506	3506													
Agricultural-Total	6754	7082	7410	7738	8066	8394	8722	*	*	*	NA	NA	*	NA	NA	1600	—	—	—	—
Total for Subarea SN	23875	25210	26372	27357	28844	30142	31440	5700	1000	500	6150	0	500	6200	13145	1600	21650	28595	-2225	-2845
Lake Berryessa (LB) Subarea																				
Municipal & Industrial (M&I)	0	0	0	0	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Rural	95	96	101	106	112	117	123	*	NA	*	NA	*	*	NA	NA	0	—	—	—	—
								400*		100*		1500*	250*				2250	2250	-3664	-5744
Agricultural-Vineyard	2460	2802	3144	3486	3828	4170	4512													
Agricultural-Other	3359	3359	3359	3359	3359	3359	3359													
Agricultural-Total	5819	6161	6503	6845	7187	7529	7871	*	NA	*	NA	0	*	NA	NA	0	—	—	—	—
Total for Subarea LB	5914	6257	6604	6951	7299	7646	7994	400	0	100	0	1500	250	0	0	0	2250	2250	-3664	-5744
Total All Subareas	58580	61871	64908	67818	71175	74290	77407	28675	11000	600	10450	1500	750	6744	13695	2100	61819	68770	3239	-8637

NOTES: [illegible] and agricultural combined. ** Assumed (no detailed information available). NA Not available to user - (1) Includes Veterans Home at Yountville.

Groundwater Basin	Subarea	Safe Yield (Ac-Ft/Yr)
Northern Napa Valley	NN	22,500
NN Subarea Total		22,500
Carneros	SN	300
Milliken-Sarco-Tulucay	SN	5,400
SN Subarea Total		5,700
Putah Creek	LB	400
Total for all Subareas		28,600

- Potential river diversions for vineyards are estimated at up to 10,000 Ac-Ft/Yr based on review of prior work and Napa River flows during the mid-March to mid-May frost protection season.

- The supply from local reservoirs is dependent on the minimum level of reliability (lowest frequency of occurrence) that is acceptable for that reservoir based on hydrologic availability and the likelihood that short-term supplemental alternate supplies could be obtained if a reservoir were operated to get more water most of the time. That is, to get a larger, long-term yield from a given reservoir, one must back off the "firm yield" operating strategy (100 percent frequency yield) and be willing to accept running low during infrequent critically-dry periods. This risk is acceptable if short-term water rationing can be imposed or an alternate short-term supply can be obtained. A review of actual 1989 local reservoir deliveries shows that the three smallest reservoirs - Kimball, Bell Canyon and Milliken, were operated at an 80 percent reliability level, whereas Hennessey and Rector were operated near the "firm yield" level. A purchase of 7,000 Ac-Ft for 1989 and 1990 from the Yuba County Water Agency, delivered via the North Bay Aqueduct, served as a short-term supplemental supply. Reservoir size plays an important role here in that Lake Hennessey, and Rector to a lesser extent, are carry-over reservoirs, and their "firm yield" is determined by multi-year drought periods, such as the current one, while the smaller reservoirs, with little carry-over storage, are impacted by single-year extreme hydrologic conditions, such as 1977. In Table 6-1 and Figure 6-1, local reservoir supply yield is based on the 80 percent frequency level for Kimball, Bell Canyon, and Milliken, and the 100 percent level for Hennessey and Rector. The allocation of reservoirs by subarea and their 80 percent and 100 percent-level yields are as follows:

Storage Reservoir	Subarea	Yield (Ac-Ft/Yr) 80%	100%
Lake Hennessey	SN	12,000	5,000*
Milliken	SN	1,500*	400
SN Subarea Total		13,150	5,400
Kimball	NN	400*	110
Bell Canyon	NN	1,200*	530
Rector	NN	1,650	1,200*
NN Subarea Total		3,250	1,840
Total for all Subareas		16,400	7,240

NOTE: Asterisk indicates yield selected for use in Table 6-1 and Figure 6-1.

As of this date (November 1990), no final allocation of the Lake Berryessa water between Napa and Solano Counties has been established beyond a 1981 agreement which specified 1500 Ac-Ft/Yr for lakeside municipal and industrial use.

The imported supply represents the North Bay Aqueduct contract entitlement buildup from a total of 6,745 Ac-Ft/Yr in 1990 to 24,900 Ac-Ft/Yr in 2020. This supply is allocated as follows to the subareas with contract entitlement at a reduced 55 percent of the ultimate amount based on the delivery capability of existing State Water Project Facilities.

Subarea	User	Yield (Ac-Ft/Yr) 1990	2020 100%	2020 55%*
SN	City of Napa	4,000	18,700	10,285
	American Canyon	2,200	5,200	2,860
	SN Subarea Subtotal	6,200	23,900	13,145
NN	Calistoga	---	500	275
	Yountville	---	500	275
	NN Subarea Total	545	1,000	550
	---		0	00
LB	Total All Subareas	6,745	24,900	13,695

NOTE: Asterisk indicates yield selected for use in Table 6-1 and Figure 6-1.

- The current reclamation supply is distributed as follows:

Source	Use	Amount (Ac-Ft/Yr)
City of Calistoga	Turf-Parks/Sport Fields	200
Town of Yountville	Turf-Golf Courses	300
Napa Sanitation District	Ranch Pasture	1,600

From a review of the baseline water need/existing supply relationship for Napa County water users, its three subareas, and County as a whole, as shown in Table 6-1 and Figure 6-1, the following observations can be made regarding the adequacy of existing water supplies:

	Adequacy of Existing Supplies	
User Group	1990	2020
Individual User:		
Municipal and Industrial		
City of Calistoga	Barley Adequate	Inadequate
City of St. Helena	Inadequate	Inadequate
Town of Yountville	Adequate	Barely Adequate
City of Napa	Inadequate	Inadequate
American Canyon CWD	Adequate	Adequate
Rural	Probably Adequate	Probably Adequate
Agricultural	Adequate	Inadequate
Subareas:		
Lake Berryessa (LB)	Adequate*	Inadequate
North Napa Valley (NN)	Adequate	Inadequate
South Napa (SN)	Inadequate	Inadequate
Napa County:	Adequate	Inadequate

* Due to the SWRCB depletion reservation for the Putah Creek area, the right to develop any water supply has been available.

Balancing Water Needs and Supplies

A review of municipal and industrial production records for the recent drought years, 1987 to 1989, indicates that the smaller municipal reservoirs have been yielding close to their storage capacity, with however some yield declines in 1989, as the drought period lengthened. In the case of Lake Hennessey, however, there is a definite reduction in yield year by year, with current production near the firm-yield rate (100 percent frequency).

Current Napa County deliveries from its imported supply-the North Bay Aqueduct, have exceeded contract entitlements by over 60 percent. That extra water has come from the Yuba County Water Agency in a separate agreement negotiated between the City of Napa and the Agency for 7,000 Ac-Ft/Yr. The water is obtained from New Bullards Bar Reservoir via the Sacramento River and picked up at the Barker Slough intake of the North Bay Aqueduct. The City of Napa plays a key role in delivering the imported supply to the three up-valley water users - Calistoga, St. Helena and Yountville, by exchanging imported water for Lake Hennessey water. The latter can be delivered via the City's Conn Transmission Main and main extensions that have been established by Calistoga and St. Helena. In the case of St. Helena, which is not a contract participant for North Bay Aqueduct water, the non-State Water Project Yuba supply has been provided. Individual North Bay Aqueduct contract entitlements have been exceeded for Calistoga and the City of Napa, while Yountville's and American Canyon's entitlements have not been exceeded. It is the imported supply that has clearly made up for the reduced local reservoir yields.

Certain data and information inadequacies must be considered when reflecting on the water need/supply relationships shown in Table 6-1 and Figure 6-1:

- The lack of publicly-available groundwater pumping rates for agricultural and rural water users requires an indirect approach to estimate water use through land use acreage and crop unit water consumption.

- Sparse hydrogeological information for some of the smaller groundwater basins, such as the Carneros area.

- Little information on actual direct river and stream diversions, and available reservoir storage capacity for capturing direct diversions. Due to the timing mismatch between water need and river/stream flows, it is the amount of storage that really establishes direct river diversion capability.

Although some additional data and information may be available upon more intensive effort, the scope of this County-wide water resource study was not focused on specific individual water users. It is believed, however, that the water need/supply relationships for the major County water users has been established with a satisfactory level of confidence.

BALANCING WATER NEEDS AND SUPPLIES

In attempting to balance Napa County's water needs and supplies for the period 1990 through 2020, certain issues must be addressed:

- Hydrologic uncertainty is a way of life in semi-arid California, impacting virtually all supplies that Napa County water users have available - groundwater, river diversion, local reservoirs, and the imported North Bay Aqueduct supply. A key point here is whether the hydrologic uncertainty is concurrent for the different sources and what the shape of their yield-frequency curves is. Note that hydrologic uncertainty may decrease as the years go on since a longer-term hydrologic database becomes available. However, it does not appear likely that the hydrologic conditions for this coming water year, nor any subsequent years, will become known in advance so that supply operations could be adjusted accordingly. The reservoir yield that one seeks to operate at reflects the required dependability (reliability) and the availability of alternate supply sources. Municipal and industrial use generally requires a higher level of dependability than agricultural use.

- Political uncertainty may also be a way of life with respect to tying down supplies in water-deficient California as the state's population continues to expand. Such uncertainty clearly is a factor in the Lake Berryessa supply and the State Water Project North Bay Aqueduct supply. In the Berryessa case, approximately 35 years after construction of the Monticello Dam, no final allocation of water from the Solano Project (Lake Berryessa) among Napa, Solano, Lake and Yolo Counties has been established. Although several agreements exist between Napa, Solano, and the U.S. Bureau of Reclamation, the actual water rights have not been established. If putting water to beneficial use is a key criteria for developing water rights, then Solano County is much further along in establishing water need from Lake Berryessa. As to the State Water Project supply, its dependability will continue to decline as the years go on if no additional facilities are constructed. The implementation of such facilities are highly dependent on political solutions reached in Sate and Federal legislative bodies, with Delta and north-south issues predominating.

- Groundwater and direct river and stream diversions within Napa County are essentially dedicated to agriculture and rural domestic water needs. At present, Calistoga's Fiege well field is the only municipal groundwater supply.

- The City of Napa's water transmission system, supplied by three sources - Lake Hennessey, Milliken Reservoir, and the North Bay Aqueduct, provides an extensive interconnecting conveyance system among the five major County municipal water agencies and the State of California's Rector Reservoir.

- Opportunities exist for expansion of reclamation within the County, especially in the South Napa Subarea from the Napa Sanitation/American Canyon wastewater treatment facilities. The timing of such reclamation is, however, dependent on economics and institutional arrangements. The economic aspects are significantly influenced by alternative supplies available to potential reclaimed water users. The existing reclaimed water use in this area does not really satisfy a true water need, but actually reflects a developed a use (ranch pasture irrigation) driven by the order to comply with Napa River effluent discharge limitations.

- The baseline water need projection and the alternative demand scenarios depict a likely range of future water needs. Such projections do not include additional short-term management of water demand during droughts. Voluntary and mandatory demand cutbacks for municipalities of 25 percent have become common in northern California since the 1976-77 drought. Agricultural-use cutbacks of up to 60 percent have occurred in deliveries from the State Water Project and the Federal Central Valley Project. But, those cutbacks become increasingly difficult as water system efficiencies are increased and as conservation becomes imbedded; and as people tire of too-frequent emergencies.

Based on the current water needs and supply analyses, and the issues described above, the following issues in balancing the County's water needs and supplies must be addressed:

- What is a realistic short-term drought-period cutback in the future water need?

- Can groundwater serve as a potential alternate supply to municipalities, especially during drought periods?

- Have river diversions been maximized through the development of storage?

- Are local municipal reservoirs developed such as to derive the maximum yield from tributary watersheds?

- What supply should be anticipated from Lake Berryessa and who would it serve?

- What can be done about firming up the North Bay Aqueduct supply?
- Can any additional in-County water transfers be implemented?
- What supplemental water supplies might be considered?

Each of these issues is discussed in the following paragraphs.

Drought-Period Water Use Cutbacks

On a short-term basis, supply and water need can be brought into balance by asking for voluntary cutbacks or imposing mandatory water rationing during critical drought periods. Although 1976-77 demand cutbacks in the Bay Area approached 40 and 50 percent for municipal users, future cutbacks probably should not exceed about 25 percent.

Groundwater as Municipal Supply

Water quality is an important consideration in the suitability of groundwater as a municipal water supply. The greatest need would come from the Cities of Calistoga, St. Helena, and Napa. According to Table 4-5, quality parameters of concern to these municipalities in obtaining groundwater from the Northern Napa basin would be high levels of iron and manganese, nitrates, TDS, sodium, chlorides, and boron. Although many of these parameters are represented by secondary standards, nitrates could pose a health risk to children, and sodium could be a problem for persons with restricted sodium diets. Treatment would be mandatory for nitrate control.

Development of municipal groundwater would require the availability of municipally-owned property located suitably. Such suitability would include proximity to water-bearing strata and distance to any potential contaminant source. A recent search for groundwater near St. Helena by Beckstoffer Vineyards produced 7 gpm at 400 feet instead of the hoped-for 150 gpm. Clearly there is no easy way to predict well production, especially for larger-capacity municipal wells. For short-term groundwater extraction by municipalities the major concern would not be the impact on basin safe yield but rather the effects on adjacent well owners.

Maximizing River Diversions

The State Water Resources Control Board's decision on Napa River diversions during the frost protection period emphasizes the value of storage so that winter flows can be captured. The existing annual diversion rate of 10,000 Ac-Ft that the current study uses in the water

need/supply balance is not based on an inventory of actual storage but on an estimate. Any refinement of this estimate would require a detailed storage inventory.

Maximizing Municipal Reservoir Yield

In connection with the reservoir yield analysis detailed in Section 5, the potential for increasing yield by reservoir enlargement was reviewed and is summarized below.

- **Milliken Reservoir.** A one foot increase in dam height would produce 39 Ac-Ft of new storage capacity. Road relocation and diversion limits impact consideration of enlargement. A 20-foot increase in dam height (792 Ac-Ft of new capacity) would produce 615 Ac-Ft of new yield.

- **Rector Reservoir.** Every foot of increased dam height produces 68 Ac-Ft of new capacity. Need saddle dams. Spillway enlargement may be difficult. Appears to be inadequate annual inflow to increase yield.

- **Lake Hennessey.** 1000 Ac-Ft of new capacity per foot of increased dam height. Highway relocation and spillway of concern. A 15-foot increase in dam height (15,000 Ac-Ft capacity change) would produce 1,500 Ac-Ft of new yield; not a very efficient yield/capacity ratio.

- **Bell Canyon Reservoir.** Every foot of dam height increase would produce 73 Ac-Ft of new capacity. Road relocation and dikes required. Based on an average annual inflow, additional yield appears to be available.

- **Kimball Reservoir.** A one-foot increase in dam height would produce 12 Ac-ft of new storage. Extensive physical works required for enlargement. An additional 500 to 1,000 Ac-Ft of yield could be developed based on average annual inflow.

In summary, several thousand acre-feet of new yield could be developed from the existing municipal reservoirs, however the cost of dam expansions are high based on previous studies by the individual agencies.

Lake Berryessa Supply

A maximum Lake Berryessa Subarea water need of 11,801 Ac-Ft/Yr (high-demand scenario) can be anticipated by the year 2020, excluding lakeside use. Any negotiations for Lake Berryessa water rights should consider this water need projection.

Firming Up North Bay Aqueduct Supply

The current reliability of about 65 percent (frequency of entitlement availability) and likely decline in future reliability as State-wide entitlements build up, is not acceptable for municipal supplies. Obviously, support for the State's program of development of additional facilities to increase yield, such as the Delta Facilities, Los Banos Grandes Reservoir, and the Kern Water Bank are a way to assure North Bay Aqueduct yield. For Napa County as a whole, a more rapid buildup of contract entitlement would be desirable. A more permanent agreement with agencies that have surplus water, such as the Yuba County Water Agency, might be obtained under sponsorship of the Department of Water Resources, rather than obtaining year-by-year individual agreements with the Agency. Another possibility is to evaluate participation in such future facilities as Contra Costa Water District's Los Vaqueros Project, as was done for the Solano Water Authority. Further, supplemental water recently offered by the Central Valley Project (requests now on hold based on concerns regarding availability of water and environmental impacts) could be used to firm up the North Bay Aqueduct supply since it could be picked up from the Sacramento River.

In-County Water Transfers

Two County water users have current water supply surpluses - the American Canyon CWD (North Bay Aqueduct contract entitlement) and agriculture (groundwater). The former supply excess will be maintained to year 2020, while the latter excess will turn into a deficiency in ten years. The American Canyon supply could be transferred to other Napa County municipal entities via the City of Napa transmission system. Use of the groundwater surplus would require development of municipal wells and probably some well-head treatment facilities.

Additional Wastewater Reclamation

An engineering study currently being conducted for the Napa Sanitation District states that there are opportunities for additional reclamation in the South Napa Subarea from the jointly owned Napa Sanitation District/American Canyon CWD Soscol Wastewater Plant. These opportunities are proposed for staged implementation as follows:

Reclaimed Water Use	Date in Place	Quantity of Reclaimed Water (Ac-Ft/Yr) Stage	Cumulative
Irrigated Ranch Pasture (Kirkland, Smoky, and Fagundes Properties)	Existing	1,622	1,622
Chardonnay Golf Course/Vineyards	1995	647	2,269
Kennedy Golf Course/Park; Napa Community College; Napa Valley Memorial Gardens; Bedford Industrial Park	2000±	828	3,097
Napa State Hospital; Potential Development Acreage; Various Industrial Park Landscaping	2012	1,365	4,462
Additional Irrigated Ranch Pasture (Airport and new Kirkland Ranch)	2012	1,481	5,943

Wastewater treatment will be such that Title 22 unrestricted use will be allowed. The sum of the ranch pasture requirements represents a minimum reclamation quantity for the wastewater plant (total of 3,103 Ac-Ft); the additional 2,840 Ac-Ft represents a replacement for fresh water now being used or which would need to be used in the future for irrigation of these properties.

In addition, landscape irrigation at the California Veterans Home could be supplied by reclaimed water from the Yountville wastewater plant.

New Supplemental Water Supplies

Supplemental water supplies that have been previously considered include new local reservoir storage and new imported water. A review of the mean annual runoff isohyetal map developed by the U.S. Geological Survey shows the most productive watersheds to be in the northwestern corner of the County (Kimball and Bell Canyon Reservoirs are located in this area) and along a narrow ridge on the western County line north of Yountville. Watersheds to the east and south show relatively low mean annual runoffs. A recent study for St. Helena (1989) suggested three potential reservoir sites - Spring Valley, Bale Slough, and York Creek. The latter two reservoirs are small; the former, supplied primarily from Napa River diversions, had a maximum capacity of 10,000 Ac-Ft. However, vineyard development in the area probably precludes any further consideration of this site. It would

appear that any significant new surface water supply within the County would have to tap Napa River flows since they originate in the productive northwest corner. (Enlargement of Kimball and Bell Canyon Reservoirs would also be productive according to the mean annual runoff map, as per prior discussion of yield from the reservoirs but would be very costly).

New imported supplies, in addition to firming up the existing North Bay Aqueduct supply, as previously discussed, could include extension of the Central Valley Project's Tehama-Colusa Canal into Solano County to the Vacaville area, and use of the North Bay Aqueduct for conveyance. In reference to the aqueduct, expansion of terminal storage in the Jameson Canyon area would improve the flexibility of the aqueduct and perhaps its yield.

WATER MANAGEMENT PLAN

Where supply deficiencies are indicated in Table 6-1 and Figure 6-1, water management measures, such as discussed above, can be implemented to match needs. In some cases, there is a current urgency to achieve a balance, while in others, the gradual water need build up out to the year 2020 will allow a more planned, staged approach. The current drought period, which began after the wet year of 1986, clearly has stressed several of the County's municipalities since they are almost exclusively dependent on surface water supplies, both local and imported. It is these multi-year, rain-deficient periods that must be used in planning water management strategy. That the current drought period is not a real extreme situation can be seen by looking at the 1928-34 period, which is several years longer, and is in fact the critical period for the much larger water projects of the state and the federal government in the Central Valley. What is apparent is that if the drought continues, the County's imported supply will most likely face a temporary contract entitlement cutback. A ten percent cutback for municipal and industrial users (60 percent for agriculture) was envisioned in the spring of 1989 when a late-season rainfall made those cutbacks unnecessary. Such a cutback should be anticipated if the drought continues into 1991.

Where immediate action is required to balance water need and supply, the following water management measures would be available:

- Mandatory rationing of municipality-supplied customers.
- Re-activation or construction of new wells to tap groundwater.
- In-County water transfers.

- Purchase of additional water from water-surplus entities such as the Yuba County Water Agency and Placer County Water Agency, whose water can be wheeled via the North Bay Aqueduct.

Where the need/balance is a longer-range problem, all of the previously discussed measures would be available for consideration.

Based upon the water need/supply balance (surplus or deficit) for 1990 and 2020, (as shown in Table 6-1, and the incremental supply available from alternative water management measures, as summarized in Table 6-2, it is recommended that the Napa County Water Management Plan consist of the following elements:

- **Public Information Element.** As monitor of the County's groundwater supplies; as holder of a key water contract (North Bay Aqueduct); and based on involvement in the potential reserved water from Lake Berryessa, the District should develop, maintain, and distribute information to County water users regarding:

  - the source of the County's water supplies including groundwater, river diversion, local reservoir storage, imported water, and wastewater reclamation. The recent presentation by County Board and engineering staff at the Napa County Water Forum and resultant newspaper coverage is a good example of this type of activity.

  - current hydrologic conditions in the County and for the State Water Project (North Bay Aqueduct) and how County water users will be impacted. Conditions would include rainfall to date versus normal and recent years; general groundwater levels; storage level in the five municipal reservoirs; Napa River flow; and anticipated North Bay Aqueduct delivery rates. Consideration should be given to establishing a water deficiency (drought) index that would trigger certain actions to restrain water use and to enhance supplies through transfers or short-term supplemental supplies. The focus would be on critical drought periods, such as the current four-year period. Early public information and written guidelines and criteria would enhance voluntary adjustments to any water/need supply imbalance and minimize economic hardships.

  - status of State's efforts to meet its water contract entitlement buildup (key projects under way and their implementation schedule; legislative activities; etc.)

TABLE 6-2
INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES

Water Management Measure	Incremental Supply (Ac-Ft/Yr) 1990	2020
Drought-Period Water Use Cutback (25%)		
Calistoga	248	379
St. Helena	484	672
Yountville	112	156
City of Napa	3,456	4,549
American Canyon	398	579
Rural (Total)	947	1,245
Agricultural (Total)	8,888	11,656
Total	14,533	19,236
Groundwater as Municipal Supply		
Calistoga	---	---
St. Helena	---	---
Yountville	---	---
City of Napa	---	---
American Canyon	Not Available	
Total	9,776	2,048
Maximizing River Diversions		
Napa River above Oak Knoll Avenue	---	
Other Streams	---	
Total	5,000	
Maximizing Municipal Reservoir Yield		
Milliken (20-ft dam height increase)	600	
Rector	Minimal	
Lake Hennessey (15-ft dam height increase)	1,500	
Bell Canyon (20-ft dam height increase)	700	
Kimball (40-ft dam height increase)	500	
Total	3,300	
Lake Berryessa Supply	Indeterminate	
Firming Up North Bay Aqueduct Supply (45%)		
Calistoga	0	225
Yountville	0	225
City of Napa	0	8,415
American Canyon	0	2,340
Total	0	11,205

TABLE 6-2
INCREMENTAL SUPPLY FROM WATER MANAGEMENT MEASURES
(CONTINUED)

Water Management Measure	Incremental Supply (Ac-Ft/Yr) 1990	2020
In-County Water Transfers		
American Canyon NBA Entitlement	610	546
North Napa Valley Groundwater	9,776	2,048
Total	10,386	2,594
Additional Wastewater Reclamation		
Napa Sanitation District		4,321
Calistoga		200
St. Helena		500
Yountville		100
Total		5,121
New Supplemental Water Supplies		
Local Storage Reservoirs		
Napa River, Off-stream		10,000
Others		1,000
Imported		
Central Valley Project		10,000
Total		21,000

- status of municipal, industrial, and agricultural water conservation efforts.

- status of wastewater reclamation efforts.

- **Water Need Element.** At five-year intervals (1995, 2000, etc.), the District should update the County-wide water needs analysis to track the baseline water use and establish revised alternative demand need projections, if necessary. A key future issue will be beneficial use, water conservation, and reuse. For example, turf irrigation and vineyard frost and heat protection may not represent the optimum beneficial use of stored (reservoir), imported, or groundwater, respectively. Alternative water, such as reclaimed wastewater, can be used for turf irrigation, while, for example, wind machines could be used for vineyard frost and heat protection, replacing the use of sprinklers for this purpose. The District should encourage compliance by municipalities with the conservation commitments contained in their State - mandated urban water management plans, and should foster introduction of incentives and ordinances to increase water conservation, especially with respect to turf and landscape layout. The District should also encourage agriculture to use advanced water-saving vineyard development methods including the use of drip irrigation and soil moisture tracking.

- **Water Supply Element.** With the completion of the current Water Resource Study for the Napa County Region, the District has added two key water supply evaluations-determination of the safe yield of the North Napa Valley Groundwater Basin, and yield-frequency relationships for the five municipal water supply reservoirs-Milliken, Hennessey, Rector, Bell Canyon, and Kimball. The study also reviewed available information on the safe yields of three other County groundwater basins: Milliken-Sarco-Tulucay, Lake Berryessa (Pope and Capell Valleys), and Carneros; the flow variation of the Napa River at Oak Knoll Avenue; the reliability of the North Bay Aqueduct supply; and the reclamation plans of the Napa Sanitation District.

  Based on the Water Resource Study, the following guidelines are offered to the District in resolving near-term and short-term imbalances between County water needs and supplies:

  - Water conservation can have a very significant impact on getting through drought periods. An automatic drought action triggering mechanism would provide early warning of the need for temporary measures and would minimize economic impacts.

- There appears to be adequate groundwater reserve in the North Napa Valley Groundwater Basin to allow municipalities to use wells as a supplemental drought-period supply. Such a short-term use may, however, not be economically justified, and once in-place would tend to be used more continuously. Sharing of such facilities with agricultural users might enhance the economics of such an arrangement.

- Reservoir storage, especially as supplied from the Napa River, is the key to river diversion capability for vineyard irrigation and frost protection. The total current storage capacity is not well documented.

- There are some opportunities for near-term transfers among the North Bay Aqueduct contractors from surpluses indicated for American Canyon and Yountville.

- Near-term multi-year arrangements for water to supplement the North Bay Aqueduct entitlement from the State are vital. Arrangements should be made through the State with such sources as Yuba and Placer County Water Agencies, using unused aqueduct capacity, as available.

- A review of the watershed inflow - storage relationship for the 50 percent frequency yield shows that there are opportunities to enhance the supply at Kimball, Milliken, and Bell Reservoirs. The efficiency of such yield enhancement at Rector and Hennessey is poor. A major constraint on dam enlargement is the cost.

As far as future activities with regard to water supply, it is recommended that the District consider the following:

- encourage or sponsor additional investigation of the smaller groundwater basins to refine safe yield estimates.

- track exploration for new wells by municipalities and wineries with regard to depth, production, and water quality.

- inventory County storage facilities beyond the five major municipal reservoirs, with special focus on facilities that derive water from the Napa River. Such an inventory may best be accomplished through a follow-up on the Questionnaire for the Napa County Wine Industry that was conducted during the current study. Information on alternate sources, such as

SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF ALAMEDA

LIVING RIVERS COUNCIL, Petitioner and Plaintiff, vs. STATE WATER RESOURCES CONTROL BOARD, Respondent and Defendant.	RG10-543923 FINAL STATEMENT OF DECISION.

The petition of Petitioner Living Rivers Council for a writ of mandate and for motions to augment the record came on regularly for hearing on May 4 and May 25, 2012, in Department 31 of this Court, Judge Evelio Grillo presiding.

STATEMENT OF DECISION

The petition of Living Rivers Council for a writ of mandate is GRANTED IN PART.

OVERVIEW.

The Legislature passed AB 2121, which required the State Water Resources Control Board ("the "Board") to "adopt principles and guidelines for maintaining

instream flows in coastal streams [in Northern California] as part of state policy for water quality control ... for the purposes of water right administration." (Water Code 1259.4(a)(1). Following several years of study, the Board noticed and distributed a draft Policy and draft SED in December 2007, then submitted corrections in January 2008 and March 2008. The draft policy was subject to review, the Board provided extensive responses to comments in February 2010, and then in February 2010 the Board issued a public notice that it would consider adopting the Policy. The Board received comments and then provided responses. The Board approved the "Policy for Maintaining Instream Flows in Northern California Coastal Streams" (the "Policy") on May 4, 2010. (AR 155-303).

The Board's adoption of a policy for water quality control was certified as exempt from CEQA. (AR 3, para 8). The adoption of the Policy required the Board to prepare a Substitute Environmental Declaration ("SED"). The Policy states that the SED consists of the draft SED dated December 2007 (AR 3394-3499) and the responses to that document (AR2139-2758). (AR 3, para 8) (Cal. Pub. Res. Code §§ 21080.5(a), (b), and (d)(3) and 21159(a); *San Joaquin River Exchange Contractors Water Authority v. State Water Resources Control Board* (2010) 183 Cal.App.4th 1110, 1125-1126.) The Policy also states that the CEQA documentation includes the SED plus a scientific basis report (AR420-852), a sensitivity study (AR3515-3588), and responses to public comments on those documents. (AR 3, para 8.)

The Board's focus in the Policy is to establish a regulatory framework for managing the flow in the coastal streams by managing the amount and timing of water diversion as well as managing impediments to stream flow like dams. The Policy

establishes a framework designed to maintain instream flows for the protection of fishery resources by prescribing protective measures on a watershed basis regarding (1) the season of diversion, (2) minimum bypass flow, (3) and maximum cumulative diversion. (AR 166.) The Policy also addresses the construction of dams and off stream water storage. (AR 166.)

EVIDENCE REGARDING THE MERITS OF THE PETITION.

The court has considered all the evidence presented. The Court grants Petitioner's First and Second requests to add additional information to the record.

NATURE OF THE POLICY

The Board adopted the Policy under a certified regulatory program that is exempt from CEQA and subject to its own environmental review requirements. (Pub. Res Code § 21080.5(d); 14 CCR §§ 15250-15252.) A SED has been described as an "abbreviated" environmental impact report." (*Environmental Protection Information Center, Inc. v. Johnson* (1985) 170 Cal.App.3d 604, 610.) However, "[w]hen conducting its environmental review and preparing its documentation, a certified regulatory program is subject to the broad policy goals and substantive standards of CEQA." (*City of Arcadia v. State Water Resources Control Bd.* (2006) 135 Cal.App.4th 1392, 1422.) Therefore, the court evaluates the SED for compliance with the substantive provisions of CEQA.

The Policy is broad programmatic document similar to a "Program" document under 14 CCR § 15168 rather than a "Project" document under 14 CCR § 15161. The Policy is prepared under Public Resources Code 21159 and under 21159(d) the Board is

not required to conduct a project-level analysis. The Policy can, therefore, focus on only the general plan or program, leaving project-level details to subsequent EIRs when specific projects are being considered. (14 CCR § 15152(b).) At the inception of the Policy, the Board stated, "Other agencies may have authority to carry out or approve activities that will be subject to the policy, but the project in this case is the policy itself, not the activities that may be subject to the policy." (AR 12830, Checklist.) The Board can use the SED "to adequately identify "significant effects of the planning approval at hand" while deferring the less feasible development of detailed, site-specific information to future environmental documents. (14 CCR § 15152 (c).) (See also *In re Bay-Delta Programmatic Environmental Impact Report* (2008) 43 Cal.4th 1143, 1169-1174.)

The Policy directly concerns water quality within the Board's permitting authority even though, as discussed below, for CEQA purposes the Board must consider how the Policy affects groundwater that is within the Board's jurisdiction but outside its permitting authority. (*United States v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 124.)

The Policy recognizes that third parties might change their actions in response to the Policy and that those changes might have potentially significant indirect environmental impacts. (AR 3, para 10.) The Policy directs the implementing agencies to incorporate feasible mitigation measures to limit the environmental impact of any Projects they undertake, and finds that to the extent that mitigation measures do not fully mitigate indirect impacts that the benefits of the Policy outweigh any unavoidable adverse impacts. (AR 4, para 12.)

COMPLIANCE WITH WATER CODE § 1259.4.

Living Rivers asserts that the Board did not comply with the legislature's direction in Water Code § 1259.4 when the Board developed the Policy. Living Rivers argues that the Policy does not comply with section 1259.4 because the Policy (1) fails to consider principles and guidelines for regulating groundwater extraction and (2) permits use of a flawed methodology for estimating the minimum bypass flow (MBF) and the maximum cumulative diversion (MCD) in a stream.

The court reviews the Board's compliance with Water Code § 1259.4 to determine whether the Policy "(1) is within the scope of the authority conferred and (2) is reasonably necessary to effectuate the purpose of the statute." (*Yamaha Corp. of America v. State Board of Equalization* (1998) 19 Cal.4th 1, 10-11.) Regarding the scope of the statute, the court does not defer to the Board's view regarding the legislature's direction. (*Yamaha,* 19 Cal.4th at 11 fn 4; *Environmental Protection Information Center v. Department of Forestry and Fire Protection* (1996) 43 Cal.App.4th 1011, 1022 ("The applicable standard of review is, therefore, "respectful nondeference.""").) Having determined the scope of the statute, the court's inquiry regarding the wisdom of the Board's decisions is confined to whether the Policy is "arbitrary, capricious or [without] reasonable or rational basis." (*Yamaha,* 19 Cal.4th at 10-11; *Neighbors in Support of Appropriate Land Use v. County of Tuolumne* (2007) 157 Cal.App.4th 997, 1004.)

In Water Code § 1259.4 the legislature directed the Board to "adopt principles and guidelines for maintaining instream flows in coastal streams [in Northern California] as part of state policy for water quality control ... for the purposes of water right administration." The Board's policy statements reflect that it and Living Rivers share the

same understanding of the legislature's goals. The Board's resolution adopting the Policy states that the Policy is focused on "measures to protect native fish populations" (AR 11) and the Policy itself states that "the primary objective of this policy is to ensure that the administration of water rights occurs in a manner that maintains stream inflows needed for the protection of fishery resources" (AR 166).

The Board correctly determined that the legislature wanted the Policy to concern the protection of native fish populations through the Board's water right permitting and licensing system and was not to focus on how the Board might regulate the extraction of percolating groundwater. Water Code § 1259.4(a) directs the Board to adopt principles and guidelines for maintaining instream flows in coastal streams " as part of state policy for water quality control ... for the purposes of water right administration." Water Code §§ 1200 et seq set out the Board's permitting and licensing system for "water right administration." Therefore, the plain language of Water Code § 1259.4(a) states that the Policy is to concern water quality for purposes of administering water permits, not for all purposes.

The text of AB 2121, the bill enacting Water Code § 1259.4, even more clearly focuses the Board on the water permitting process. AB 2121 states:

> The Legislature finds and declares all of the following: ...
>
> (d) ... the adoption [of guidelines] would significantly advance the effort to ensure that appropriate fish measures are included in new water right permits and that cumulative impacts are considered. ...

(f) Pending before the board are more than 276 applications to appropriate water from streams in the Counties of Marin, Napa, Sonoma, Mendocino, and Humboldt.

(g) Many of these applications have been pending for a decade. Most of these applications have been pending for at least five years. These delays are inappropriate, and they produce regulatory uncertainty for the water user community and the conservation and fishing communities."

(Section 1 of Stats. 2004, c. 943.) The text of the bill makes clear that the Board was to develop a policy to evaluate the needs of the fish and to provide certainty in the water permitting process.

Under California law, the Water Board's water permitting authority applies only to water in surface channels and to groundwater in subterranean streams flowing in known and definite channels. "[S]ubsurface water that is not part of a subterranean stream flowing through a known and definite channel is referred to in the case law as "percolating groundwater," which falls outside the Board's jurisdiction." (*North Gualala Water Co. v. State Water Resources Control Bd.* (2006) 139 Cal.App.4th 1577, 1582 fn 4. See also Water Code § 1200.) The Board has jurisdiction over percolating groundwater, but can regulate it only through discretionary enforcement actions to prevent waste or unreasonable use. (Water Code §§ 275, 2100.) Given the statutory distinction between surface channel and subterranean stream water subject to the Board's "water right administration" and percolating groundwater not subject to that administrative scheme, the court must give effect to the phrase "for purposes of water right administration."

The Policy reflects the Board's understanding of the limits of the legislature's direction. The Policy states, "Except as provided below, this policy applies to applications to appropriate water from surface water streams or from subterranean streams flowing through known and definite channels." (AR 24, 178, 1843-1844.) The Board did not limit the Policy to water permits related to surface water streams and the Policy expressly applies to water permits related to subterranean streams flowing through known and definite channels. The Board was, however, required under CEQA and Pub. Res Code § 21080.5(d)(2)(A) to consider how the Policy might encourage the increased use of percolating groundwater, which in turn might have an impact on the environment.

The Policy reflects a reasoned approach to managing instream flows in coastal streams in Northern California with the goal of rehabilitating and protecting fish habitat. The Board's decision to permit stream measurement by proxy or by approximation might not always lead to accurate information or estimate, but it had a rational basis and is not arbitrary or capricious. Furthermore, the Board specifically acknowledged the measurement problems associated with the use of reference streams, noting that the adopted methodology "is a standard method appearing in textbooks for estimating flows in ungauged streams, and would be used by the State Water Board regardless of whether the policy is adopted." (AR 2899-2900.)

COMPLIANCE WITH CEQA - GENERALLY

The court evaluates the SED under the same standards as an EIR and applies the usual standard of review is under CEQA - the court reviews the Board's compliance with CEQA's procedures de novo and the Board's factual findings for substantial evidence.

(*Vineyard Area Citizens for Responsible Growth, Inc. v. City* (2007) 40 Cal.4th 412, 1277.) The failure to provide information required by CEQA in an EIR is a failure to proceed in a manner required by law and is reviewed de novo. "The failure to comply with CEQA's procedural or information disclosure requirements is a prejudicial abuse of discretion if the decision makers or the public is deprived of information necessary to make a meaningful assessment of the environmental impacts." (*Ballona Wetlands Land Trust v. City of Los Angeles* (2011) 201 Cal.App.4th 455, 468.)

COMPLIANCE WITH CEQA - DISCLOSURE

Legal standard and background facts. The Board was required to provide adequate disclosures in the draft SED that was available for public review. Pub. Res. Code § 21080.5(d)(3)(B) states, "(d) To qualify for certification ..., a regulatory program ... shall meet all of the following criteria: ... (3) The plan or other written documentation required by the regulatory program does both of the following: ... (B) Is available for a reasonable time for review and comment by other public agencies and the general public." This is also consistent with 23 CCR § 3777(a), which states, "The Draft SED must be circulated prior to board action approving or adopting a project ... ."[1]

"The EIR process ... informs the public of the basis for environmentally significant decisions by public officials and thereby promotes accountability and

[1] The draft SED was first circulated in 2007 and the current version of 23 CCR § 3777 did not become effective until February 11, 2011. The Board's statement of reasons for the amendment of 23 CCR § 3777, however, state that the amendments were "largely a rewrite," were "intended to clarify," and were "necessary to comply with and implement" the statute. This suggests that the amendment was not a substantive change and that the regulations in effect in 2007 also required circulation of the draft SED before Board approval of a project.

informed self-government." (*Laurel Heights Improvement Assn. v. Regents of University of California* (1998) 47 Cal.3d 376, 392; *Ballona Wetlands Land Trust v. City of Los Angeles* (2011) 201 Cal.App.4th 455, 466-467.) "An EIR must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights, supra*, 47 Cal.3d 376, 405; *Center for Biological Diversity v. County of San Bernardino* (2010) 185 Cal.App.4th 866, 882-883.)

Particularly relevant to the issues in this case, an EIR or SED is a document for public consumption and must be written in plain English so lay readers can ascertain the scope of the project, the alternatives considered, the impediments to the alternatives and to any proposed mitigation, and the basis for the agency's proposed decision. (14 CCR §§ 15021(a), 15140, and 15147; *Sunnyvale West Neighborhood Assn. v. City of Sunnyvale City* (2010) 190 Cal.App.4th 1351, 1389 and 1391; *Neighbors of Cavitt Ranch v. County of Placer* (2003) 106 Cal.App.4th 1092, 1103 fn 2; *San Franciscans for Reasonable Growth v. City and County of San Francisco* (1987) 193 Cal.App.3d 1544, 1548-49.) The information in an EIR "must be presented in a manner calculated to adequately inform the public and decision makers, who may not be previously familiar with the details of the project. Information scattered here and there in EIR appendices, or a report buried in an appendix, is not a substitute for a good faith reasoned analysis." (*Environmental Protection Information Center v. California Dept. of Forestry and Fire Protection* (2008) 44 Cal.4th 459, 493.)

"[T]echnical perfection is not required; the courts have looked not for an exhaustive analysis but for adequacy, completeness and a good faith effort at full

disclosure.." (*Pfeiffer v. City of Sunnyvale City Council* (2011) 200 Cal.App.4th 1552, 1561. See also 14 § CCR 15151; *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 712.) The lead agency is not required to disclose in full every study or report in the administrative record, but it is required to adequately inform the public of the arguably feasible mitigation measures it considered and the impediments to those mitigation measures. (*Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 88; *Sierra Club v. County of Napa* (2004) 121 Cal.App.4th 1490, 1501-1506.)

On issues of disclosure, "when a plaintiff asserts error based on the omission of information, independent review will apply if the information in question is required by CEQA and necessary to informed discussion. In contrast, if the asserted error concerns the amount or type of information that is not required by CEQA and necessary for an informed discussion, then the substantial evidence standard applies." (*Madera Oversight Coalition, Inc. v. County of Madera* (2011) 199 Cal.App.4th 48, 101-102.)

Consistent with CEQA's disclosure requirements, the draft SED was required to include a description of the proposed activity with alternatives to the activity, and mitigation measures to minimize any significant adverse effect on the environment. (Pub. Res. Code § 21080.5(d)(3)(A).) The Board circulated a draft SED dated December 2007 (AR 3394-3499), various persons submitted comments, and the Board provided responses to those comments in January 2010 (AR 2139-2433 and AR 2434-2697). The Board then circulated draft revisions to the Policy and the SED in February 2010 (AR 3589-3818). The "Information Sheet" specifically noted that most of the public comments had concerned cumulative impacts and mitigation measures. (AR 3728.)

Following the circulation of the documents in February 2010, and the receipt of additional public comments, the Board adopted the Policy. For purposes of analyzing the disclosure claims, the Court reviews the information that the Board had circulated to the public through February 2010.

The SED disclosed that the Policy might lead to increased groundwater pumping and the anticipated potential impacts.[2] (AR 1882-1887.) Where a SED identifies a potential impact, it must then either (1) identify measures that will mitigate or avoid the significant effects on the environment or (2) identify specific economic, legal, social, technological, or other considerations that make mitigation measures or alternatives infeasible. (Pub Res Code § 21081.)

Groundwater - Evaluation and Disclosure of the Groundwater Delineations and Related Regulatory Concept. Under California's legal framework regarding water use the Board's permitting authority is limited to surface channel and subterranean streams but does not include percolating groundwater. Therefore, it is important for regulatory and enforcement purposes to delineate where one type of water stops and the other starts. "California is the only western state that still treats surface water and groundwater under separate and distinct legal regimes. ... The persistence of these alternative regimes inevitably leads to thorny issues of classification and boundary-setting. ... [C]lassification disputes in this field quickly take on an Alice–in–Wonderland quality because the legal categories (e.g., " 'subterranean streams flowing through known and definite channels,' " "percolating water") are drawn from antiquated case law and bear

[2] Living Rivers acknowledges that the SED correctly anticipates that third party actions might cause significant environmental impacts. (14 CCR § 15064 (defining "significant"))(14 CCR § 15358 (defining "effects" and "impacts").)

little or no relationship to hydrological realities." (*North Gualala Water,* 139 Cal.App.4th at 1590-91.) (See also Living Rivers 2nd RJN, Exh A. (Board Report on California law regarding groundwater.).)

Living Rivers asserts that the Board failed to consider and disclose two mitigation measures developed by the Board's staff: (1) "Groundwater Delineations," which was a methodology to identify subterranean streams where groundwater use could deplete stream flows (AR 11758-11774) and related maps (AR 11780-11884) and (2) a regulatory concept that persons who use groundwater in the delineated areas must report that pumping to the Board so the Board can then determine if a permit is required (AR 12160). Living Rivers asserts that the Board could have, and should have, considered these means to more aggressively exercise its permitting authority over surface channel water and subterranean streams. (5/25/12 TR at 18, 20, 26-28, 55-56, 58.) The Board asserts that it was not feasible to extend the Board's reporting and permitting authority and that the Board therefore had no obligation to discuss these mitigation options. (5/25/12 TR at 20, 44, 46-48, 58.)

If the Board considered a mitigation measure and determined that it was facially infeasible, then the Board would not be required to analyze the measure in any detail. (*Cherry Valley Pass Acres and Neighbors v. City of Beaumont* (2010) 190 Cal.App.4th 316, 350.) Similarly, if the Board determined that a mitigation measure could not be legally imposed, then the Board would not be required to analyze the measure in any

depth. Instead, the SED could "simply reference that fact and briefly explain the reasons underlying the lead agency's determination." (14 CCR § 15126.4(a)(5).)[3]

The Board did not disclose the "Groundwater Delineations" or the related regulatory concept in the draft SED that was circulated to the public in December 2007. In the Board's January 2010, responses to comments, the Board disclosed that mapping information related to the "Groundwater Delineations" was available (AR 2586) but did not disclose or discuss how the "Groundwater Delineations" might serve as a mitigation measure. Because omissions are at issue, the court applies the independent review standard when determining if the information was necessary to an informed discussion. (*Madera,* 199 Cal.App.4th at 101-102.)

The court finds that adopting the "Groundwater Delineations" and related maps as mitigation measures in the Policy was not facially infeasible and there is a fair argument that they could be legally adopted.[4] The "Groundwater Delineations" and related maps were not a facially infeasible mitigation measure because there is a fair argument that their adoption may have made the Board's monitoring of the anticipated increase in groundwater use more effective and efficient by distinguishing between groundwater in subterranean streams subject to the Board's permitting process and percolating

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[3] If Living Rivers or some other commenter had proposed the mitigation measures in a specific, concrete suggestion, then the Board would have been required to respond. "[A]n adequate EIR must respond to specific suggestions for mitigating a significant environmental impact unless the suggested mitigation is facially infeasible. While the response need not be exhaustive, it should evince good faith and a reasoned analysis." (*Napa Citizens for Honest Government v. Napa County Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 360.) (See also *Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App.4th 1019, 1029 ("EIR must respond to specific suggestions for mitigating a significant environmental impact unless the suggested mitigation measure is facially infeasible").)

[4] The court reads the "facially infeasible" standard and the "cannot be legally imposed" standard as equivalent to an "absence of fair argument" standard.

groundwater subject only to the Board's discretionary enforcement authority under the Public Trust Doctrine and the doctrine of waste. (AR 7834-7835.)

There is a fair argument that it would have been practically feasible to disclose the "Groundwater Delineations" and related maps because the Board's staff and its consultant, Stetson Engineers, had prepared the materials before the legislative deadline of January 1, 2008.[5] In August 2005, agencies pointed out the relevance of subterranean streams (AR 12872, 12915); in November 2006, Board's staff discussed subterranean stream delineation and depletion (AR 11939); and in February 2007 Stetson Engineers prepared a substantial study on the location of subterranean streams and methods for measuring whether groundwater wells were depleting the subterranean streams (AR 11758-11780). Given that a significant portion of the work was completed, there is a fair argument that this mitigation measure was not a project unto itself that would be at least as complex, ambitious, and costly as the Project itself. (Compare *Concerned Citizens of South Central L.A. v. Los Angeles* (1994) 24 Cal.App.4th 826, 842-843.) The SED discloses that hydrology is a developing science and that future developments may determine what water is subject to what regulatory scheme. (AR 2434-2697, Responses to Comments 24.4.26, 30.0.2, 30.0.5, 30.0.6, 30.0.7, 30.0.8.) The developing nature of any "Groundwater Delineations" might be a reason not to adopt them as a mitigation measure, but it does not render them "facially infeasible."

There is a fair argument that adopting the "Groundwater Delineations" and related maps to assist the Board in its enforcement of the Policy would be a lawful mitigation measure. If properly proposed and adopted, then the delineations and maps would

[5] The Board was required to prepare and propose the Policy before January 1, 2008. (Water Code § 1259.4.)

arguably be quasi-legislative in nature and therefore subject to some deference as the Board enforced the Policy through permits and enforcement actions. (AR 7834-7835.) (*North Gualala Water Co. v. State Water Resources Control Bd.* (2006) 139 Cal.App.4th 1577, 1607.)[6]

The court finds under the independent review standard that the Board should have disclosed its work on the "Groundwater Delineations" and related maps because there is a fair argument that their use as an enforcement tool could be a feasible mitigation measure. Even if the Board decided, or decides on remand, that the mitigation measure is not feasible, the Board must still disclose that it considered the measure and explain why the measure is not feasible. (14 CCR § 15091(a)(3).)[7] The court leaves to the Board's discretion what level of disclosure might be adequate.

The court finds that adopting the regulatory concept that persons who use groundwater in the delineated areas must report that pumping to the Board was facially infeasible because there is no fair argument that it could be legally imposed. (AR 12160.) The Board's permitting authority is limited to surface channel water and subterranean streams (Water Code § 1200) and the Water Code suggests that the Board has no authority to enact regulations to require routine reports of groundwater use.[8] The

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[6] The court does not defer to the Board in determining whether a mitigation measure "cannot be legally imposed," as the court reviews the merit of the legal issue de novo. (*City of Marina v. Board of Trustees of the California State* (2006) 39 Cal.4th 341, 355-356.)

[7] On the substantive issue of whether the Board decided to adopt a mitigation measure, the court would review to the Board's decision under the substantial evidence standard.

[8] The Board can require reports of groundwater use regarding a specific location following a specific enforcement action under the doctrine of waste. Living Rivers, however, argued that the Board could require reports of percolating groundwater use whenever any landowner used percolating groundwater within a specified distance from any delineated stream.

legislature enacted a focused statute that directs that persons in Riverside, San Bernardino, Los Angeles, and Ventura Counties who extract more than 25 acre feet of groundwater each year must report information to the Board. (Water Code § 4999 et seq.) This focused statute implies that the Board lacks the authority to require landowners to file permit requests for groundwater in other counties and under other circumstances. (*Wasatch Property Management v. Degrate* (2005) 35 Cal.4th 1111, 1118 ("[W]hen the Legislature has carefully employed a term in one place and has excluded it in another, it should not be implied where excluded.").) The legislature also enacted statutes relating to groundwater management suggesting that groundwater is to be managed by local agencies. (Water Code § 10750 et seq.) The only authority suggesting that the Board could require reports of groundwater use is that the Board's investigatory authority over bodies of water is not expressly limited to surface channel water and subterranean streams. (Water Code § 1051.) The arguable inference by omission that the Board can require the reporting of the use of percolating groundwater is weak compared to the substantially stronger inferences in Water Code § 4999 et seq. and Water Code § 10750 et seq. that the Board lacks that regulatory authority.

The court finds under the independent review standard that the Board had no obligation to disclose the concept that it could require persons who use percolating groundwater to report that pumping to the Board, as the concept appears to be lack even arguable merit. (*Clover Valley Foundation v. City of Rocklin* (2011) 197 Cal.App.4th 200, 244 ("An EIR need not identify and discuss mitigation measures that are infeasible); *Cherry Valley Pass Acres and Neighbors v. City of Beaumont* (2010) 190 Cal.App.4th 316, 347-348.).)

At the hearing, the Board's counsel stated, "We prefer to take on battles we can win based on the law." (5/25/12 TR at 58.) CEQA does not require the Board to assert untenable legal positions or otherwise take on losing battles. What CEQA requires is that where the Board identifies a potential mitigation measure that can be supported by a fair legal argument, that the Board must evaluate the mitigation measure, decide whether the measure is feasible, and, if Board decides that the measure is not feasible given the current state of the law, explain why it decided to avoid the legal battle. (*Laurel Heights Improvement Assn. v. Regents* (1988) 47 Cal.3d 376, 404-405.) The requirement that an agency explain why a mitigation measure or alternative project is infeasible applies without regard to whether the impediments to feasibility are economic, legal, social, or technological. (14 CCR § 15091(a)(3).)

Groundwater - Disclosure of the Effectiveness of the Existing Mitigation Measures. The SED suggests that local regulations will mitigate or avoid the impact of increased use of percolating groundwater and implies that these are feasible mitigation measures. (Pub Res Code § 21081(a)(1).) In fact, however, the Board has limited ability under California water law to effectively monitor and regulate the use of percolating groundwater and under the existing regulations in four of the five affected counties there likely will be little to no CEQA review of the anticipated increase in use of percolating groundwater.

The SED did not clearly present to the public the reality that under California law (1) the Board does not monitor the use of percolating groundwater, (2) any permitting of the use of percolating groundwater is at the county level, (3) Marin and Humboldt counties have no plans, codes, or ordinances for regulating the use of percolating

groundwater (AR 2610), (4) Sonoma County has a non-regulatory, collaborative, plan (Living Rivers 2nd RJN, Exh 3), (5) Mendocino County regulates the use of percolating groundwater only in the Town of Mendocino and only for new uses or new developments (Living Rivers 2nd RJN, Exh 2), (6) Napa County regulates the use of all groundwater "to the maximum extent possible" (Living Rivers 2nd RJN, Exh 4 (Napa Reg 13.15.010)), and (6) as a result there will likely be little to no CEQA review of the anticipated increase in the use of percolating groundwater in four of the five affected counties. (5/25/12 TR at 54-55.)

The draft SED does disclose significant portions of the regulatory framework. The Responses to Public Comments explain that the Board has jurisdiction over all the water in California, but under Water Code § 1200 et seq. the Board only has permitting authority over surface channel water and groundwater known as subterranean streams flowing in known and definite channels. (AR 2609-2611) Consistent with the Board's permitting authority, the Draft revisions dated February 2010 states "this policy applies to applications to appropriate water from surface water streams and from subterranean streams flowing through known and definite channels." (AR 3606.) The Draft revision dated February 2010 has a section titled "Enforcement" that differentiates between "8.3. Continuing Authority to Amend Permits and Licenses," and "8.4. Prohibition Against Waste and Unreasonable Use of Water." (AR 3616-3617.) The Board's responses to public comments about groundwater issues states repeatedly words to the effect that "Extractions from percolating groundwater are not subject to the State Water Board's water right permitting authority." (AR 2434-2697, Responses to Comments 23.3.4,

23.4.1, 24.4.3, 24.4.26, 23.6.5, 30.0.3, 30.0.7.) These disclosures informed the public that the Board has no permitting authority regarding the use of percolating groundwater.

The SED also disclosed that the Board's enforcement authority regarding percolating groundwater was limited to enforcement actions to prevent waste and that the limited enforcement authority could have a significant practical environmental effect. The Response to Public Comments explained:

> In some cases, it may not be feasible to fully mitigate for the indirect impacts of the Policy. ... [T]he State Water Board, Regional Water Quality Control Boards, and Department of Fish and Game may not have the resources to fully enforce the regulatory requirements described below. For example, the State Water Board does not have the resources to investigate every possible instance of increased riparian diversions or groundwater pumping and take regulatory action, if warranted, pursuant to article X, section 2, of the California Constitution or the public trust doctrine.

(AR 2605-2606.) The Board's Draft revision dated February 2010, has both an Appendix F regarding "Compliance Assurance," which explains in some detail how the Board intends to enforce the Policy (AR 3681-3683) and an Appendix G regarding "Prioritization of Enforcement" (AR 3684-3686). Together, these disclosures informed the public that the Board's discretionary enforcement efforts to regulate the use of percolating groundwater will be limited by its available resources.

The SED also disclosed summaries of the existing mechanisms for regulating the use of percolating groundwater in Marin, Humboldt, Sonoma, Napa, and Mendocino

Counties. (AR 2610.) The SED did not, however, effectively disclose that there would be no CEQA review of any use of percolating groundwater in Marin, Humboldt, or Sonoma counties, that there would be CEQA review of the use of percolating groundwater in Mendocino county only in the town of Mendocino, and that there would be consistent CEQA review only in Napa county. The Board's Supplemental Brief confirms by inference that Napa is the only affected county that will have effective CEQA review of the use of percolating groundwater. (Board Brief filed May 23, 2012, at 1:28 and 2:9.)

The SED then confused and complicated the information provided by suggesting that the five counties have effective regulation and that there would be CEQA review of the use of percolating groundwater. Examples include:

1. "The five counties in the Policy area ... *may* mitigate the potential impacts of increased groundwater pumping by regulating groundwater use pursuant to their police powers." (Response to Comment 23.7.1, AR 2610.) (Emphasis added.)

2. "*Certain* actions that affected parties take to increase groundwater extraction *might* be subject to CEQA review at the 'project level' and the lead agency would be required to adopt mitigation measures to reduce significant project impacts." (Response to Comment 23.4.16, AR 2583; See also responses to Comments 23.4.26, AR 2586; 23.4.39, AR 2591; 23.4.43, AR 2593; 23.6.4, AR 2599; 30.0.1, AR 2687; 30.0.7, AR 2689; 30.0.11, AR 2691.) (Emphasis added.)

3. "To the extent that the land use and water development projects are not regulated by the State Water Board, they are within the purview of local governments and those entities *can and should* avoid or mitigate their significant environmental impacts. ... Individual projects *will* be subject to the appropriate level of environmental review at the time they are proposed, and mitigation would be identified to avoid or reduce the adverse effects of potentially significant effects, prior to any project-level action. (March 14, 2008 Draft SED, AR 1916) (Emphasis added.)

4. "Future CEQA reviews conducted by the State Water Board or by another lead agency *can be expected* to identify any significant project-specific environmental effects and mitigate them to less-than-significant levels. (March 14, 2008 Draft SED, AR 1919) (Emphasis added.)

To the lay reader, these statements imply, if not aggressively suggest, that the anticipated increases in the use of percolating groundwater will be subject to CEQA review. The Board's use of qualifiers such as "may," "might," and "can" obscure the reality that there will likely be no meaningful environmental review of increased use of percolating groundwater in Marin, Humboldt, Sonoma, or Mendocino counties. For example, the draft SED states "In some cases, it may not be feasible to fully mitigate for the indirect impacts of the Policy" (AR 2605), but the reality appears to be that "For most streams in the Policy Area, the regulatory policies of Marin, Humboldt, Sonoma, and Mendocino counties are not likely to effectively mitigate for the increased use of percolating groundwater that is an expected indirect impact of the Policy."

Because the amount or type of information that is required by CEQA and necessary for an informed discussion is at issue, the court applies the substantial evidence standard to its review of whether the Board provided adequate information to the public. (*Madera,* 199 Cal.App.4th at 101-102.) The court has evaluated the disclosures consistent with the law that a SED or EIR is intended for public consumption and must, therefore, convey all the required information to the public in a manner designed to make the issues understandable to the public. (14 §§ CCR 15121, 15140, 15147.) A CEQA disclosure is not adequate if only a PhD biologist can understand the implications of the disclosed facts or if only a lawyer can understand the implications of the distinction between the Board's jurisdiction and its permitting authority. (14 §§ CCR 15140 and 15147; *San Franciscans for Reasonable Growth v. City and County of San Francisco* (1987) 193 Cal.App.3d 1544, 1548-49 (an EIR must be "readily understandable ... by interested non-professional laypersons").)

There is no substantial evidence that the SED adequately informed the public that under current law in Marin, Humboldt, Sonoma, and Mendocino counties there will be little to no monitoring of the expected increase in the use of percolating groundwater. The SED's disclosure that the Board can initiate enforcement actions to limit the use of percolating groundwater is accurate in isolation, but misleading without an explanation that it is a lesser level of regulation than a permitting process. The SED requires the reader to gather information from scattered places and then critically parse sentences to discern that there will be little effective monitoring of the increased use of percolating groundwater.

The SED does not accurately present information to enable the public to understand and to consider meaningfully the limited legal options facing the Board to mitigate the expected increase in the use of percolating groundwater. As a result, with regards to the discussion regarding percolating groundwater the SED does not effectively meet CEQA's minimum disclosure requirements for promoting the accountability of public agencies and public's informed self-government.

The Board's failure to clearly disclose what appear to be the limited mitigation measures available to address the increased use of percolating groundwater use creates a presumption of prejudice. (*Schenck v. County of Sonoma* (2011) 198 Cal.App.4th 949, 959-960; *Sunnyvale West Neighborhood Assn. v. City of Sunnyvale City* (2010) 190 Cal.App.4th 1351, 1388; *Neighbors of Cavitt Ranch v. County of Placer* (2003) 106 Cal.App.4th 1092, 1100-1101.) The omitted information was material and the Board has not overcome the presumption of prejudice. Therefore, the court orders that the matter be remanded for adequate public disclosure.

Dam removal and construction of off stream storage. The SED contains information regarding dam construction and off stream storage. Because the amount or type of the information provided is at issue, the court applies the substantial evidence standard to its review of whether the Board provided adequate information. (*Madera,* 199 Cal.App.4th at 101-102.)

There is substantial evidence that the draft SED adequately disclosed that the Policy might lead to dam removal and construction of off stream storage, potential impacts (AR 1894-1904), and that the Board and other agencies will need to implement mitigation efforts based on the specific impacts of each project (AR 1880, 1919). The

disclosures and discussion in the March 2008 draft SED were appropriate for a program level document. The March 2008 draft SED was not deficient because in the Board's response to comments dated January 2010 the Board provided additional information regarding potential mitigation options that might be appropriate for potential future projects. (AR 2606-2609.) Furthermore, the Board's responses to comments were provided to the public in January 2010 and for purposes of analyzing the disclosure claims, the Court reviews the information that the Board had circulated to the public through February 2010.

Full Disclosure to the Board. The Board's staff did not disclose to the Board that a consultant (Stetson) had developed a regulatory concept for controlling groundwater pumping. (AR 12160.) The regulatory concept would have requested owners to file permit requests whenever they were drilling within 200 feet of a stream bed so that the Board could conduct a hydrological review and, if warranted, issue a cease and desist order. Living Rivers has not cited to any authority suggesting that the staff erred in not disclosing this particular proposal to the Board. The court has found that there is no fair legal argument that the Board could implement this regulatory concept.

COMPLIANCE WITH CEQA - EVALUATION OF IMPACTS, MITIGATION MEASURES, AND ALTERNATIVES.

Having found that the Board did not make clear and adequate public disclosures regarding the Board's limited ability to monitor and mitigate the impact of the anticipated increase in the use of percolating groundwater as a result of the Policy, the court cannot, and does not, reach the issues concerning whether the Board's findings under Pub. Res.

Code § 21081 are supported by substantial evidence. The Board might consider different evidence and make different findings following further public review and Board deliberation. (*Rio Vista Farm Bureau Center v. County of Solano* (1992) 5 Cal.App.4th 351, 374.)

EVIDENCE REGARDING THE APPROPRIATE REMEDY.

The court has considered the declarations of Philip Crader, Manager of the State Water Board's Permitting and Licensing Section, and Brian Johnson, Californian Director of Trout Unlimited. These declarations are relevant to scope of the appropriate remedy under Pub Res Code 21168.9 and not to the merits of the Board's compliance with Water Code § 1259.4 and CEQA.

THE APPROPRIATE REMEDY.

Summary. The court directs the Board to vacate Resolution 2010-0021. The Board must evaluate the "Groundwater Delineations" as a potentially feasible mitigation measure for the anticipated increased use of percolating groundwater and make appropriate disclosures regarding that evaluation and resulting decision. (14 CCR § 15091(a).) The Board must accurately present information to enable the public to understand and to consider meaningfully the limited legal options facing the Board to mitigate the expected increase in the use of percolating groundwater. The court will not dictate how the Board must meet its obligations under CEQA. (Pub. Res. Code § 21168.9(c).)

The Policy will not remain in effect pending CEQA compliance. The Policy was not adopted in compliance with CEQA and therefore must not remain in effect pending compliance with the writ and further CEQA review. The court could permit the Policy to remain in effect only if a court finds that "(1) the portion or specific project activity or activities are severable, (2) severance will not prejudice complete and full compliance with [CEQA], and (3) the court has not found the remainder of the project to be in noncompliance with [CEQA]." (Pub. Res. Code § 21168.9(b).)

The CEQA violation in this case concerned the adequacy of public disclosures and the resulting lack of informed deliberation rather than the adequacy of evidence to support a substantive decision made after informed deliberation. As a result, the violation affected the adoption of the Policy as a whole rather than some severable portion that might not be supported by substantial evidence. Severance of disclosure and deliberation from the substance of the agency action would prejudice complete and full compliance with CEQA because it would render SEDs and EIRs "nothing more than post hoc rationalizations to support action already taken." (*Center for Sierra Nevada Conservation v. County of El Dorado* (2012) 202 Cal.App.4th 1156, 1181.) Finally, if an agency has not complied with disclosure requirements that concern the project as a whole, then the entire project is invalid and there is no "remainder of the project" that could be in compliance with CEQA.

In considering section 21168.9(b), the court follows *Ultramar, Inc. v. South Coast Air Quality Management Dist.* (1993) 17 Cal.App.4th 689, 698, where the trial court found that the public agency failed to provide a required public comment period and entered a judgment that suspended the approved agency action pending a reevaluation of

the action following the required public comment period. *Ultramar* distinguished between the situation in *Laurel Heights* where an EIR "described adequately the environmental effects" and the situation in *Ultramar* where the EIR "omitted [a] portion ... dealing with the cumulative effects." (*Id.*, 17 Cal.App.4th at 705.) The court then stated, "we cannot overemphasize the importance of full compliance with all notice provisions of applicable law, so that there will be maximum public comment and involvement. ... [O]ur role is to ensure that the law is followed, so that an informed decision is made. Given the significance of whatever path is followed, any decision must be subject to full public review before its implementation." (*Id.*, 17 Cal.App.4th at 705.)

The balancing of the equities also weighs in favor of vacating the Policy while the Board completes the CEQA process. The Board makes a persuasive argument that Water Code § 1259.4 was designed to bring predictability to water permit administration, that the Policy has provided that predictability, and that vacating the Policy will return the permitting process to an inefficient and potentially inconsistent case-by-case review of permit applications. (Crader Dec., para 4-6.)[9]

The Board's equitable argument is, however, undercut by two factors. First, the Board assumes that the environmental benefits of the Policy outweigh the potential adverse environmental impacts and implicitly asks the court to issue an order that will have the effect of a temporary statement of overriding considerations. (Pub. Res Code § 21081(b); 14 CCR § 15093.) The court will not presume that the Policy includes adequate mitigation for the anticipated use in percolating groundwater or that overriding

[9] The Board also provided evidence that vacating the Policy could lead to an increased strain on the Board's resources because there might be an increase in water permit applications and the applications would need to be processed on a case-by-case basis. (Crader Dec., para 7-10.)

considerations support the implementation of the Policy in its current form. Second, the Board retains its regulatory authority to evaluate and issue water permits with conditions while the CEQA process continues. The court does not preclude the Board from treating the vacated Policy as a guideline and, if consistent with Water Code § 275, Water Code § 1200 et seq., and other laws, and if within the proper exercise of the Board's discretion, processing water applications consistent with the vacated Policy until the CEQA process is completed.

The Board relies on *County Sanitation Dist. No. 2 of Los Angeles County v. County of Kern* (2005) 127 Cal.App.4th 1544, 1603-1605, where the court found similar equities compelling and permitted a portion of an ordinance to remain in effect while the agency completed CEQA review. *County Sanitation* is distinguishable on three grounds. First, in *County Sanitation*, the parties agreed that the heightened treatment standards at issue should remain operative. (*Id.*, 127 Cal.App.4th at 1604.) Second, in *County Sanitation*, the heightened treatment standards were severable from the remainder of the ordinance at issue. (*Id.*) Third, in *County Sanitation* the agency action created an ordinance and there was an interest in maintaining the existing regulatory status quo instead of reverting to no regulation while the CEQA process continued. In this case the statutory process for water permits remains in effect and the Board will continue to process water permit applications within that structure while the CEQA process continues. (Water Code § 1200 et seq.)

The court does not address whether the Board could ultimately determine that the benefits of the Policy as a whole outweigh the potential adverse impacts of increased

groundwater use in what appears will be the absence of effective reporting and enforcement mechanisms. (Pub. Res. Code § 21081(b); 14 CCR § 15093.)

Evaluation of the "Groundwater Delineations" as a mitigation measure and related disclosures. The court has decided that the "Groundwater Delineations" are not facially infeasible as a mitigation measure. Stated otherwise, the court has found there is a fair argument based on information in the record that the "Groundwater Delineations" are a feasible mitigation measure. The Board must now conduct its evaluation and decide whether the "Groundwater Delineations" are a feasible mitigation measure. After its evaluation and decision, the Board must make the appropriate findings. (14 CCR § 15091(a).)

Recirculation of the SED. The court leaves to the Board's discretion whether to recirculate the SED and, if so, whether to recirculate all or only parts of the SED. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 449; 14 CCR 15088.5(c).) The Board must make the determination whether mitigation measures related to the anticipated increase in the use of subterranean streams and percolating groundwater use can be addressed in isolation or are interrelated with other aspects of the Policy.

The Board characterizes the court's proposed statement of decision as directing that "the Board needs to disclose a small amount of information." The Board then suggests that this information "merely clarifies or amplifies" the information already disclosed and that as a result further public disclosures might not be necessary. (14 CCR 15088.5.) The court issues no order on recirculation, but notes that the difference

between inadequate disclosures and adequate disclosures under 14 § CCR 15151 is not likely to be merely a small amount of clarification or amplification.

DATED: AUG 0 9 2012

Evelio Grillo
Judge of the Superior Court

SUPERIOR COURT OF CALIFORNIA
COUNTY OF ALAMEDA

Case Number: RG10543923
Case Name: Living Rivers Council vs. State Water Resources Control Board

1)Final Statement of Decision

2)Judgment

3)Proposed Writ of Mandate

DECLARATION OF SERVICE BY MAIL

I certify that I am not a party to this cause and that a true and correct copy of the foregoing document was mailed first class, postage prepaid, in a sealed envelope, addressed as shown below, and that the mailing of the foregoing and execution of this certificate occurred at US Post Office Building, Second Floor, 201 13th Street, Oakland.

I declare under penalty of perjury that the foregoing is true and correct. Executed on **August 10, 2012**

Executive Officer/Clerk of the Superior Court
By Scott Sanchez, Deputy Clerk

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SUPERIOR COURT OF CALIFORNIA
COUNTY OF MENDOCINO

RUDOLPH LIGHT AND LINDA LIGHT, **Petitioners,** **vs.** **THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, et al.,** **Respondents.**	**Case No. SCUK CVG 11 59127** **ORDER GRANTING PETITION FOR WRIT OF MANDATE IN CONSOLIDATED ACTIONS**
RUSSIAN RIVER WATER USERS FOR THE ENVIRONMENT; ALLEN NELSON; BILLY MUNSELLE; ROBERT TERRY ROSETTI; REDWOOD RANCH AND VINEYARDS, LP. **Petitioners,** **vs.** **THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, et al.,** **Respondents.**	

ENDORSED-FILED

SEP 26 2012

CLERK OF MENDOCINO COUNTY SUPERIOR COURT OF CALIFORNIA

I. INTRODUCTION

Petitioners Rudolph and Linda Light (hereafter "Light Petitioners") and Russian River Water Users for the Environment, Allen Nelson, Billy Munsell, Robert and Terry Rosetti, and Redwood Ranch and Vineyards, L.P. (hereafter "RRWUE") (collectively "Petitioners") separately filed writs of mandate seeking an order from the Superior Court declaring invalid Section 862 of Title 23 of the California Code of Regulations. The State Water Resources Control Board (hereafter "SWRCB") had voted to enact Section 862 on September 20, 2011, with an effective date of March 14, 2012. The cases were consolidated for trial in this court.

Petitioners attack the constitutionality of Section 862 on a number of different grounds. Petitioners also claim the SWRCB's jurisdiction was exceeded by enacting a regulation of this scope. Petitioners urge the court to invalidate Section 862 using its authority under Government Code Section 11350. Finally Petitioners claim the SWRCB violated the California Environmental Quality Act (hereafter "CEQA").

In a number of respects, the court agrees with Petitioners. Consequently, and for reasons fully explained herein, the court grants the consolidated petitions for writ of mandate and hereby declares Section 862 to be constitutionally void. The court concludes the SWRCB exceeded its authority by adopting a regulation encompassing all classes of water rights holders, including riparians, and failing to make the necessary specific findings as to those water users. The court also invokes its authority under Government Code Section 11350(b) and declares Section 862 to be invalid because there is not substantial evidence in the record to show the regulation, as enacted, is necessary.

II. FINDINGS OF FACT[1]

A. The Russian River

The Russian River Watershed consists of 1485 square miles of land and river. (AR 3377.) For a distance of approximately 110 miles, the river flows in a southwestern direction through Mendocino and Sonoma counties, eventually reaching the Pacific Ocean. (AR 1715.) The watershed includes numerous tributaries in both counties that feed into the river.

Water is diverted from the Russian River and its tributaries for a variety of purposes including municipal, industrial, domestic, and agricultural use. (ER 3876.) The Sonoma County Water Agency (hereafter "SCWA"), the Mendocino County Russian River Flood Control and Water Conservation Improvement District (hereafter "RRFC&WCID"), as well as the Redwood Valley County Water District each hold water rights to divert for municipal, industrial and irrigation use. (AR 3876.)

Numerous other public and private entities divert water from the Russian River and its tributaries as well. There are about 1778 water rights, water right claims, and pending water right applications in the Russian River watershed. Of this, 533 water records (roughly 30%) provide for the diversion of water for frost protection use. (AR 3876.)

B. Coho and Chinook salmon and Steelhead trout

Coho and Chinook salmon as well as steelhead trout are protected species under the Endangered Species Act. (AR 2.) Coho salmon are at risk of extinction (AR 241.) The remaining species have a low probability for viability. (AR 241.) Any takings of these species are against the law. Section 9(a)(1) of the Endangered Species Act makes it unlawful for any person to "take" any endangered or threatened species. "Take" in this context includes harming, wounding, or killing. (AR 2.)

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[1]The court's factual findings are taken from the record developed at the administrative level. That record consists of over 15,000 pages of written material and over 15 hours of videotaped testimony from the April 2009, November 2009, January 2010, and September 2011 hearings. To assist the trial court, the parties prepared an appendix of documents which they jointly considered relevant. Due to the importance and complexity of the issues presented, however, the court did not limit its review solely to the appendix and the documents therein. The court reviewed the complete record and watched all video taped hearings held on the above referenced dates as well as the NMFS video of stream footage.

Coho, Chinook and steelhead all spawn and rear in the Russian River water basin. (AR 2.) Collectively, these species are referred to as "salmonids." (AR 230.) According to the National Marine Fisheries Service (hereafter "NMFS"), there is 1778 miles of potential salmonid habitat in the Russian River. (AR 232.) Salmonids in both the smolt and fry stages are susceptible to stranding both from natural causes and unnatural causes. (AR 237.)

There is overlap between vineyards and the salmonid habitat. As of 2008 there was 60,640 acres of vineyard in the Russian River water basin. Seventy percent (70%) of these acres are within 300 feet of the salmonid habitat, and twenty-five percent (25%) of the salmonid habitat is within 300 feet of a vineyard. (AR 233.)

"Stranding" is the separation of fish from flowing surface water. (AR 3903.) Juvenile salmonids are more vulnerable to stranding in the spring due to their size. They can become stranded over gravel bars or trapped in off-channel habitat. (AR 5620.) Stranding can occur as a result of natural declines in flow, municipal or industrial water withdrawals, and agricultural withdrawals. (AR 3903; *see also,* 2008 Biologic Opinion Prepared by U.S. Army Corp of Engineers and NFMS at AR 4758-4760.)

Over time, the health of the spawning and rearing habitat has declined. (AR 240.) There are many factors contributing to this situation. In fact, NMFS has identified 22 of the 35 salmonid habitat attributes are limiting reproduction and survival. (AR 240.) One of the top four stressors is water diversion and impoundment. (AR 240.) NMFS has identified specific risks to salmonids from low in-stream flow: 1) increased risk of stranding of fish in edge water habitats: 2) decreased cover exposing the species to predators; and 3) possible interference with late end of spawning season. (NMFS spokesperson AR Disc #5.)

Ensuring the viability of these species is not only a public trust mandate but also a significant element in the environmental and economic stability for Sonoma and Mendocino counties.

C. April 20, 2008

On April 20, 2008, two incidents of juvenile salmonid strandings in the Russian River watershed were reported to the NMFS. One incident occurred in Mendocino County on the main stem of the Russian River near Hopland. A NMFS biologist documented the stranding of ten (10) steel head fry in this location. (AR 2398.) The other stranding incident occurred in a tributary called Felta Creek in Sonoma County. NFMS documented thirty-one (31) stranded juvenile salmonids. These were the only documented salmonid strandings in the watershed in the spring of 2008. (AR 828, 2397

The strandings on April 20, 2008, were a result of a "perfect storm" of several coinciding conditions during an unusually cold and dry spring. The record shows that "the [2008] frost season was the worst frost season in the history of the upper Russian River." (Lee Howard, President of RRFC&WCID. AR Disc #2 and AR 33-34.).

There was virtually no rain during March and April that year. March was the driest on record with no recorded rain fall at all. (AR 823-831.) The lack of rain resulted in severely low base stream flows in both the main stem and the tributaries of the Russian River. Base flows measured by the SCWA were well below average at the time of these events. In other years, the average March-April flow measured at the Hopland gage is 976 cubic feet/second (cfs). (AR 828.) Flows in April 2008 were barely above the minimum in-stream flows required by [SWRCB] Decision 1610, peaking at 215 cfs and rarely exceeding 200 cfs. In-stream flow on April 20, 2008, was only 168 cfs. (AR 828.)

Little or no rainfall also results in very dry air. On April 20, 2008, there was extremely low humidity. Low temperatures and low humidity produce the most severe type of frost events called advective frosts. (Glen McGourty, Mendocino County Farm Advisor, University of California Cooperative – AR 138-196.). Advective frosts are caused by large cold air masses, usually accompanied by wind and low humidity. (AR 151.) The air actually may become colder with elevation and temperatures can drop as low as 21 degrees. Most frost events in Mendocino County and many in Sonoma County are advective freezes.

The spring of 2008 also brought very cold temperatures to the region. In fact, the 2008 frost season was the coldest in over thirty years with freezing temperatures on at least twenty (20) nights in late March and early April. (AR 828.) An average spring in this area has 5-6 nights of freezing temperatures. (AR 300.) On April 20, 2008, a severe advective frost of unusually long duration arrived in the region necessitating grape growers and pear growers to use water for frost protection or lose their crops. On this occasion, the temperature dropped to 23 degrees Fahrenheit. (McCourty AR Disc #2.) For those in water management, "the combination of record cold and reduced base flows set the stage for an operational worst case scenario." (AR 33-34.)

D. Frost Protection

Under California law, frost protection is a recognized beneficial use of water. (Cal. Code Regs. Tit. 23, §662.5.) Many of the farmers in the region frost protect their crops using an overhead sprinkler system supplied by water obtained from direct diversions from the Russian River or from a tributary thereto. Diversions are sometimes supplemented with water from a storage pond or from a well. Due to the lack of rain, by late April 2008, storage ponds had largely been depleted. (Koball, AR Disc #3; AR297-98.) Some farmers rely solely on groundwater for frost protection. Section 862 applies to groundwater users even though not all aquifers are connected to the river; and even of those that are, the SWRCB has no information about the extent to which there is a correlation between drawing water from an aquifer and a corresponding instantaneous reduction in the river or tributary.

Using overhead sprinklers to frost protect is the most effective way to protect grape vines and pear trees during times of severe advective frosts.[2] (McCourty, Farm Advisor to Lake and Mendocino Counties from the University of California Cooperative and the Department of Agriculture, testified before the SWRCB in April of 2009 and again in November 2009.) Frost protection is necessary to protect the green tissue on the plant from frost damage. Thirty minutes

[2] Overhead sprinklers serve other purposes such as cover crop maintenance which is a means of controlling erosion and insects. (Koball, April 7, 2009, AR Disc #3, AR297.)

below 32 degrees Fahrenheit results in crop damage. (McCourty, April 2009.) Buds are especially susceptible to frost damage. and frost damage can result in complete crop loss. Crop loss during frost season usually cannot be remedied by replacement crops; those vines that are damaged are lost for the entire year.

There are passive methods of frost protection including site selection, cover crop management, adjusting the time and method of pruning, and early spring irrigation. These management techniques are inadequate for advective freezes such as that on April 20, 2008. There are synthetic sprays available for use in lieu of water. Copper is the most effective but it is toxic to aquatic life. It is not widely used for frost protection because in the spring-time it runs or seeps into the river or groundwater, causing toxicity to fish and other life.

Other active methods of frost protection include wind machines and heaters. Wind machines are futile when temperatures drop below 28 degrees because their effectiveness depends on the presence of warm air which only occurs during radiation frosts. (AR 170-171; *see also* Pete Opatz AR Disc #5 crop failure in Sonoma County on April 20, 2008 in vineyard using wind machines; and AR 1555-57.) Heaters are not commonly used because they rely on diesel fuel which is expensive and negatively affects air quality. Air Quality Control Districts discourage and, under certain conditions, prohibit their use due to the compromise in air quality. They are also ineffective in advective freezes. (AR 297.)

Sprinklers are an effective form of frost protection because when the water freezes on the plant it forms a protective coating around the vine. When the water turns from a liquid to a solid during freezing, heat is liberated and it protects the vine. A temperature of 32 degrees is maintained within the coating as long as there is a mixture of water and ice dripping off the plant. Depending on the dew point, sprinklers often must be turned on before the air temperature reaches 32 degrees and left on after the air temperature returns above 32 degrees. In summary, using sprinklers for frost protection is the best method available to defend against advective frosts in the Russian River watershed. (AR Discs #2 – 5.) The record at the agency level conclusively shows that using water to frost protect is an essential element of vineyard and orchard management in the upper river and middle river basins because it is the only method available that is effective in advective frosts.

Without water to frost protect, complete crop loss due to frost damage would be far more prevalent in certain areas of Sonoma County and much of Mendocino County. Crop failure due to frost damage has measurable and potentially catastrophic economic consequences to the individual farmer, employees and county revenues. (*See* Dyson, "Economics of Advective Frost Damage in Sonoma County," March 2010, AR 1555-1557.)

Sean White, General Manager of the Mendocino County RRRC&WCID and a fisheries biologist, confirmed that overhead sprinklers have proven to be the most effective in the Russian River Water basin where there are so many advective frosts. (April 2009, AR Disc #3.) There was no evidence presented at the agency level contravening this conclusion, nor the severe negative economic consequences from wide-spread crop loss from frost damage.

This method of frost protection uses a significant amount of water for a crop that is otherwise very water efficient. (McCourty, Nov. 9, 2009 AR Disc #5[3].) On April 20, 2008, the low humidity and fast moving cold front resulted in temperatures dropping very fast and remaining well below freezing for a long time. The Agricultural Advisor for Mendocino County advised farmers to turn on sprinklers at 37 degrees when 34 degrees is average. This resulted in roughly twice the amount of water being consumed in Mendocino County as compared to an average frost event. (McCourty, April 2009, AR Disc #2.)

E. Water Management and the SCWA

Water management decisions influenced developments on April 20, 2008 as well. As noted above, the Russian River is a managed river. In-stream flow is not determined solely on natural flow and natural regeneration. In fact, in-stream flow is managed by the SCWA. There are two dams on the Russian River relevant to this case. Coyote Dam was built in 1959 creating the reservoir at Lake Mendocino, north of Ukiah. SCWA manages water releases from Coyote Dam. Warm Springs Dam created the reservoir at Lake Sonoma, which is located at the north end of the Dry Creek Valley in Sonoma County. It too is operated by the SCWA.

In the upper basin of the Russian River the flow levels in the main stem are controlled by the SCWA's water releases from Lake Mendocino. SCWA is legally responsible for maintaining minimum in-stream flows set by SWRCB decision 1610. (AR 283-284.) Flow in tributaries is not affected in the same manner. (Sean White, General Manager of RRFC&WCID, and Pam Jeane, SCWA Chief Engineer, Coyote Valley Dam, April 7, 2009, AR Disc #3.)[4]

On the morning of April 20, 2008, when the temperature started to drop precipitously, SCWA released insufficient amounts of water from Lake Mendocino. Larger advance releases were needed to compensate for the already very dry conditions, the approaching cold front, and the expected need to frost protect. The failure to release more water occurred in part because the dam at Lake Mendocino is operated in Santa Rosa--many miles to the south where weather patterns are much different. In Santa Rosa, operators were unaware of the approaching severe frost and therefore the dam operators did not have time to increase water releases before the farmers turned on their sprinklers. Some estimated that the delay due to the lack of accurate information exceeded 24 hours.

In the spring of 2008, SCWA Coyote Dam operators had only one source of information in the upper Russian River basin to assess in-stream flows. There was one electronic stream flow gage at Hopland, located approximately 14 miles south of the dam. By the time a drop in stream flow due to frost protection was measured at the Hopland station, it was too late to adequately

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[3] UC Cooperative Extension Ag Advisor McGourty testified that since 1985, water consumption in the upper basin of the Russian River watershed has been static even though there are more grapes under production. This is explained largely because agriculture in the upper basin has converted from pear orchards to grape vineyards. Grape vineyards use half the amount of water for irrigation and frost protection than pears. (AR Disc #5, 1:40-45.)

[4] The RRFC&WCID store approximately 8,000 acre feet of water in Lake Mendocino in conjunction with SWCA. RRFC&WCID is the agricultural and municipal water rights holder for the upper Russian River basin. The District provides irrigation water to industry, approximately 4,000 acres of agriculture, as well as water for municipalities such as the City of Ukiah. (AR Disc #3.)

respond because water released from Coyote Dam takes 10-12 hours to travel to the Hopland station. Therefore, there was a lag time *before releasing* water at the dam due to the lack of timely information about conditions, and even more lag time after the release simply because it takes time for the water to travel the 14 miles of river channel.

The slow response by SCWA at Coyote Dam on April 20, 2008, was a significant factor adding to the problem of critically low stream flows due to the dry conditions in the Russian River Basin. Pam Jeane, Chief Engineer for the SCWA at Lake Mendocino, testified that "the biggest issue with regard to frost protection and maintaining in-stream flows is this issue of being reactive as opposed to proactive" about water demand. (April 2009, Disc #3, AR 287.) She also underscored that in 2008 there was an insufficient number of in-stream flow gages throughout the river system both north of Hopland and south into Sonoma County. This prevented SCWA from being proactive in advance of freezing weather.

As set forth previously, temperatures plummeted during the early morning hours of April 20, 2008, and the farmers began to frost protect to save their crops. U.C. Agricultural Advisor McCourty testified that at 20 or 21 degrees farmers cannot save their crops even with frost protection. On that particular morning temperatures dropped to 23 degrees and the associated frost posed a critical threat to crop survival. When the farmers turned on the sprinklers, there was a resulting instantaneous draw down in water as measured at the Hopland gage. The draw-down was measured as a reduction of 83 cfs. The in-stream flow prior to frost protection pumping was only 168 cfs. (AR 826-28.) The flow dropped by nearly half at that location. This was an unprecedented set of circumstances.

F. The Cause of the Strandings

In sum, the court finds that the combination of 1) the severe cold temperatures on April 20, 2008; 2) the low humidity in the air, 3) the above average number of preceding frost events that spring consuming any prior storage; 4) the duration of this and prior frost events; 5) the far below average in-stream flow resulting from the dry conditions; 6) the failure of SCWA to timely release water to compensate for the incoming freezing weather; and 7) the commencement of frost protection by farmers; resulted in the stranding of the salmonids near Hopland. No one factor alone caused the strandings: it was the culmination of these unique conditions.

Thirty-one juvenile salmonids were also found stranded in Felta Creek, a tributary to the Russian River located in Sonoma County. (AR 3391.) This stranding occurred for the same reasons except the flow in the tributary was not affected by releases from either of the dams. The administrative record shows this stranding happened near a single vineyard using direct diversion to frost protect four acres of grape vines. This stranding was a result of dry conditions, record cold air, and the farmer's direct diversion of water from the tributary.

These were the only two documented strandings of salmonids during the 2008 frost protection season. No strandings were documented during the 2009, 2010, or 2011 frost seasons.

The two documented strandings on April 20, 2008 eventually caused the SWRCB to invoke its rule-making process which culminated in the passage of Section 862.[5]

G. Mendocino and Sonoma County Vineyards

Grape vineyards represent a significant percentage of the economy in both Mendocino and Sonoma counties. Both counties measure the value of grape production not only in terms of the crop itself, but also in terms of wine production. Vineyards and grape growing also contribute to tourism, tax revenue, and real estate stability.

In Mendocino County, the 2009 grape crop was estimated at $78 million. (AR 3905.) It is the most valuable agricultural commodity in the county. (McCourty, April 2009, AR Disc #2.) Pears and other crops bring in $30-40 million. There are 29,000 jobs in Mendocino County. Over 1,000 of those jobs are in the wine industry, which is valued at $220 million.

In Sonoma County, there are over 60,000 acres of vineyards. Approximately 48,000 of those acres are in the Russian River watershed. (Opatz, AR Disc #5.) The average vineyard size is 35 acres. In 2009, the grape crop in Sonoma County brought in $465 million. (AR 3905.)

It is unknown the percentage of vineyards in the Russian River water basin that irrigate for frost protection. The proportion of vineyards that rely on surface water diversions for frost protection is also unknown. (AR 234.) The percentage of ground water use that has any effect on the river is also unknown. Hence, there exists "the need for better monitoring and recording of that type of information . . . to better understand the risk." (NMFS-April 2009 AR Disc #3.)

H. Post April 2008

Immediately after the discovery of the two April 2008 incidents of salmonid strandings, NMFS instigated the formation of the Frost Protection Task Force (hereafter "Task Force"). The Task Force included government agencies like NMFS, the SWRCB, the Department of Fish & Game, SCWA, and the RRFC&WCID, several non-profits such as Trout Unlimited and Fish Friendly Farming, and representatives of the agricultural community. That group developed draft protocols to provide the SCWA with more accurate frost forecast information prior to the onset of frost protection. This forecasting information ultimately improved decision making regarding water releases from Coyote Dam in 2009. The Task Force collapsed when NMFS unexpectedly sent a letter on February 19, 2009, to SWRCB asking for the implementation of emergency regulations and for a prohibition on frost protection for the upcoming frost season. (AR Discs #2 & 3.) NFMS's request surprised many members of the Task Force, undermined its functioning, and caused it to disband.

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[5] A model was proposed by NMFS in March 2011 from which to extrapolate from the documented strandings the number of actual strandings. (AR 2397.) The model is flawed for a variety of reasons. The most significant is the admitted lack of data or science to support the conclusions. (AR 3401-3404.) The premises used in the model are nothing more than unverified assumptions without scientific data or other factual support. The model does not include a statistical component of naturally occurring strandings in the same areas for comparative analysis. It also does not address the effect of rapid flow reductions from diverters other than farmers. For these reasons, it was an abuse of discretion if relied upon. Importantly, juvenile salmonid strandings have been documented in the watershed in times other than frost protection. (*See* Affidavit on Stream Flow fluctuations AR 3542-3547.)

This letter triggered a series of hearings before the SWRCB. These hearings were conducted on April 7, 2009, November 18, 2009, January 19, 2010, and September 20, 2011. At the hearings members of the SWRCB heard hours of testimony and public comment about salmonids, farming, frost protection, water management, and the general condition of the watershed. Substantial written information was provided to the Board before and between the hearings.

Between February 2009 and September 2011 (when Section 862 was eventually passed), significant advances were made to provide for more effective water management and conservation by vineyard owners in the Russian River water basin. This effort became known as the Russian River Frost Program. It was a collaborative program of grape growers in Sonoma County and Mendocino County, the respective county Farm Bureaus, the RRFC&WCID, and the California Land Stewardship Institute. The primary objective of the Program was to manage the diversion and use of water for frost protection in such a way so as to benefit the fisheries and the fish habitat, especially in times of water scarcity.

At the November 2009 hearing, representatives of the program described the corrective action already taken and other changes underway. The Upper Russian River Stewardship Alliance (hereafter "URSA") and the Middle Russian River Stewardship Alliance (hereafter "MRSA") had formed to address the unique issues present in the different parts of the watershed. The two alliances presented implementation plans for 1) the Upper Russian River (Hopland and Ukiah growing areas) and 2) the Middle Russian River Watershed within Sonoma County (Alexander Valley, Dry Creek Valley, Knights Valley, and Russian River Valley growing areas). (AR Disc #5, representative of Russian River Frost Program: AR 823-38.)

In the upper basin of the watershed, between April 2009 and November 2009, a new telemetric flow gage had been installed at Talmage, California. Talmage is further up-river and therefore much closer to the Coyote Dam than the gage at Hopland. This allowed SCWA to receive instantaneous flow data at a strategic measuring point to better determine anticipated demand. The lag time for SCWA was reduced from ten hours to two hours. Telemetric meters were also installed by several individual growers at their points of diversion. These telemetric meters supply instantaneous information to SCWA that informs the agency when frost protection is commencing. Frost forecasting was improved both from a technological and scientific perspective. Communication of forecasting information between RRFCD, SCWA, and farmers had been improved in advance of the 2009 frost protection season. Improved frost forecasting allowed SCWA to have more timely and detailed information about approaching frosts and inform growers when compensatory releases would occur. (AR 845.)

The Pumping Coordination Protocol developed between SCWA and RRFCD&CID was used during the 2009 frost season. This protocol enabled SCWA to be more proactive in compensatory releases of water. SCWA was better informed about when freezing air was coming, and when the farmers would need to frost protect. This resulted in far less of an overall draw down from the river in spring 2009.

Most importantly, several new off stream storage ponds were funded and under construction by vineyard owners in the upper river basin during this same time. Off stream

storage is the most viable alternative source of water for frost protection. The cumulative effect of these projects resulted in the conversion of 721 acres of vineyards to off stream storage systems that previously relied on direct diversion for frost protection. The reduction in the rate of diversion from the river during frost season because of the conversion to storage was estimated at 87 cfs; more than compensating for the record breaking 83 cfs draw down that occurred on April 20, 2008.

Lower in the watershed in Sonoma County, the scope, frequency, and type of frost protection methods used is much different than in Mendocino County. Water is used less universally and diversions for frost protection do not affect the main stem of the Russian River due to geological differences in that part of the basin. In addition, the air temperatures do not drop as fast or as low – it simply does not get as cold. Only three tributaries of the thirteen in the middle basin frost protect at all. (AR 861, McIlroy, November 2009 AR Disc #5.) Because of these different conditions, MRSA focused on development of water use and conservation plans by growers in these tributaries. MRSA had begun mapping diversions in these tributaries and exploring diversion coordination between growers. The Sonoma County Farm Bureau and the Winegrowers Alliance's mandatory membership structure provided reasonable assurance of farmer cooperation and participation in the MRSA program. (AR Disc #5, Opatz testimony; *see also* Opatz testimony, January 2010, relating statistics on grower participation.) [6]

Of note, MRSA had taken measures to prevent the reoccurrence of salmonid strandings. At Felta Creek, the vineyard owner removed the diversion pump from the tributary. The grower built a water storage system supplied by off-channel ground water pumped through a well. The grower intended to use that water exclusively for frost protection in the future thus eliminating risk to salmonids. (AR 827; AR Disc #5.)

Matthew Deitch, PhD, hired by the Russian River Property Owners Association, evaluated the impacts on the Russian River from groundwater pumping in the Alexander Valley. Prior to the hearing in November 2009, the association had installed stream flow gages at the north end and south end of Alexander Valley to better understand the effect on the main stem of the river when diverting ground water for frost protection in that area. This monitoring showed that stream flow recession does not occur simultaneous with groundwater pumping associated with frost protection. (Russian River Property Owners Association, AR Disc #5 at 1:52.) The Association pledged to continue their study of aquifer regeneration and the effects of groundwater pumping on tributaries in Alexander Valley. The Association also voiced its support of MRSA and URSA.

[6] Laurel Marcus, a recipient of the 1993 State Government award and who is recognized in the fields of wetlands restoration and fish-friendly farming techniques, spoke on behalf of the California Land Stewardship Institute (hereafter "CLSI") on April 9, 2009, November 18, 2009, and January 10, 2010. She explained the climate and topographical differences between the upper Russian River basin (Hopland and north) and the middle and lower basins where water for frost protection is used far less widely and far less frequently. She also explained that there are frost zones in the different areas that call for different analysis. (AR Disc #5; AR 872-877.) She emphasized that the installation of Coyote Dam in 1959 changed fundamentally the river's channel and consequently its in-stream flow patterns. She testified there is an inadequate basis of data about current stream flow conditions to best understand how to protect the fish. She advocated for a more scientific study by non-biased professionals to assimilate the myriad of factors affecting stream flow in the different parts of the watershed, including tributaries. CLSI had committed to assisting the URSA and MRSA plans and urged the SWRCB to conduct further study before enacting the regulation.

I. The Adoption of Section 862

Prior to the January 2010 hearing, a proposed regulation very similar to the regulation ultimately adopted was released to the public. At the hearing the SWRCB made clear its intent at passing a regulation and forwarding it to the Office of Administrative Law. Thereafter, notice was given of the preparation of an Environmental Impact Report (EIR) with the SWRCB being the lead agency. (AR 1714.) A draft EIR was prepared and circulated in May 2011. (AR 2596.) The revised EIR was released in September 2011, after sufficient comment period. On September 20, 2011, Section 862 was passed unanimously by three members of the SWRCB..

Section 862 acknowledges that water used for frost protection is a recognized beneficial use under Section 671 of the California Code of Regulations. However, it states that there is a danger that high instantaneous demand for water for frost protection by numerous vineyardists and others may contribute to a rapid decrease in in-stream stage that could result in salmonid stranding. For this reason, Section 862 provides that as of March 14, 2012, all diversions of water from the Russian River watershed (with exceptions such as above Coyote Dam where salmon and steel head do not travel), including all ground water, is per se', an unreasonable use of water and prohibited. Pursuant to the regulation, water for frost protection can only be used if the diverter or groundwater user is participating in a Water Demand Management Program (hereafter "WDMP") that has been approved by the SWRCB. There are numerous conditions to approval of a WDMP which are discussed at length herein. Without an approved WDMP governed by a board capable of enforcing Section 862, and a corrective action plan to prevent salmonid strandings, using water for frost protection is forbidden. All water rights holders, including those holding riparian, overlying, and pre-1914 appropriative rights, are encompassed within the regulation. (The full text of the regulation is attached hereto.)

According to the SWRCB's analysis in the EIR, the cost of compliance with the regulation is significant. The SWRCB estimates that the initial capital cost for a 160-acre vineyard will range between $9,700 and $17,000. The annual costs will range between $3,000 and $4,000. However, capital costs for implementing any needed corrective actions for a 160-acre vineyard will range from $236,000 to $352,000 and annual upkeep costs will range from $26,000 to $36,200. (AR 2461.) The capital costs for a 40-acre vineyard range between $59,000 and $87,800 to implement a corrective action plan with annual maintenance costs ranging from $6,500 to $9,000. (AR 2462.)

Light Petitioners are riparian rights holders in an unnamed tributary of the Russian River. They filed formal objections to the proposed regulation throughout the agency-level proceedings. (AR 3094.) The Light Petitioners are certified organic grape growers and Dr. Light is a recognized conservationist having won the John Wesley Power Stewardship Award in 2005 from the Russian River Watershed Council. (AR 3094-3162.) RRWUE and the remaining named petitioners are a collection of riparian, pre-1914 appropriative rights holders, overlying users, and licensed or permitted appropriative rights holders located in Sonoma County. All Petitioners are vineyardists in the Russian River watershed. Petitioners are all holders of vested water rights who have been and are currently exercising those rights in the Russian River watershed.

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J. Procedural History

Section 862 was formally adopted by the SWRCB on September 20, 2011. (AR 5179-5184.) On October 19, 2011, Light Petitioners filed their petition for a writ of mandate in Mendocino County Superior Court seeking to invalidate the regulation. On October 20, 2011, RRWUE filed a similar petition for a writ of mandate in Sacramento County Superior Court. On November 14, 2011; SWRCB filed a motion to transfer the Light Petition to Sacramento County Superior Court in order to consolidate the two actions. Both sets of petitioners thereafter filed motions for a preliminary injunction or stay of the regulation pending litigation in the respective courts.

On February 2, 2012, Judge Frawley of the Sacramento County Superior Court issued an order denying the State's request to transfer and consolidate the two actions in Sacramento County. Instead, the court ordered the RRWUE petition transferred to Mendocino County and consolidated with the Light Petition in this court. Earlier that same day, this court issued an order granting the Lights Petitioners' request for a stay.

The court heard argument on June 28, 2012 and the court's decision follows.[7]

III. MEMORANDUM OF DECISION

A. Section 862 Is An Improper Exercise Of The Board's Authority

1. Standard of Review

Substantial briefing and argument was devoted to the appropriate standard of review. Respondent argued that this court's review is strictly a review of a quasi-legislative document. This court disagrees.

The standard of review to be applied in these matters is complicated by the fact that in adopting the regulation, the SWRCB was exercising both its quasi-legislative and quasi-judicial functions which invoke different standards of review.[8] "Although the two functions are merged under a single board, each has distinct attributes." *United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d at 112 (hereafter "*SWRCB.*")

A legislative function involves the application of a rule in all future cases, whereas a quasi-judicial action is the determination of specific rights under existing law with regard to a specific fact situation. *Mountain Defense League v. Board of Supervisors* (1977) 65 Cal.App.3d 723. Section 862 is a new rule affecting all frost protection water users in the Russian River watershed regardless of the nature of their property right. (*See* §862(a).) As such, Section 862 must be viewed as a quasi-legislative document. However, when the SWRCB decides to modify an

[7] Respondent filed objections to Petitioners RRWUE Request for Judicial Notice of certain documents. The court ruled orally on the objection at the hearing in June and will not repeat that ruling herein.

[8] Water Code §174 gives the SWRCB both adjudicatory and regulatory authority.

existing water rights permit. it is exercising its quasi-judicial powers. (*Temescal Water Co. v. Dept. of Public Works* (1955) 44 Cal.2d 90, 100-106; *SWRCB, supra,* 182 Cal.App.3d at 113-114.) Section 862 also modifies existing appropriative licenses and permits by conditioning each of them on compliance with the regulation. (*See* §862(e)("compliance with this section shall constitute a condition of all water right permits and licenses that authorize the diversion of water from the Russian River system for purposes of frost protection".)

In modifying existing water permits and licenses as provided in subdivision (e), the SWRCB was performing its adjudicatory function and review is governed under the provisions of Code of Civil Procedure §1094.5. (*Temescal Water Co., supra* at p. 100; *SWRCB, supra,* 182 Cal.App.3d at 113; *Mountain Defense League, supra,* at 113-114; *Bank of America v. State Water Resources Control Bd.* (1974) 42 Cal.App.3d 198, 206.)

Where an administrative agency acts in both its quasi-legislative capacity and its quasi-judicial capacity, and reaches the required determination in a single decision, review of that determination is conducted under the more stringent standard for quasi-judicial acts. *Mountain Defense League, supra,* 65 Cal. App.3d at 729. In *U.S. v. SWRCB, supra,* 182 Cal.App.3d at 114, the appellate court observed that the SWRCB had exercised its dual functions in a single proceeding but it had issued separate determinations reflected in two separate documents. It therefore applied the respectively applicable standard of review for the two decisions. Here, there is only one document wherein the SWRCB exercised both functions. Therefore, this court will apply the more stringent standard for quasi-judicial acts set forth in Section 1094.5.

Where Section 1094.5 applies, the inquiry "shall extend to the questions whether the [Board] has proceeded without, or in excess of jurisdiction; whether there was a fair trial; and whether there was any prejudicial abuse of discretion. Abuse of discretion is established if the [SWRCB] has not proceeded in the manner required by law, the order or decision is not supported by the findings, or the findings are not supported by the evidence." (Code Civ. Proc. § 1094.5, subd. (b).) "Where it is claimed that the findings are not supported by the evidence, in cases in which the court is authorized by law to exercise its independent judgment on the evidence, abuse of discretion is established if the court determines that the findings are not supported by the weight of the evidence. In all other cases, abuse of discretion is established if the court determines the findings are not supported by substantial evidence in light of the whole record." (*Id.*, subd. (c).)

The trial court is authorized by law to exercise its independent judgment on the evidence when "the right or interest affected by the administrative decision is a 'vested' one." (*State Water Resources Control Board Cases* (2006) 136 Cal.App.4th 674, 721, quoting *Merrill v. Department of Motor Vehicles* (1969) 71 Cal.2d 907, 914.)

> If the right affected is 'vested' the decision is reviewed by means of a limited trial de novo. There, the trial examines the record for errors of law AND exercises its independent judgment upon the weight of the evidence before the administrative agency with any further evidence properly admitted by the court. If, on the other hand, the right is not 'vested' the trial court's scope of review is confined to matters of law appearing on the record of the

> administrative proceeding, and accordingly its review of the evidence produced below is limited to a *determination of whether it is legally sufficient to sustain the decision.*

(*State Water Bd. Cases, supra,* 136 Cal. App.4th at 721) (emphasis in original.) Under either scenario, questions of law are subject to *de novo* review. (*Id.* at 722.)

> The appropriate degree of judicial scrutiny in any particular case is perhaps not susceptible of precise formulation, but lies somewhere along a continuum with non-reviewability at one end and independent judgment at the other. Quasi-legislative administrative decisions are properly placed at that point of the continuum at which judicial review is more deferential; ministerial and informal actions do not merit such deference, and therefore lie toward the opposite end of the continuum. Courts must, in short, independently judge the text of the statute, taking into account and respecting the agency's interpretation of its meaning, of course, whether embodied in a formal rule or less formal representation. Where the meaning and legal effect of a statute is the issue, an agency's interpretation is one among several tools available to the court. Depending on the context, it may be helpful, enlightening, even convincing. It may sometimes be of little worth. Considered alone and apart from the context and circumstances that produce them, agency interpretations are not binding or necessarily even authoritative. To quote the statement of the Law Revision Commission in a recent report, 'The standard for judicial review of agency interpretation of law is the *independent judgment* of the court, giving *deference* to the determination of the agency *appropriate* to the circumstances of the agency action.'

(*State Water Bd. Cases, supra,* 136 Cal.App.4th at 722-23, quoting *Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 7–8) (citations and quotations omitted.)

Based on the foregoing, this court will apply its independent judgment in conducting its review of the SWRCB's exercise of its powers. The court uses its independent judgment in interpreting the various Water Code provisions at issue as well as the applicable case law and gives deference to the SWRCB's interpretation only if the SWRCB shows that such deference is warranted by the circumstances.

2. California Water Rights

It is a fundamental principle of water law in California that one may not withdraw water from its source without first acquiring "water rights." (§§ 102, 1052.) A "water right" is the right to *use* the water: to divert it from its natural course. *SWRCB, supra,* 182 Cal.App.3d at 100. The right of property in water is usufructuary, and it consists not so much of the fluid itself as the advantage of its use." (*Id.* at 100-102, citing *Eddy v. Simpson* (1853) 3 Cal. 249, 252.) The law is clear that one does not own water, but the right to its use. *Rancho Santa Margarita v. Vail* (1938) 11 Cal.2d 501, 554-555; *see generally* Hutchins, The Cal. Law of Water Rights (1956) pp. 36-38; 1 Rogers & Nichols, Water for Cal. (1967) p. 191.)

Once rights to use water are acquired, they become vested property rights. This is an important principle to have in mind in the instant case. As such, they cannot be infringed by others or taken by governmental action without due process and just compensation. *SWRCB, supra,* 182 Cal.App.3d at 101, citing *Ivanhoe Irr. Dist. v. All Parties* (1957) 47 Cal.2d 597, 623, *rev'd. on other grounds in Ivanhoe Irrig. Dist. v. McCracken* (1958) 357 U.S. 275; *U.S. v. Gerlach Live Stock Co.* (1950) 339 U.S. 725, 752-754.

(a) Surface Water

Surface water consists of all water flowing above the surface or in subterranean streams flowing through known and defined channels. (Wat. Code §1200.) California operates under a hybrid system of water rights which recognizes both doctrines of riparian rights and appropriation rights. (*People v. Shirokow* (1980) 26 Cal.3d 301, 307.) The riparian doctrine confers upon the owner of land contiguous to a watercourse the right to the reasonable and beneficial use of water on his land. All landowners bordering the stream are vested with a common ownership of the waters of the stream, and in times of shortage all riparians must share in the shortage proportionately. (*Prather v. Hoberg* (1944) 24 Cal.2d 549, 559-560.) Riparian rights are limited by the concept of reasonable and beneficial use, and they may not be exercised in a manner that is inconsistent with the policy declaration of Article X, Section 2, of the California Constitution. (*In re Waters of Long Valley Creek System* (1979) 25 Cal.3d 339.) Riparians have no rights to a specific amount of water. (SWRCB, 182 Cal.App.3d at104.)

The 1913 Water Commission Act created a Water Commission and provided a procedure for the appropriation of water for useful and beneficial purposes. Its main purpose was to serve as an orderly method for the appropriation of unappropriated waters. In 1923, the statutory procedure became the exclusive means of acquiring appropriative rights. Since then, anyone seeking to obtain an appropriative water right is required to file an application with what is now known as the SWRCB. (*Shirokow, supra* at 301; Wat. Code §1225.) In issuing appropriation permits, the SWRCB has two primary duties: 1) to determine if surplus water is available; and 2) to protect the public interest. (*SWRCB, supra,* 182 Cal.App.3d at 102.)

The doctrine of prior appropriation contemplates the diversion of water and applies to "any taking of water for other than riparian or overlying uses." (*City of Pasadena v. City of Alhambra* (1949) 33 Cal.2d 908, 925 [and cases there cited.) Under the prior appropriation doctrine, one who actually diverts and beneficially uses water obtains the continued right to do so, so long as the water is surplus to the needs of riparians and earlier, or prior, appropriators. (Wat. Code §1240; *Shirokow, supra,* 26 Cal.3d at 308.)

Appropriative water rights are divided into two general categories: pre-1914 appropriative rights and permitted or licensed water rights. Prior to the Water Commission Act of 1913, one could acquire the right to divert water by simply diverting it and putting it to use. (*Shirokow, supra,* at 308.) "These rights are referred to as "pre-1914 rights." They are not subject to the statutory licensing procedure set forth in the Water Code.

The California constitution protects appropriators, but only to the extent the appropriator is lawfully entitled to the water. (Art. X, §2.)[9] The rights not subject to the statutory appropriation procedures are narrowly circumscribed–they include only riparian rights and those which have been otherwise appropriated prior to December 19, 1914. *Shirokow, supra,* at 309.

As such, riparian rights are superior to appropriative rights. (*El Dorado Irrigation. District v. State Water Resources Control Board ("El Dorado")* (2006) 142 Cal.App.4th 937, 960-961.) Between appropriators, the rule is "first in time, first in right." *Miller & Lux, Inc. v. Tulare Lake Basin Water Storage District* (1933) 219 Cal.41, 46. The unique feature of the appropriative water rights doctrine is the priority system: those with more senior rights are entitled to fulfill their needs before a junior appropriator is entitled to use any water. (*El Dorado, supra,* at 960.)

(b) Ground Water

Ground water rights are divided into two categories: overlying and appropriative. Overlying rights are akin to riparian rights in surface water use and an appropriative ground water right is similar to an appropriative surface water right. In other words, overlying ground water rights are superior to appropriative ground water rights. (*City of Pasadena v. City of Alhambra,* (1948) 33 Cal.2d 908 926.)

A landowner overlying a groundwater basin has a right to use the percolating groundwater of the basin beneath his/her lands for reasonable beneficial uses on the overlying land. The right is based on the ownership of the land and is appurtenant thereto. No priority is given to one overlyer's rights as against any other overlyer, regardless of when the rights are exercised. (*City of Barstow v. Mojave Water Dist.* (2000) 23 Cal.4th 1224, 1240.)

As between overlying owners, the rights, like those of riparians, are correlative: each may use only his or her reasonable share when water is insufficient to meet the needs of all. Each overlying landowner must reduce his or her extractions proportionately when groundwater supplies cannot provide enough water for the cumulative, reasonable, overlying uses of each overlying landowner. (*Wright v. Goleta Water Dist.*, (1985) 174 Cal.App.3d 74, 84.) Absent court order or adjudication under statute, the overlyer's right to water extends to that which can be reasonably and beneficially used on the overlying land.

Groundwater appropriators are those who acquire rights to surplus water by virtue of use on non-overlying land, overlyers who use all or a portion of their groundwater on lands that do no overlie the groundwater basin, and overlying municipalities who uses all available groundwater for municipal purposes. (*San Bernadino v. Riverside* (1921) 186 Cal. 7, 25.) As between appropriators, however, the one first in time is the first in right, and a prior appropriator is entitled to all the water s/he reasonably and beneficially requires. (*Barstow, supra,* at 1241.)

[9] Until the license is issued the Board may reserve jurisdiction to amend the terms of the permit. (Water Code §1394.) If the permit holder or license holder violates any of the terms or conditions or fails to apply the water to a beneficial purpose, the Board may revoke the permit or license. (Water Code §§1410, 1611.) In 1980, the SWRCB was given increased powers to enforce terms and/or conditions of a permit. (*See e.g.,* Water Code §1825)

An appropriative use of percolating groundwater has a lower priority than uses by overlying ground water users. The right to use water from a groundwater basin is, generally speaking, limited to surplus water in the basin *i.e.*, that beyond the reasonable and beneficial needs of overlyers.

(c) Reasonable Use and Beneficial Use

Superimposed on the basic principles defining water rights is the overriding constitutional limitation that water is used only as reasonably required for the beneficial use to be served. (Cal. Const. art. X, §2.) In 1928, the amendment to the state's constitution made clear that all water users, appropriators, and riparians are subject to the limitation that water use be reasonable and for a beneficial purpose. (*Peabody v. City of Vallejo,* (1935) 2 Cal.2d 351.) Article X, section 2, reads:

> It is hereby declared that because of the conditions prevailing in this State *the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented,* and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. *The right to water* or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and *shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water. Riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section,* for the purposes for which such lands are, or may be made adaptable, *in view of such reasonable and beneficial uses*; provided, however, that nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which his land is riparian under reasonable methods of diversion and use, or of depriving any appropriator of water to which he is lawfully entitled. This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained.

(Emphasis added.)

The amendment declares: 1) the right to the use of water is to such water as shall be reasonably required for the beneficial use to be served; 2) such right does not extend to the waste of water; 3) such right does not include unreasonable use, unreasonable method of use, or unreasonable method of diversion of water; and 4) riparian rights attach to, but to no more than, so much of the flow as may be used consistently with the foregoing principles. (*Peabody, supra,* at p. 367; *People ex rel. State Water Resources Control Bd. v. Forni* (1976) 54 Cal.App.3d 743, 749.)

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3. The SWRCB Acted in Excess of its Jurisdiction in Enacting Section 862

a) The SWRCB Exceeded Its Regulatory Authority in Enacting Section 862

As explained by the Supreme Court in *Shirokow*, the Water Commission Act and its amendments were subsequently codified in Divisions 1 and 2 of the Water Code. The powers of the original Water Commission with regard to the system of appropriation became vested in the SWRCB. (Water Code §179.) The Water Code and specifically Division 2, as expressed in Section §1050, is a legislative enactment in furtherance of the Constitution, article X, Section 2 (originally added in 1928 by amendment as art. XIV, § 3).

The *Shirokow* Court recognized that the Water Code articulates a policy consistent with that expressed in the 1928 amendment. "It provides that all water within the state is the property of the people (§102), the people have a paramount interest in the use of all water of the state (§ 104), and the state shall determine the manner in which the water of the state should be developed for the greatest public benefit (§ 105)." It further stated,

> These declarations of policy together with the comprehensive regulatory scheme set forth in section 1200 *et seq.* demonstrate a legislative intent to vest in the board expansive powers to safeguard the scarce water resources of the state.

(*Shirokow, supra*, 26 Cal.3d at 308-09.)

The context of the Court's statement is important to understand its scope. Here, in referring to the Board's "expansive powers" the Court was alluding to Water Code Section1200 and those sections following; and in particular Section 1201. Section 1200 gives the SWRCB power to grant, deny, or condition appropriative water rights, permits, and licenses in non-percolating water. [10] Section 1201 provides:

> All water flowing in any natural channel, *excepting so far as it has been or is being applied to useful and beneficial purposes upon, or in so far as it is or may be reasonably needed for useful and beneficial purposes upon lands riparian thereto, or otherwise appropriated*, is hereby declared to be public water of the State and subject to appropriation in accordance with the provisions of this code. (emphasis added.)

"Section 1201 evinces an intention to declare the waters of the state to be subject to appropriation in so far as that can be done without interfering with vested rights." (*Shirokow, supra*, at 309, quoting *Bloss v. Rahilly* (1940) 16 Cal.2d 70, 75-76.) As stated succinctly in *Shirokow*, the water rights *not* subject to SWRCB's statutory appropriation procedure are riparian rights and those rights appropriated after 1914. "Any use other than those excepted is, in our view,

[10] The broader issue before the Court in *Shirokow* was whether "prescriptive water rights" survived the 1913 Water Commission Act, and if so, whether they were in their own class of water "rights," or instead, within the class of post-1914 appropriative water rights and subject to the licensing and permitting jurisdiction of the SWRCB. The Court concluded that holders of prescriptive rights were subject to the jurisdiction of the SWRCB.

conditioned upon compliance with the appropriation procedures of division 2." (*Shirokow, supra* at 309.)

Many subsequent cases have also referenced the SWRCB's expansive powers in the arena of licensing and permitting of appropriative rights. Most recently, in *California Farm Bureau Federation v. State Water Resources Control Board* (2011) 51 Cal.4th 421, 429, the Supreme Court stated.

> The SWRCB *regulates all appropriative water rights* [commencing with section 1200] acquired since 1914. An appropriative right is the right to take water from a watercourse that does not run adjacent to a landowner's property. Since 1914, all appropriative rights have been acquired through a system of permits and licenses that the SWRCB or its predecessor state entities have issued. Before 1914, appropriative rights were acquired under common law principles or earlier statutes. ***The Water Rights Division has no permitting or licensing authority over riparian or pueblo rights, or over appropriative rights acquired before 1914. The SWRCB does have authority to prevent illegal diversions and to prevent waste or unreasonable use of water, regardless of the basis under which the right is held.*** *Ibid.* (emphasis added.)

Long before *Shirokow*, in *Long Valley Creek, supra,* 25 Cal.3d 339, the Supreme Court addressed to what extent the SWRCB has the power to define and limit future riparian rights pursuant to its statutory adjudication procedure under Water Code Section 2525. Unlike this case, in *Long Valley Creek* the appeal arose out of an adjudicatory proceeding to determine the rights of *all claimants* to the waters of the Long Valley Creek Stream System in Lassen, Sierra, and Plumas Counties. The stream system contained a 465-square-mile watershed, lying across the California-Nevada border. After the snow-melt runoff was depleted, there was only enough water to irrigate a small portion of the total irrigable land.

There had been prolific litigation among the various water claimants in the area since at least 1883. In the interest of resolving the conflicts that had generated such extensive litigation, nine claimants filed a petition in 1966 with the SWRCB for statutory adjudication under Water Code Section 2525 of all water rights in the stream system. Extensive investigation, public hearings, and argument was heard by the SWRCB before it entered its order determining and establishing the several rights to the water of the entire stream system.

One affected riparian rights holder appealed to the Superior Court the SWRCB's determination of rights in the stream system. For many years, he and his predecessors had irrigated 89 acres of their land. He also claimed prospective riparian rights in the creek for an additional 2.884 acres. The order of determination awarded him water for only the 89 acres as to which he was currently exercising his riparian rights; it extinguished entirely his claim as a riparian landowner to the future use of water with respect to the remaining 2.884 acres. He appealed the SWRCB's termination of his right to prospective use of the stream water.

In deciding the case, the Supreme Court recognized that a substantial body of case law concerning a riparian's prospective rights had developed in California as a result of private

lawsuits between various water rights claimants. Nevertheless strong policy concerns disfavored private litigation to resolve conflicting claims to water in a stream system.

> "T]here is a limitation inherent in the ability of private lawsuits to provide clarity, certainty, and security to water rights and water users. Thus, in *Meridian, Ltd. v. San Francisco,* (citation omitted), we stated that "This method of resolving controversies involving the rights of the users of water on the river is necessarily piecemeal, unduly expensive and obviously unsatisfactory." Our analysis of the nature of the prospective riparian right in this context therefore does not imply that the Legislature may not define or otherwise limit the scope of such a right, or delegate to the Board the authority to do so *in a statutory adjudication proceeding.*" (*Id.* at 348-49) (Emphasis added.)[11]

The last phrase in the quote is controlling: "our analysis of the nature of the prospective riparian right in this context therefore does not imply that the Legislature may not define or otherwise limit the scope of such a right, or delegate to the Board the authority to do so *in a statutory adjudication proceeding.*" This language does not indicate that the SWRCB was given regulatory power to define or otherwise limit the scope of prospective riparian rights generally or existing riparian rights. That regulatory authority lies exclusively with the Legislature and only then will it be upheld if it does not violate the constitution.

This limitation is consistent with the Supreme Court's stated expectation that in a typical adjudicatory proceeding there are hearings or investigation upon which to base findings of fact with regard to the particular individual riparian rights holder involved. "The statutory adjudication procedure involves a complex balancing of both public and private interests, with the final decree assuring certainty to the existing economy and reasonable predictability to the uses of water in a stream system." *Id.* at 354. The Court expressed approval for a heightened level of fact finding that is the function of an adjudicatory proceeding before the SWRCB could properly limit or further refine the scope of a particular riparian right. In other words, even in an adjudicatory proceeding, the SWRCB cannot issue a blanket decision limiting the rights of riparians throughout a particular water system without considering their individual reasonable needs, existing use, purpose, and specific plans for prospective use.

For these reasons, the Supreme Court in *Long Valley Creek* also concluded that the SWRCB's determination to extinguish the appellant-riparian's claim to the future use of water was unconstitutional.

This was consistent with the prior decision in *Tulare Dist. v. Lindsay-Strathmore Dist.* (1935) 3 Cal.2d 489, 531.[12] In *Tulare, the Legislature* had enacted a blanket provision

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[11] The Court pointed to Water Code Section 2501, which states: "The board may determine, in the proceedings provided for in this chapter, *all* rights to water of a stream system whether based upon appropriation, *riparian right*, or other basis of right." Section 2769 further states that "the *decree shall in every case* declare as to the water right adjudged *to each party, the priority, amount, season of use, purpose of use, point of diversion, and place of use of the water ....*" (*Id.* at 348-49.)

[12] Article XIV section 3 was repealed on June 8, 1976. Article X section 2 was adopted on the same date and contains the identical language.

extinguishing unexercised riparian rights after ten years. That provision was then known as Section 11 of the Water Commission Act. The Supreme Court invalidated Section 11 because it was contrary to "the letter and spirit of the 1928 constitutional amendment." That amendment, while limiting the riparian as against an appropriator, to reasonable beneficial uses, expressly *protects the riparian not only as to his present needs*, but also as to future or prospective reasonable beneficial needs and those rights could not be terminated without making the necessary findings of fact. (*Id.* at 524.)

This is an important principle from *Tulare* that is very applicable to the case at bar. The Supreme Court was deciding how riparian rights holders should be treated in light of the then "new" constitutional amendment which limits all water users to the reasonable and beneficial uses. The Court discussed at length how that determination could be made.

> Under this new doctrine, it is clear that when a riparian or overlying owner brings an action against an appropriator, it is no longer sufficient to find that the plaintiffs in such action are riparian or overlying owners, and, on the basis of such finding, issue the injunction. It is now necessary for the trial court to determine whether such owners, considering all the needs of those in the particular water field, are putting the waters to any reasonable beneficial uses, giving consideration to all factors involved, including reasonable methods of use and reasonable methods of diversion. From a consideration of such uses, the trial court must then determine whether there is a surplus in the water field subject to appropriation. If the riparian is putting the water to any reasonable beneficial uses, it is now necessary for the trial court to find expressly the quantity so required and so used. A finding, such as that in the present case to the effect that the riparian requires a "reasonable" amount for such uses, under the new doctrine, is clearly insufficient and a judgment based thereon must be reversed. The trial court, under the new doctrine, must fix the quantity required by each riparian for his actual reasonable beneficial uses, the same as it would do in the case of an appropriator. The new doctrine not only *protects the actual reasonable beneficial uses of the riparian* but also the prospective reasonable beneficial uses of the riparian. (*Id.* at 524-25.)

Therefore, while the doctrine of reasonable and beneficial use is a limitation on water rights users, it is also a constitutional protection for riparians and others similarly situated to the actual reasonable and beneficial use of the water. And that determination is necessarily fact laden. The *Tulare* litigation was remanded to the trial court to make such findings about the riparians involved in that case.

Importantly though, in declaring Section 11 unconstitutional, the Supreme Court was also finding that even the Legislature cannot enact a blanket regulation extinguishing riparians rights to the reasonable and beneficial use of water when there have been no findings about the particular rights holders and their individual methods of use including the need for use of water in the future. Were it too do so, it would conflict with Article X, section 2.

The Long Valley Creek Court consequently declined to interpret the statutory adjudication authority in Section 2501, *et seq.*, as allowing the SWRCB to extinguish altogether future riparian rights.

> In light of [*Tulare*] we are reluctant to conclude that the Board may altogether extinguish a riparian's future claim when it has not been established that the imposition of other less drastic limitations on the claim would be less effective in promoting the most reasonable and beneficial use of the stream system. (*Id at 357-58.)*

Respondent suggests that *In re Hallett Creek Stream System* (1988) 44 Cal.3d 448, stands for the proposition that the SWRCB may "regulate" the rights of riparians with the same broad authority that it has to condition licenses or permits to appropriators. This court rejects that interpretation.

In *Hallett Creek*, the Supreme Court of California recognized expressly that the United States as a sovereign entity has the same riparian rights under California law as any other property owner. *Hallett Creek* involved unexercised riparian rights in a national forest. The Court reaffirmed that those riparian rights, even if unexercised (as in *Long Valley Creek*) cannot be extinguished. But, because they had not yet been exercised, the SWRCB could decide in the future that the particular unexercised riparian claim had lost its priority against other water rights holders including appropriative rights that were currently being exercised.

> In other words, while we interpret the Water Code as not authorizing the Board to extinguish altogether a future riparian right, *the Board may make determinations as to the scope, nature and priority of the right that it deems reasonably necessary to the promotion of the state's interest in fostering the most reasonable and beneficial use of its scarce water resources.* (*In re Water of Hallett Creek Stream System* (1988) 44 Cal.3d 448, 471) (emphasis added.)

The language appears in the context of deciding the SWRCB's adjudicatory, not regulatory, authority over *specific* previously unexercised riparian rights. It answers the query of how a previously unexercised riparian right might be treated as against previously exercised appropriative rights in the allocation and prioritization of water. The opinion also underscores that even in an adjudicatory proceeding, the Board must make findings about the "scope, nature and priority of the right [at issue]."

The principle of protecting the public trust does not expand the authority of the SWRCB to enact broad regulations such as Section 862. *Environmental Defense Fund Inc. v. East Bay Mun. Utility District ("EDF II")* (1980) 26 Cal. 3d 183, involved conditions placed on appropriative right permits granted previously by the SWRCB to the United States Bureau of Reclamation for the Auburn Dam. In that case, the Supreme Court, *inter alia*, reversed an earlier decision giving the SWRCB exclusive jurisdiction over proceedings to compel water agencies to reclaim waste water. The Court in *EDF II* concluded that giving the SWRCB and the courts concurrent jurisdiction over such competing adjudicatory claims was consistent with *Long Valley Creek*.

Importantly, the Supreme Court observed that the provisions of article X, section 2, are "self-executing" and the courts have traditionally enforced the proscriptions against unreasonable uses and unreasonable methods of diverting water. (*See e.g., Joslin v. Marin Mun. Water Dist.* (1967) 67 Cal.2d 132; *Peabody v. City of Vallejo* (1935) 2 Cal.2d 351.)

The Court also recognized that the arena of water development, such as in the construction of dams, is a complex area of the law affecting not only the interest in additional water resources, but also the use of the particular waters developed and the potential harm which may occur to existing resources due to the new development. "In obvious recognition of our public policy to require water resources be put to beneficial uses and not wasted, the complexity of the problems presented, the numerous persons affected by water development projects and the necessity of continued regulation to meet changing circumstances, the Legislature has provided a comprehensive system for development, issuance, and administrative regulation of *appropriative water rights.*" (emphasis added.)

Although respondent suggests otherwise, there is no overarching "planning authority" giving the SWRCB any broader authority beyond its statutory authority to place conditions or limits on licenses given appropriators. The Board can do so either by way of regulation or adjudicatory proceeding. As evidence of this, Court stated in *EDF II* that

> In summary, and in the words of *Modesto Properties Co v. State Water Rights Bd.* (1960) 179 Cal.App.2d 856, 860, the Legislature devised a plan which was commensurate in scope with [article X, section 2] and delegated to the board by the Water Commission Act the authority to protect the public interest *not only in the issuance of appropriative permits and licenses but also in their later administration.* As pointed out in our earlier decision in this case [citation omitted] the board 'has been granted broad authority to control and condition water use, insuring utilization consistent with public interest.' (Water Code §1257.) This authority includes protection of the environment. The [board's] powers extend to regulation of water quality and prevention of waste. (*e, g.*, Water Code §§ 100, 275.).'

In *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, the state's highest court addressed the relationship between the appropriative water rights system (as summarily discussed above) and the public trust doctrine which operates to protect environmental and recreational values in navigable lakes and other water ways.

At issue was whether private plaintiffs could file suit directly, without first bringing an adjudicatory action before the SWRCB. The Los Angeles Water Department had been granted by the SWRCB appropriative water permits decades earlier. Plaintiffs sought to place limits on those permits, arguing the public trust doctrine required it. The Supreme Court's opinion was intended to guide litigation in U.S. District Court. The Court held that the private plaintiffs could file directly with the Superior Court as the courts have concurrent jurisdiction with the SWRCB over appropriative water rights disputes and plaintiffs properly could rely on the pubic trust doctrine in bringing their challenge.

The Court reviewed the evolution of the public trust doctrine in California and the law governing appropriative water rights. The two principles evolved independently of each other but both embody important values that make the law more responsive to "the diverse needs and interests of the State in the planning and allocation of water resources." (*Id.* at 445.)

> The state has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible.[27] Just as the history of this state shows that appropriation may be necessary for efficient use of water despite unavoidable harm to public trust values, it demonstrates that an appropriative water rights system administered without consideration of the public trust may cause unnecessary and unjustified harm to trust interests. As a matter of practical necessity the state may have to approve appropriations despite foreseeable harm to public trust uses. In so doing, however, the state must bear in mind its duty as trustee to consider the effect of the taking on the public trust and to preserve, so far as consistent with the public interest, the uses protected by the trust. (*National Audubon Society*, at 446-47.)

In *National Audubon Society* the Court observed that the function of the SWRCB has evolved since1913. It has quasi judicial authority to decide competing water rights claims in specific stream systems whether they are riparian or appropriative. When it makes those decisions it must have in mind the state's duty as trustee of the public trust. It is also charged with comprehensive planning and allocation of water resources particularly in the areas of protecting water quality and providing for water resource development. Examples of these cases are *EDF II* which involved waste water reclamation and the Board's efforts to adopt new quality standards in the Sacramento-San Joaquin River Delta and *apply those standards to existing appropriative rights holders*, namely the United States Bureau of Reclamation and operators of the Central Valley Project. *National Audubon Society* made clear that the public trust doctrine gave plaintiffs standing and a legitimate cause of action. For purposes of this case, it serves as a reminder that among the State's duties is the duty to protect and preserve the environment; but *National Audubon Society* does not expand *the SWRCB's authority* in enacting regulations over riparians.

For purposes of this court's analysis, three relevant principles can be extracted from these decisions: 1) The SWRCB has adjudicatory and regulatory authority given to it by the Legislature to issue or reject applications for appropriative licenses and/or permits and in imposing conditions on appropriative licenses and/or permits *post hoc*; 2) article X, section 2, places tight constitutional limits on the SWRCB when adjudicating or regulating claims of riparians and overlyers (and pre-1914 appropriative rights holders); and 3) blanket rules or broad regulations, whether they be prohibitions, or limitations on rights to use water, do not withstand constitutional challenge when such rules broadly and uniformly affect groups of vested rights holders--in particular riparians, overlyers, and pre-1914 appropriative rights holders--absent specific and particularized findings as to how those individual rights are exercised or their access to water put to a reasonable and beneficial use is affected.

The present case is most like *Tulare*. Section 862, like the Water Act provision in *Tulare*, is a blanket provision uniformly limiting all riparian, overlying, and pre-1914 riparian rights holders in the Russian River watershed. In formulating Section 862, the SWRCB simply made a broad and unsupported finding that every water user in the watershed, when using water to frost protect, presented a risk to salmonids which in turn was an unreasonable method of use of water.

The crux of the problem is that there were no findings as to the particular water rights holders. At the administrative level there were no findings about the specific individual use or method of use by the riparian rights holders and to what extent that particular use poses a risk the salmonid population. There were no studies or findings by the SWRCB as to how the individual rights holders of riparian water rights in the Russian River watershed are exercising their respective rights or how that unique exercise would be affected by the regulation. Article X, section 2 protects as it does limit "*the actual reasonable beneficial uses of the riparian*" and the cases discussed herein require their uses to be closely examined before limiting them through regulation. They cannot be treated in a generically.

There are 533 rights holders using water for frost protection in this watershed. Some are located in the upper basin where the climate conditions and method of using water are different than in the lower and middle basin of the watershed. There is no legal basis to treat them the same; but there are many reasons to treat them differently. Those reasons were neither explored nor considered. The law is clear with respect to riparians, overlying users, and pre-1914 rights owners--*Long Valley* and *Tulare* require specific findings before extinguishing their right to use water.

The finding that using water for frost protection is an unreasonable method of use within the meaning of Article X, section 2 cannot be sustained because it is not supported by the necessary investigation and factual findings as to how the affected parties contribute to the harm to be avoided.

Considered together, *Hallett Creek, Tulare,* and *Long Valley Creek* show that the SWRCB does not have the legislative authority to enact a regulation and apply it to hundreds of water rights owners--including riparian, overlying, and pre-1914 rights owners--and prohibit them from exercising their vested rights to the water for a heretofore recognized beneficial purpose based on the record here.[13] The duty to protect the public trust does not justify a different result.

All the cases quoted by Respondent in its brief discussing the "expansive powers" of the SWRCB have a different context than that here. Those cases discuss the SWRCB's authority to issue or condition appropriative rights whether those conditions are imposed in an adjudicatory proceeding or by way of regulation. The cases do not make the same claim with respect to riparian rights holders. (*See U.S. v. SWRCB, supra* 182 Cal.App.3d 82; EDF *II, supra* 26 Cal.3d 183.) The plain language of Water Code Section 1201 supports this view as well.

Respondent quotes from *Hallet Creek* in its brief at p. 11, line 25. The quote is not authority for the regulation enacted here. The *Hallet Creek* Court was simply making clear that the SWRCB was not powerless in controlling the use or method of use by a riparian, absent a private claim. The Court pointed out that the SWRCB can itself *initiate a court action, seek legislation from the state legislature or apply to the executive branch for interim measures.* The Supreme Court gave examples where the SWRCB has sought recourse in the past with one of

[13] The Water Demand Management Program element of the regulation is discussed elsewhere in this decision. Had it conditioned their use on reporting diversion locations, methods of use, and/or diversion practices this court might be reaching a different result.

these three branches of government.[14] Here too, the SWRCB is not left without recourse. The SWRCB can pursue regulation of riparian rights in the Russian River watershed with the Legislature or it can file an injunctive or a declaratory relief action in the courts, as it did in *Forni*.[15]

b) The Board's Authority to Ensure that Water is Put to a Reasonable and Beneficial Use Does Not Provide Independent Authority to Enact §862 Because There Were No Specific Findings of Fact with Regard to the Affected Riparian Rights Holders.

The overriding principle governing the use of water in California is that such use be reasonable. (*Forni, supra*, at 750.) However, what is reasonable use or a reasonable method of use of water is a question of fact to be determined according to the circumstances in each particular case. (*Joslin, supra*, at 139; *Gin S. Chow, supra*, at 706.) As the Court stated in *Tulare Dist. v. Lindsay-Strathmore Dist., supra*, "[w]hat is a beneficial use, of course, depends upon the facts and circumstances of each case. *What may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need. What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time.*" (3 Cal.2d at 567) (emphasis added.)

Frost protection is a recognized beneficial use of water in California. (Cal. Code Regs. Tit. 23, §662.5.) Using overhead sprinklers for frost protection is the only effective method to protect crops in times of advective freezing. There is no adequate substitute. As grape production in Mendocino and Sonoma counties is a mainstay of the economy and job base, crop loss from frost can present devastating results. (See Findings of Fact, infra.) It is an abuse of discretion to find otherwise.

Petitioners argue that the SWRCB has exceeded its regulatory powers by declaring in Section 862 that frost protection, a previously recognized beneficial use, to now be an unreasonable use of water. They further object to prohibiting all divisions of water rights holders in the entire Russian River water shed from using water for frost protection absent a WDMP. They argue that whether or not a specific use or method of use is unreasonable is a factual inquiry and must be made on a case by case basis as to the individual user. They also argue that the courts have exclusive jurisdiction to make unreasonable use determinations. The Court agrees with the former argument and not necessarily the latter.

In *Joslin, supra, at* 139, the Supreme Court applied the tenet of particularizing "reasonable use" determinations in an appeal from an adjudicatory proceeding before the SWRCB. The Supreme Court held that the plaintiff gravel miners, while riparian rights holders, were not putting the water to a reasonable use by the taking of rock, sand, and gravel from the stream such that they

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[14] *Hallett Creek* arose from an adjudicatory action under Section 2525 brought by a private claimant in the Hallett Creek stream system. Once the SWRCB accepted the request for adjudication of rights, the United States filed a riparian claim to waters in Plumas National Forest which the SWRCB rejected. The United States then filed a notice of exception in Lassen County Superior Court resulting in the decision discussed herein.

[15] Section 275 does not give the SWRCB the power to itself enact a regulation with the scope of Section 862; it requires the Board to take action before the Legislature, the Judiciary, or the Executive.

could require the removal of an upstream dam. The Court reached this conclusion based on the facts in the record about the specific user, that user's method of use, and the effect on the stream.

In another appeal from an adjudicatory proceeding, the Court in *SWRCB, supra* at 129-130, approved the SWRCB's exercise of its authority to condition appropriative permit holders under Water Code Section 1200 to prevent the waste or unreasonable use of water. Section 1200 gave authority to condition the permits; and the duty to prevent waste, unreasonable use, or an unreasonable method of use was a legitimate reason for doing so. In conditioning the permits held by the U.S. Bureau of Reclamation and the Central Valley Protect, the SWRCB had held hearings and made findings as to these specific permit holders and their practices. In reviewing their practices the SWRCB concluded that changed circumstances in the Delta revealed "new information about the adverse effects" of those particular projects [permit holders] upon the Delta and that required revision to water quality standards."[16]

Section 862 is not limited to appropriative rights holders who are subject via Section 1200 to the jurisdiction of the SWRCB. The regulation here applies to riparian users, overlyers, and pre-1914 rights holders as well. While they too must abide by the reasonable use principle set forth in the constitution, their method of use cannot be declared unreasonable without the necessary factual findings about their specific use. Each riparian's use and method of use is unique. Facts such as place of diversion, volume, time of use, effect on the stream stage, and relationship to salmonid habitat must be considered before declaring the use of water by a riparian to be unreasonable.

This conclusion is reinforced by the actual language in the Art. X, section 2. The rule of reasonable use not only limits the rights of riparians and others similarly situated, but it also *protects the actual reasonable beneficial uses of the riparian* and the prospective reasonable beneficial uses of the riparian as well. (*Tulare, supra* at 524-25.) Their individual rights cannot be adequately protected when their individual uses were never examined.

The Russian River Watershed is large and diverse. (AR 3377.) The river flows for 110 miles through Mendocino and Sonoma counties before reaching the ocean. (AR 1715.) There are over 500 water rights holders and thousands of acres of vineyards affected by Section 862.

Vineyards located in the northern part of the watershed typically face more frequent and more severe frost events. The regulation nevertheless prohibits frost protection by water rights holders in the southern portion of the watershed even though they generally use considerably less water and use it at different times. There was no evidence presented that frost protection in the middle or lower basins of the Russian River created a draw down in the main stem of the river at all. The *instantaneous draw downs* that are a threat to the fish simply are not watershed wide.

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[16] The language in *SWRCB, supra*, at 130, which states: "the Board's power to prevent unreasonable methods of use should be broadly interpreted to enable the Board to strike the proper balance between the interests in water quality and project activities in order to objectively determine whether a reasonable method of use is manifested," has to be read in the context of the case. There the SWRCB decided to condition specific appropriative licenses on compliance with the new water quality standards. The SWRCB was not enacting a new rule or regulation affecting appropriative and non-appropriative rights holders alike.

There are no facts in the record from which to conclude all use of water within the watershed for frost protection is unreasonable.

Even users in the upper basin cannot be treated generically. Micro-climatic conditions differ depending on the widely varying topography. Whether a vineyard is located in a broad open area of the valley, or in a more narrow area, or in one with steep terrain greatly influences the frequency, severity, and duration of frost events. This in turn determines the need for water for frost protection and its volume. Not all vineyards have the same needs, the same uses, or experience the same frost events in the same way. Yet the regulation declares all uses unreasonable despite these differences. (AR Disc #3 2:10.)

The size of the vineyard or orchard also determines how much water is diverted. The amount of water clearly is a factor in determining an individual water user's impact on stream stage at any given time. Some vineyards consist of a very few acres *(e.g.*, at Felta Creek it was a four acre vineyard) and some consist of hundreds of acres.

The specific location of the individual diversions also determines the risk to the salmonid population. Not all diversions are located in areas that pose a risk to salmonids, even in the event of a frost. (*See* April 2009 hearing, AR Discs #2-4.). The two strandings that set in motion the proceedings leading up to Section 862 occurred in isolated places: one in the main stem of the river near Hopland and the other in a tributary in Sonoma County. (AR 3391.) NFMS estimated that roughly 30% of the salmonid habitat is within 300 feet of a vineyard. There was no evidence that the risk to the juvenile salmonid population is static throughout the 1485 square miles of the watershed.

Absent findings relating to the method of use, need for use, and anticipated future use of water for frost protection by individual riparians and non-riparians alike and some showing of a correlative risk to salmonids, it is improper to make a sweeping conclusion that each water rights holder who uses water for frost protection is using water unreasonably. *Tulare* and *Long Valley Creek System* support this conclusion. Because these factual findings were not made at the administrative level, this is a separate ground for invalidating the regulation.

Neither *Forni* nor *Imperial Irrigation District v. SWRCB* (1987), 186 Cal.App.3d 1160, calls for a different conclusion. Respondent argues that in *Forni,* 54 Cal.App.3d 743, "the Court of Appeal upheld a very similar frost protection regulation promulgated by the SWRCB . . . ." Respondent is incorrect. The Court of Appeal did not uphold the regulation in *Forni*; rather it reversed the trial court's order granting respondents' motion for summary judgment.[17]

Contrary to the present case, in *Forni* the SWRCB had not enacted a regulation sweeping riparians and overlying rights holders within its scope. Instead, the SWRCB filed an injunctive

[17] The Court of Appeal took some effort to make sure the opinion was not overly interpreted: "In conclusion, we wish to make it unmistakably clear that all we hold today is that appellant's complaint states valid causes of action for either injunctive or declaratory relief or both, and that the question of reasonable use or reasonable method of use of water constitutes a factual issue which cannot be properly resolved by a motion for judgment on the pleadings." (*Forni,* 54 Cal.App.3d at 754.)

claim under Section 275 trying to enforce a regulation directed at appropriative rights users to riparians. That regulation, Section 659, declared all water drawn from the Napa River for frost protection an unreasonable method of diversion. However, it further stated:

> No permits for the *appropriation* of water from the Napa River after March 15 of any year for frost protection shall be granted except to replenish winter storage and such permits shall not be granted until a water distribution program among the water users is established that will assure protection to prior rights. Regardless of the source of the water, the Board will retain jurisdiction to revise the terms and conditions of all permits issued for frost protection should future conditions warrant.

(Forni, supra, 54 Cal.App.3d at 752., n4) (emphasis added.) Section 659 on its face only applied to appropriative rights holders – an important distinction from the present case.

This distinction is more obvious by reading the Court of Appeal's rejection of a facial constitutional attack on Section 659. The Court concluded that the permit requirement affected only appropriators and "not the riparian owners whose right to use the water derives from their ownership of land rather than administrative authorization." Therefore, the Court of Appeal refused to declare Section 659 facially unconstitutional because it was susceptible to a constitutionally valid reading.

The Court in *Forni* therefore concluded that "properly construed, §659 [declaring frost protection in the Napa River Valley to be unreasonable] amounted to no more than a policy statement which leaves the ultimate adjudication of reasonableness to the judiciary." The appellate court further observed that trying to enforce Section 659 on riparian rights holders by bringing the declaratory relief action, was the "best proof that [SWRCB] did not consider the regulation and the policy declaration therein binding as to respondent riparian owners. . . ."

Here, Section 862 applies to all water rights holders including riparians, overlyers, and pre-1914 appropriative rights holders. Respondent does not argue differently. Section 862 is not susceptible to a constitutionally valid reading like the regulation in *Forni*. The statements in that opinion suggest that had the appellate court concluded the statement "declaring frost protection in the Napa River Valley unreasonable" was a regulatory revision of the law that also applied to riparian rights holders, the appellate court would have found Section 659 to be an unconstitutional.[18]

The case of *Imperial Irrigation District* also fails to support Section 862. That case involved an adjudicatory proceeding before the SWRCB brought by a private claimant, and in the course of that proceeding the Board had made detailed factual findings about the Irrigation District's wasteful practices. It was not a regulation sweeping hundreds of water rights holders into its scope. The proceedings to determine the Irrigation District's wasteful practices were far

[18] The Water Master for the Napa River testified in this proceeding on April 7, 2009. He emphasized that the core principle of the program which governs the Napa River is a court ordered minimum in-stream flow requirement. (AR Disc #3; 1:38.) Minimum in-stream flow requirements necessary to protect salmonids are conspicuously missing from the regulatory scheme in Section 862.

different than enacting a regulation simply declaring the practices of hundreds of water rights users to be unreasonable without ever exploring actual, individual uses or methods of use.

For these reasons and all the reasons discussed thus far, this court holds Section 862 to violate article X, section 2, of the California Constitution because the regulation exceeds the regulatory authority delegated to the SWRCB. In addition, its universal application to riparian rights holders, pre-1914 rights holders, and overlying users of groundwater without any specific findings showing a unreasonable use or method of use by the individual water rights holders undermines the validity of the regulation as well. As a separate ground, the Court finds that the SWRCB's duty to prevent the unreasonable use of water cannot, as a matter of law, justify this regulation in the absence of an examination into the uses, methods of use of the water rights holders affected.

Petitioners argue that only the courts can make "reasonable use" determinations. It is true that the courts have traditionally enforced the proscriptions against unreasonable uses and unreasonable methods of diverting water. (*See e.g., Joslin, supra,* 67 Cal.2d 132; *Peabody, supra,* 2 Cal.2d 351.) The appellate courts have made clear that the SWRCB can make such determinations in conditioning appropriative licenses whether in an adjudicatory proceeding or by way of regulation. The SWRCB can also limit the scope of a riparian right in an adjudicatory proceeding which necessarily involves fact finding as to the specific riparian affected. Whether or not the courts have exclusive jurisdiction over reasonable use determinations by riparian rights holders is not in line with the decisions discussed. For this reason, this Court is unwilling to accept Petitioners' premise as the law.

c) Section 862 Violates the Rule of Priority.

The "rule of priority" recognizes that riparian rights are superior to appropriative rights. (*El Dorado,* 142 Cal.App.4th at 960-961.) Between appropriators, the rule is "first in time, first in right." (*Miller & Lux, Inc. v. Tulare Lake Basin Water Storage District,* 219 Cal. at 46.) Those with more senior rights are entitled to fulfill their needs before a junior appropriator is entitled to use any water. (*El Dorado, supra,* at 960.) "[W]ater right priority has long been the central principle in California water law. . . . In the case of an overdraft, riparian and overlying use is paramount, and the rights of the appropriator must yield to the rights of the riparian or overlying owner." (*City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 2000.) The rule of priority has been reaffirmed numerous times.

The importance of the rule of priority is most apparent when the natural or abandoned flows in the watercourse are not sufficient to supply all demands. During periods of shortage, principles of water policy often collide. When the doctrines of reasonable use or public trust clash with the rule of priority, the rule of priority must yield. (*El Dorado,* 142 Cal.App.4th at 964, 966.) However, "*every effort*" must still be made to preserve water right priorities. (*Ibid.*) (emphasis added.)

Section 862 prohibits all water rights holders from using water for frost protection unless a WDMP has been approved by the SWRCB and the diverter/grower is participating in the program. The WDMP must operate under a governing board. The governing board must, among other duties, establish a "corrective action plan" to prevent the stranding of salmonids. It further

provides: "the diverters shall implement corrective actions in accordance with the corrective action plan, or cease diverting water for frost protection." (§862(c)(4).)

Whether or not Section 862 respects adequately the rule of priority must be assessed by assuming there will come a time of extreme advective frost in a dry year with low humidity and low stream flow, thus presenting a risk to the salmonid population as well as to grape and pear crops. When and where along the watercourse this will happen is difficult to predict, but that was the scenario in 2008. Under such conditions, riparian and pre-1914 rights holders are entitled by law to exercise their rights to water first, and must share the water proportionately. Only then, if there is sufficient water remaining, will appropriative rights holders be able to exercise their rights, and only then in order of succession based on when their right was acquired.

Using water for frost protection is not efficacious unless used at the right time – applying water too late results in irreparable damage to the crop. (McGourty– AR Disc #2. "thirty minutes below 32 degrees" results in irreparable damage to the crop). Waiting too long to turn on the sprinklers or turning them off too soon will also result in crop loss that cannot be recovered. (AR Discs #2-3.) Section 862 favors staggered diversions, but staggered diversions in times of scarcity means some growers would not be allowed access to water at the time it is needed. This scenario portends conflict among users as well as conflict with the rule of priority. Section 862 provides no means of *enforcing* priority at a time when it will matter, likely in the middle of the night.

It is the duty of SWRCB to "make every effort" to protect the rule of priority. Even though it is a concern secondary to ensuring only reasonable use and protecting the public trust, it is still a core principle of the law and deserving of enforcement. In enacting Section 862, the SWRCB failed to provide for enforcement of the rule of priority as *City of Barstow* requires. Instead, the SWRCB foisted that responsibility off on newly conceived "governing boards" that may be "governing" one diverter or many diverters. Governing boards comprised of private citizens with conflicting interests lack true authority and are ill equipped to resolve those conflicts.

The only reference in Section 862 to the rule of priority is in subdivision (c)(4), which provides in part, "the governing body, in consultation with diverters, shall develop a corrective action plan *that will prevent stranding mortality*." "In developing the corrective action plan, the governing body shall consider the relative water right priorities of the diverters and any time delay between groundwater diversions and a reduction in stream stage."

This minor reference is insufficient. This watershed encompasses more than 500 water rights holders representing numerous diverters and thousands of acres of grape production. The regulation contemplates a myriad of governing boards of varying sizes and concerns spanning the watershed. It is not hard to foresee that there will be no overlap between WDMPs and likely little or no coordination. Setting up a private governance scheme as envisaged by Section 862 is insufficient to maintain the rule of priority. The regulation neither requires that senior rights will be enforced over junior rights, nor does it contain an effective mechanism to enforce those rights.

This is not a trivial concern. The rule of priority remains a vested right of all priority rights holders throughout the water system, and therefore, it is of vital importance to them. The rule is meant to provide certainty to a water rights holder that they will have access to water put to a reasonable and beneficial use in accordance with their priority, in times of scarcity. If the rule of priority is diminished or ignored, that certainty vanishes. Water Code Section109(a) declares that

"the growing water needs of the state require the use of water in an efficient manner and that the efficient use of water requires certainty in the definition of property rights to the use of water and transferability of such rights." The rule of priority gives definition to the right held by the owner. It is a rule of substance: riparian rights have value, as do senior appropriative rights, and the rule of priority protects that value among those who own such rights *and* those that wish to acquire them. Failing to enforce the rule diminishes the value of the water rights held by users throughout the watershed and may turn future planning for the "efficient use of water" on its head.

Respondent argues that Section 862 does not provide the governing boards with any enforcement power: "the governing boards will not be required to enforce the corrective action plans." (Respondent's brief at p. 19.)[19] If Respondent is correct then there is no provision for the enforcing the rule priority at a time when it really may matter to avoid crop loss. Respondent's argument renders meaningless the mere mention of the rule of priority in the regulation.

Respondent also argues that concerns about the rule of priority only arise if a corrective action plan is necessary. Given that the birth of this regulation was a time of water scarcity, and given the broadly stated objective of preventing salmonid strandings, it is implausible to conclude that any WDMP will be approved without a corrective action plan.[20]

For these reasons, this court concludes that Section 862 is invalid because it fails to provide for enforcement of the rule of priority.

d) Section 862 Improperly Delegates Agency Authority to the Water Demand Management Program Governing Boards.

As a general rule, powers conferred upon public agencies and officers which involve the exercise of judgment or discretion are in the nature of public trusts and cannot be surrendered or delegated to subordinates in the absence of statutory authorization. (*Sacramento Chamber of Commerce v. Stephens* (1931) 212 Cal. 607, 610; *Webster v. Board of Education*, (1903) 140 Cal. 331, 332 (duties of the board of education are legislative and quasi judicial in their character and the general rule is that such duties cannot be delegated).

Public agencies may delegate the performance of ministerial tasks, including the investigation and determination of facts preliminary to agency action. (*Klevesahl v. Byington*, 1 Cal.App.2d 671, 676; *Mechi v. Lyon Van & Storage Co.* (1940) 38 Cal.App.2d 674, 682.) Merely administrative and ministerial functions may be delegated to assistants whose employment is

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[19] Section 862 suggests otherwise: Subdivision (b) requires the governing body to be "capable of ensuring that the requirements of the program are met." Without having the force of law, it is hard to imagine any WDMP governing board having this capability.

[20] Section 862 requires that each WDMP must, in conjunction with the Department of Fish & Game and the National Marine Fisheries Service, prepare a risk assessment document that evaluates the threat of salmonid stranding in its area of oversight from frost diversion. (§862(c)(3).) If a threat of stranding is perceived, then a corrective action plan must be prepared. There is no definition of "threat" or "risk" in the regulation and little guidance for growers to accurately predict or determine if a correction action plan is necessary and what financial investment must be made to avoid it. But, based on the drastic consequence of being unable to use water for frost protection if none is in place, it defies logic to argue that many WDMPs will chose to forego such a plan.

authorized, but there is no authority to delegate acts discretionary or quasi-judicial in nature. An administrative board cannot legally confer upon its employees authority that under the law may be exercised only by the board. (*Schecter v. County of Los Angeles* (1968) 258 Cal.App.2d 391, 396; *see also House v. Los Angeles County* 104 Cal. 73, 79; *Holley v. County of Orange*, 106 Cal. 420 *Vita-Pharmacals, Inc. v. Board of Pharmacy*, 110 Cal.App.2d 826, 830-831.)

Petitioner RRWUE argues that the SWRCB improperly delegated authority to the governing boards of the WDMPs. As noted in section 3(c), *supra*, Respondent argues that the boards are not given any true enforcement authority in Section 862, and therefore, there is no improper delegation. (*See* Respondent's brief at p. 19, lines 13-19: "neither is any governing body being required to enforce the regulation if a diverter refuses to operate consistent with an approved WDMP. That responsibility will fall on the State Water Board.") Civil Code Section 3542 requires all interpretations to be reasonable. In this case, a common sense reading of Section 862 in the context of the longstanding agricultural practice at issue leads to a different conclusion than that posited by Respondent.

Section 862 prohibits all diversions of water for purposes of frost protection between March 15 and May 15 unless done in accordance with a SWRCB-approved WDMP. (§862(a).) The WDMP "*shall* be administered by an individual or governing body *capable of ensuring* that the requirements of the program are met." (§862(c))(emphasis added.) The governing body must 1) conduct an inventory of the frost diversion systems in its area in conjunction with other government agencies.; 2) establish a stream stage monitoring program; 3) assess the risk of salmonid stranding from frost protection by diverters under its administration; 4) develop and implement a corrective action plan that "will prevent stranding mortality." (*See also* subdivision (c)(4).) These are duties imposed on the governing boards and if not fulfilled, its members will be denied water for frost protection. Diverters shall implement the corrective action plans "or cease diverting water for frost protection." (§862(c) (1)-(4).) This is obviously a grave consequence given that using water to frost protect is essential to crop preservation in many areas within the watershed.

The governing boards must plan for a time of water scarcity in times of freezing weather. To do so adequately, Section 862 requires the governing board to perform all of the functions described **and** "*be capable of ensuring that the requirements of the program are met.*" (§862(b).) (emphasis added.) Section 862 envisages water development management plans of substance, specificity, and enforcement capability. If the WDMP does not have sufficient force to it, or if the governing board does not have apparent control over its members, then the SWCRB will not approve the WDMP and all of its members will be prohibited from using water during frost season. A facile plan will be rejected.

Governing boards will have to set conditions to access to water such as building storage ponds or reservoirs at considerable individual expense. (See AR 854 – range of cost to construct storage ponds $47,000-$529,000.) Or, the governing board may simply require participants to reduce diversion volume across the board (maybe eliminating diversions by junior appropriative rights holders). Or, governing boards may order staggered diversions which will increase the risk of frost kill to some diverters. The board may compel removing acreage from production. The board may require the installation of expensive technology for monitoring purposes. (AR 2461 – estimates of initial capital investment per 160 acre vineyard ranges from $9600-$17,000; capital

investments for corrective action plans range from $236,000-$352,000.) These are not ministerial functions. These are conditions historically set by the SWRCB

Faced with the hazard of non-approval and the consequence that carries, no governing board will run the risk of non-approval by the SWRCB. The regulation is intended to reduce water used for frost protection and it anticipates WDMP governing boards giving full force and effect to that aim. The private governing boards will necessarily either be given enforcement powers by its members (or otherwise risk denial of a WDMP) or chose to take enforcement action over the water rights holders under its authority. Governing boards predictably will compel members to take specific action whether it is an investment in infrastructure or a curtailment of water use—these are powers previously reserved for the SWRCB. There is no precedent for a private group of water users determining when another water rights holder's access to water will be conditioned, limited, or eliminated altogether.

Truly fundamental issues should be resolved by the Legislature. (*Kugler v. Yocum* (1968) 69 Cal.2d 371.) Declaring the use of water for frost protection an unreasonable use of water is a fundamental shift in water policy in this state. Arguably, that decision should be made by the Legislature. Even if the SWRCB is empowered to make such a declaration, it cannot then delegate its power to enforce the conditions of water use to private "governing boards" that are purely a concoction of the regulation. The variations in the nature and value of the water rights held and the exposure to crop loss are matters too diverse and too important to expect private governing boards to properly prioritize, condition, or enforce. Whether or not a grower should be required to build a storage reservoir, drill a well, or curtail production due to the risk to the salmonid habitat is the job of the SWRCB precisely because of the vested right affected.

The multitude of mini, private water governments mandated by Section 862 is also an invitation to run afoul of due process. As the United States Supreme Court has observed in similar circumstances, "t]his is legislative delegation in its most obnoxious form; for it is not even delegation to an official or an official body, presumptively disinterested, but to private persons whose interests may be and often are adverse to the interests of others in the same business. ..." (*Carter v. Carter Coal Co.* (1935) 298 U.S. 238, 31. *See also Bayside Timber Co. v. Board of Supervisors* (1971) 20 Cal.App.3d 1.)

The court finds Section 862 to be invalid because it improperly delegates SWRCB's authority to private WDMP governing boards.[21]

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[21] Petitioners also argue that SWRCB improperly delegated authority to the Deputy Director for Water Rights to exempt diverters from Section 862's requirements. Merely administrative and ministerial functions may be delegated to assistants whose employment is authorized, but there is no authority to delegate acts discretionary or quasi-judicial in nature. (*Schecter v. County of Los Angeles*, 258 Cal.App.2d at 396.) The authority given to the Deputy Director in Section 862(d) is limited to approving WDMP criteria to exempt groundwater users or directly approving exemptions requested by groundwater users. An exemption can be granted only if it is proven that the groundwater at issue is not hydraulically connected to the Russian River stream flow. This decision appears to be a ministerial function given the basis for the determination is set forth in the regulation itself.

e) The Composition of the Board On September 20, 2011, Is Not a Basis to Invalidate the Regulation.

Light Petitioners assert that "a regulation making fundamental changes in water law cannot legally be adopted by a three person board that does not contain a lawyer with water law expertise." (Light Petitioner's Brief at p. 32, lines 25-26.) In support of this argument, Light Petitioners rely upon Water Code Section 175 which sets forth the basis of the SWRCB. Specifically, Light Petitioners point out the SWRCB is to be made of five members, one of which is required to be an attorney who is qualified in the fields of water supply and water rights. Respondent counters that Light Petitioners waived this claim by not raising it in the underlying administrative proceedings, and in any event, the regulation was passed by the statutorily-required three member quorum of board members. (Respondent's brief at p. 20, lines 7-15.) The court denies relief on this claim because, even assuming Light Petitioners have not waived this claim, there is insufficient evidence in the record to support it.

Water Code Section 175(a) establishes the existence of a five member board, with each member appointed by the Governor. When a vacancy occurs, the Governor is to immediately fill the position.[22] (Water Code § 177.) Four of the five board members are to possess specialized experience, including one California-licensed attorney "who is qualified in the fields of water supply and water rights." (Water Code § 175(a).) "Three members of the board shall constitute a quorum for the purpose of transacting any business of the board." (Water Code § 181.)

The core of Light Petitioners' complaint is that the SWRCB lacked an attorney with the statutorily-required expertise. However, Light Petitioners fail to cite to any information in the administrative record establishing that fact. The court will not accept mere assertions outside the record as a basis to invalidate the regulation. However, in this case, the court determines such a fact would not result in the relief sought.

Here, both sides agree that Section 862 was adopted by three members of the board. (AR 5178.) The Court concludes this met the threshold for a quorum as required by Water Code Section 181. Further, the attorney board member was not required to participate in the vote because the statute does not set forth which individual board member(s) must be present to create a quorum. Rather, the statute permits a quorum to consist of *any* three board members. (*Id.*) Accordingly, Light Petitioners' complaint that this specific regulation was adopted by a three member vote that did not include an attorney with water rights expertise—even if true—would not be violative of the Water Code, and therefore, would not constitute a basis to invalidate the regulation.

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[22] Light Petitioners assert in their reply that the attorney board member's term expired sometime prior to July 5, 2011. There is no claim the Governor failed to fill this vacancy as required by law.

B. The Agency's Declaration of Necessity for Section 862 Was Not Supported by Substantial Evidence Within the Meaning of Govt. Code §11350(b)(1).

1. Standard of Review

Petitioners argue that there was no established necessity for the regulation within the meaning of Government Code Section 11350. Section 11350(a) provides, in relevant part:

> Any interested person may obtain a judicial declaration as to the validity of any regulation or order of repeal by bringing an action for declaratory relief in the superior court in accordance with the Code of Civil Procedure... .The regulation or order of repeal may be declared to be invalid for a substantial failure to comply with this chapter . . . .

Subdivision (b)(1) provides that a regulation may be declared invalid if the agency's determination that the regulation is reasonably necessary to effectuate the purpose of the statute, court decision, or other provision of law that is being implemented, interpreted, or made specific by the regulation is not supported by substantial evidence.

Judicial review for "substantial evidence" involves a determination of whether the agency decision was rational in light of the relevant evidence in the record. (*Western States Petroleum Assn. v. Superior Court* (1995) 9 Cal.4th 559, 570-72.)

> "'Substantial evidence' is evidence of ponderable legal significance, evidence that is reasonable, credible and of solid value. 'Substantial evidence ... is not synonymous with 'any' evidence.' Instead, it is 'substantial' proof of the essentials which the law requires.' The focus is on the quality, rather than the quantity, of the evidence. 'Very little solid evidence may be 'substantial,' while a lot of extremely weak evidence might be 'insubstantial.' (*Roddenberry v. Roddenberry* (1996) 44 Cal.App.4th 634, 651) (citations omitted.)

2. There Was Not Substantial Evidence Presented to Support a Watershed-Wide Regulation.

Petitioners argue that the voluntary compliance programs known as the Russian River Frost Program, MRSA, and URSA, obviated the need for the regulation. Prior to passing Section 862, the URSA program had made tangible improvements to the overall functioning and management of the upper portion of the watershed. MRSA members had installed stream and diversion monitoring equipment and organized the funding and construction of water storage facilities in several different private vineyards. The volume of water set aside in these storage ponds more than offset the stream flow decrease experienced in 2008. The development of new protocols between SCWA and the RRFP&WCID increased dramatically the effectiveness of compensatory releases in times of severe advective frost. The MRSA program properly targeted frost protection practices in tributaries because there was no evidence of harm to the in-stream

flow of the main stem of the Russian River in Sonoma County from frost protection. MRSA also proved that the risk previously posed at Felta Creek had been eliminated.

The SWRCB rejected the establishment of URSA/MRSA and their umbrella organization known as the Russian River Frost Program as a substitute for regulation. SWRCB's reasons for doing so are stated at AR 3865-66, to wit, the plans did not adequately provide for water conservation in tributaries nor did the programs have the ability to ensure full compliance by diverters in the voluntary programs.

Though this court may disagree with the SWRCB's judgment about the potential effectiveness of MRSA or URSA or the Russian River Frost Protection Program, an agency's determination that voluntary efforts are insufficient to accomplish the stated objective of the regulation does not appear to be a proper ground under the substantial evidence test to declare invalid under Government Code Section 11350(b), an otherwise properly enacted regulation.

While there is no basis to declare the regulation invalid for failing to adopt the voluntary programs as a substitute for regulation, there is also is no basis to ignore what the programs had accomplished between May 2008 and September 2011 that served to reduce the risk to juvenile salmonids. Viewing the record of evidence as a whole to determine if there is substantial evidence to support the need for the regulation, the Court must consider these tangible improvements in the watershed that would serve to accomplish the objective of the regulation.

To be specific, steps taken in Felta Creek completely eliminated the possibility of strandings occurring at that location again. The vineyard operator removed the pump and the diversion and will rely on ground water for frost protection in the future. Private vineyard owners in the upper basin collectively invested $2,460.000 to build storage reservoirs that reduced demand for water from the river by 86.6 cfs. (AR 854.) In other words, this volume of water would no longer be diverted from the river for frost protection. Substantial reduction in demand obviously reduces risk to salmonids in times of scarcity. More and better situated gages were installed to allow SCWA to be better informed as to when to release water from Coyote Dam. It is an abuse of discretion to not study the effect these concrete steps would have on the river and the aim of protecting salmonids before the regulation was adopted. The changes in the upper basin of the water shed obviously would have a direct and positive effect on stream flow in the future and failing to study the extent of that impact was an abuse of discretion.

These improvements to the watershed alone may not be a basis for invalidating the regulation. But these improvements were never factored in by the SWRCB in their determination that a watershed-wide prohibition on using water for frost protection was necessary.

Faced with solid evidence of meaningful improvements, the weakness of the remaining evidence upon which to find a need for a watershed-wide prohibition to prevent salmonid strandings is magnified. The watershed is large and varied. There are variations in climate and topography. Some areas frost protect more frequently than others. Some use more water than others to frost protect. Some users frost protect in some years and not in others. Some frost protect in areas where there is no showing of a risk to the salmonids. Some use water to frost protect in areas where there is known salmonid habitat. The point is there is not enough factual data to demonstrate the need for the prohibition throughout the river basin.

The same observation is true with respect to ground water users. Ground water users draw water from aquifers. *No evidence was presented* showing temporary water depletion in aquifers causes a reduction to in-stream flow from the main stem of the Russian River. Ground water users were swept into the regulation without any factual basis to show their individual practices are linked to salmonid strandings.

There is overwhelming evidence of significant variations within the watershed justifying the need for more study and/or more tailored drafting. The general declaration that frost protection may pose a risk to salmonids might be acceptable if supported by facts or logical inferences, but they show just the opposite. NMFS reported there are 60,640 acres of vineyard in the Russian River watershed. (AR 233.) Of the total potential salmonid habitat, 25% is within 300 feet of a vineyard. NMFS also stated that 70% of all vineyards are within 300 feet of salmonid habit. (AR 233.) NFMS acknowledged that "adjacency does not necessitate an impact, but one study estimated 30% of tributaries are affected." (AR 234.) NMFS also told the SWRCB that it is unknown how many vineyards irrigate for frost protection and it is also unknown "the proportion of vineyards that rely on surface water diversions." (AR 234.)

These figures indicate that NMFS has some idea where salmonid habitat and vineyard propagation overlap, yet the regulation was not customized to fit this area of convergence. The EIR acknowledges that most salmonid habitat lies in tributaries and not in the main stem of the river, but the SWRCB failed to limit the regulation to the area(s) where the risk of harm is truly present. (AR 3865-66.)[23]

The Biologic Opinion for Water Supply, Flood Control Operations and Channel Maintenance, published in 2008 by the U.S. Army Corp of Engineers in consultation with the NMFS for use by SCWA and RRFC&WCID, recommended ramping rates that result in river stage changes of one inch or less per hour to protect steelhead fry and two inches or less per hour to protect juveniles. (AR 4586-4588; 4759-60.) The total stage reduction measured at the Hopland gage on April 20, 2008, was 2.76 inches over 7.5 hours, or .37 inches per hour. The most severe event occurred on April 21 when the river stage dropped 3.6 inches over 10.5 hours, or a rate of .34 inches per hour. The draw downs on April 20 were not in excess of current NMFS guidelines for water channel management on the Russian River – in fact they were far below it. In light of the evidence that the draw downs from frost protection in 2008 did not result in violations of NMFS own guidelines, the necessity for the regulation, as enacted, must be questioned.

The absence of meaningful study to decide the minimum in-stream flow requirements in the main stem and tributaries of the Russian River in order to protect salmonids is a glaring omission in the record. The Water Master for the Napa River testified that the court ordered minimum in-stream flow requirements in the Napa River serves as the primary building block for determining water use by grape growers in frost season. NMFS Assistant Regional Administrator

[23] The academic studies that were submitted (AR 5620, 5627 and 5644) are instructive generally to the phenomena of salmonid stranding and the reasons for it, but only one speaks to the relevant region. "Hydrologic Impacts of Small Scale Instream Diversions for Frost and Heat Protection in the California Wine Country" studied the impact of diversions for frost and heat protection in two tributaries in the Russian River watershed. The data and conclusions reinforce the observation that the risk of juvenile salmonid strandings is most acute in tributaries.

for Habitat Conservation Program in California testified that "it is very important to have minimum in-stream flow criteria achieved, if we can do that we can protect the fish." (AR Disc #5, 2:48.) Section 862 was enacted without making such a determination, leaving no specific standard to accomplish the objective.

Petitioners argue that the two incidents of salmonid strandings did not show the requisite necessity for the regulation. It is relevant that there were no other documented salmonid strandings either in 2008 or during the frost seasons of 2009, 2010, or 2011. This court also rejects NMFS posit that thousands of fish were stranded. The NMFS analysis was fundamentally flawed because it was not based on facts or data but on conjecture and speculation. (*See* note 5, *supra*.) Inferences may constitute substantial evidence, but they must be the product of logic and reason. Speculation or conjecture alone is not substantial evidence. (*Roddenberry, supra*, at 651.) The NMFS model is based on conjecture; not inferences based on fact or logic and cannot be considered.

Though speculation is not permitted, rational inferences are appropriate. Based on the severity of the conditions in the spring of 2008, mistakes in water management by SCWA, as well as frost-related diversions, it would be unreasonable to conclude these strandings occurred in isolation. The existence of some strandings in salmonid habitat on the morning of April 20, 2008 is a logical basis to infer there were others--we simply do not know the severity or the location of presumptive strandings.

The rational conclusion to be drawn from the limited documentation is that further study is needed to draw refined geographical correlations between diverting water for frost protection and risk to juvenile salmonids. This is especially true when so many positive changes have been made to improve the watercourse since 2008. Guess work or instinctual reactions cannot be a basis to declare, as a matter of law, that using water for frost protection is a waste or an unreasonable method of use of water system-wide.

After releasing the initial draft of Section 862, SWRCB chairman admitted that insufficient data or information was available to conclude that every diverter or groundwater user posed a risk to the salmonids. (AR Disc #7 – 2010 workshop, 16:00) Instead he stated, "our intention is to develop data that is helpful to us." Section 862 goes much further than developing data: it declares the use of water for frost protection to be unreasonable throughout the entire watershed. "Unreasonable" has an important legal meaning that has been discussed previously. [24] Enacting a regulation of the breadth and scope of Section 862 before developing a sufficient scientific or fact-driven analysis to conclude the regulation is necessary to eliminate the harm, is not acceptable.

Instead of gathering the specific factual data itself, the SWRCB has implemented a regulation requiring private individuals to do this work at their own cost. The private individuals will then submit this information to the SWRCB in the form of potentially hundreds of separately

[24] Both the Chairperson of the SWRCB and a SWRCB voting member of the Board made statements during the hearings acknowledging their finding that frost protection is an unreasonable method of using water was simply a way to acquire regulatory control over farmers in the Russian River watershed. They further acknowledged the finding was "offensive" and implied that they knew using water in this manner was a necessary component of viticulture. (AR Disc #2 at 1:39; AR Disc #7 at 0: 11; AR Disc #2 at 2:57.) Regardless, to make the finding there has to be substantial evidence to support it, not just a desire to regulate.

filed WDMPs, which may be approved or denied at the discretion of the SWRCB. The problem is further compounded by the by the lack of any identifiable standards in the body of the regulation to guide either the governing boards or the SWRCB in developing and/or approving a WDMP. The law requires the SWRCB to draft a regulation when there is substantial evidence showing the necessity for it--not to draft a regulation mandating private individuals to gather the evidence necessary to support the regulation in the first place.

A thorough review of the record leaves this court finding only a tenuous basis for the regulation as enacted. The determination by the SWRCB that Section 862, as drafted, is reasonably necessary to effectuate its purpose is not supported by substantial evidence and for that reason the Court declares the regulation invalid under Government Code Section 11350(b)(1).

C. CEQA Claims

Petitioners raise a number of factual challenges to the adequacy of the EIR eventually adopted by the SWRCB. These challenges need not be addressed because the court has found 862 to be invalid on various different grounds. The court will, however, address the issue of whether the SWRCB proceeded in a manner required by law in enacting §862.

1. Standard of Review

On a writ of mandate in CEQA actions the trial court reviews the administrative record for "a prejudicial abuse of discretion." (Pub. Resources Code, § 21168.5; *Sunnyvale West Neighborhood Assn. v. City of Sunnyvale City Council* (2010) 190 Cal.App.4th 1351, 1371.) "Abuse of discretion is established if the agency has not proceeded in a manner required by law or if the determination or decision is not supported by substantial evidence." (Pub. Resources Code § 21168.5; *Sunnyvale, supra,* 190 Cal.App.4th at1371.) "Judicial review of these two types of error differs significantly...." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 435(*Vineyard*).) The Court reviews de novo whether the agency employed the correct procedures or properly interpreted CEQA's requirements, "we accord greater deference to the agency's substantive factual conclusions." (*Ibid.; Fat v. County of Sacramento* (2002) 97 Cal.App.4th 1270, 1277, 119 Cal.Rptr.2d 402 (*Fat*).) "In reviewing for substantial evidence, the reviewing court 'may not set aside an agency's approval of an EIR on the ground that an opposite conclusion would have been equally or more reasonable,' for, on factual questions, our task 'is not to weigh conflicting evidence and determine who has the better argument.' " (*Vineyard, supra,* at p. 435.) See also *Citizens for East Shore Parks v. California State Lands Com.* (2011) 202 Cal.App.4th 549, 556-57

a. The Resolution and the Regulation Were Validly Adopted.

Petitioners argue that the SWRCB did not proceed in a lawful manner on September 20, 2011 when the regulation was enacted. Petitioners argue that the Board moved to adopt the regulation without adopting the underlying resolution and final EIR.

Petitioners are correct that at the time the formal motion was made by member Spivy-Weber to adopt the regulation, she did not also move adoption of the accompanying resolution accepting the final EIR. (AR 15069.) Moments later, the only three members of the board present

voted unanimously in support of the motion as made. The chairperson then adjourned the meeting. Within minutes and while the video taping equipment was still running, a staff person clarified with all members present that the motion was to adopt "the resolution with the changes to the Regulation [sic]." (AR 5152.) The staff person could be seen and heard asking the question and chairperson responded in an audible manner that it was and Ms. Spivey-Weber could be seen nodding in an affirmative manner. (see AR Disc 10 24:00 – end.)

While not procedurally perfect, by referring to the transcript and watching the video including the context of the entire discussion that took place on September 20, 2011, it is apparent that the board members intended to adopt the resolution with the changes to the regulation. The record is not reasonably susceptible to a different interpretation.

Petitioners have not provided any authority that would support a finding that the resolution and regulation were not validly adopted under the circumstances present. Therefore the court declines to make such a finding.

CONCLUSION

For all the reasons discussed herein, this Court grants Petitioners Writ of Mandate and declares invalid Section 862.

IT IS SO ORDERED.

Dated: September 26, 2012

Ann Moorman
Judge of the Superior Court

STATE WATER RESOURCES CONTROL BOARD
REGULATION

Text of Regulation

Amendment to Division 3 of Title 23 of the California Code of Regulations

Add the following section:

§ 862 Russian River, Special.

Budding grape vines and certain other crops in the Russian River watershed may be severely damaged by spring frosts. Frost protection of crops is a beneficial use of water under section 671 of this chapter. During a frost, however, the high instantaneous demand for water for frost protection by numerous vineyardists and other water users may contribute to a rapid decrease in stream stage that results in the mortality of salmonids due to stranding. Stranding mortality can be avoided by coordinating or otherwise managing diversions to reduce instantaneous demand. Because a reasonable alternative to current practices exists, the Board has determined these diversions must be conducted in accordance with this section.

(a) After March 14, 2012, except for diversion upstream of Warm Springs Dam in Sonoma County or Coyote Dam in Mendocino County, any diversion of water from the Russian River stream system, including the pumping of hydraulically connected groundwater, for purposes of frost protection from March 15 through May 15 shall be diverted in accordance with a board approved water demand management program (WDMP). For purposes of this section, groundwater pumped within the Russian River watershed is considered hydraulically connected to the Russian River stream system if that pumping contributes to a reduction in stream stage to any surface stream in the Russian River watershed during any single frost event.

(b) The purpose of the WDMP is to assess the extent to which diversions for frost protection affect stream stage and manage diversions to prevent cumulative diversions for frost protection from causing a reduction in stream stage that causes stranding mortality. The WDMP, and any revisions thereto, shall be administered by an individual or governing body (governing body) capable of ensuring that the requirements of the program are met. Any WDMP developed pursuant to this section shall be submitted to the board by February 1 prior to the frost season.

(c) At a minimum, the WDMP shall include (1) an inventory of the frost diversion systems within the area subject to the WDMP, (2) a stream stage monitoring program, (3) an assessment of the potential risk of stranding mortality due to frost diversions, (4) the identification and timelines for implementation of any corrective actions necessary to prevent stranding mortality caused by frost diversions, and (5) annual reporting of program data, activities, and results. In addition, the WDMP shall identify the diverters participating in the program and any known diverters within the area subject to the WDMP who declined to participate. The WDMP also shall include a schedule for conducting the frost inventory, developing and implementing the stream stage monitoring program, and conducting the risk assessment.

(1) Inventory of frost diversion systems: The governing body shall establish an inventory of all frost diversions included in the WDMP. The inventory, except for diversion data, shall be completed within three months after board approval of a WDMP. The inventory shall be updated annually with any changes to the inventory and with frost diversion data. The inventory shall include for each frost diversion:

(A) Name of the diverter;

(B) Source of water used and location of diversion;

(C) A description of the diversion system and its capacity;

(D) Acreage frost protected and acres frost protected by means other than water diverted from the Russian River stream system; and

(E) The rate of diversion, hours of operation, and volume of water diverted during each frost event for the year.

(2) Stream stage monitoring program: The governing body shall develop a stream stage monitoring program in consultation with National Marine Fisheries Service (NMFS) and California Department of Fish and Game (DFG). For the purposes of this section, consultation involves an open exchange of information for the purposes of obtaining recommendations. The governing body is authorized to include its own expert scientists and engineers in the consultation, and request board staff to participate, when desired. The stream stage monitoring program shall include the following:

(A) A determination of the number, type, and location of stream gages necessary for the WDMP to monitor and assess the extent to which frost diversions may affect stream stage and cause stranding mortality;

(B) A determination of the stream stage that should be maintained at each gage to prevent stranding mortality;

(C) Provisions for the installation and ongoing calibration and maintenance of stream gages and

(D) Monitoring and recording of stream stage at intervals not to exceed 15 minutes.

(3) Risk assessment: Based on the inventory and stream stage information described above, and information regarding the presence of habitat for salmonids, the governing body shall conduct a risk assessment that evaluates the potential for

frost diversions to cause stranding mortality. The risk assessment shall be conducted in consultation with NMFS and DFG. The governing body is authorized to include its own expert scientists and engineers in the consultation, and request board staff to participate, when desired. The risk assessment shall be evaluated and updated annually.

(4) Corrective Actions: If the governing body determines that diversions for purposes of frost protection have the potential to cause stranding mortality, the governing body shall notify the diverter(s) of the potential risk. The governing body, in consultation with the diverters, shall develop a corrective action plan that will prevent stranding mortality. Corrective actions may include alternative methods for frost protection, best management practices, better coordination of diversions, construction of offstream storage facilities, real-time stream gage and diversion monitoring, or other alternative methods of diversion. Corrective actions also may include revisions to the number, location and type of stream stage monitoring gages, or to the stream stages considered necessary to prevent stranding mortality. In developing the corrective action plan, the governing body shall consider the relative water right priorities of the diverters and any time delay between groundwater diversions and a reduction in stream stage. The corrective action plan shall include a schedule of implementation. To the extent feasible, the corrective action plan shall include interim corrective actions if long-term corrective actions are anticipated to take over three years to fully implement. The diverters shall implement corrective actions in accordance with the corrective action plan, or cease diverting water for frost protection.

(5) Annual Reporting: The governing body shall submit a publically available annual report of program operations, risk assessment, and corrective actions by September

1 following the frost season that is the subject of the report. The report shall include:

(A) The frost inventory, including diversion data.

(B) Stream stage monitoring data.

(C) The risk assessment and its results, identification of the need for any additional data or analysis, and a schedule for obtaining the data or completing the analysis.

(D) A description of any corrective action plan that has been developed, any corrective actions implemented to date, and a schedule for implementing any additional corrective actions.

(E) Any instances of noncompliance with the WDMP or with a corrective action plan, including the failure to implement identified corrective actions.

The report shall document consultations with DFG and NMFS regarding the stream stage monitoring program and risk assessment and shall explain any deviations from recommendations made by DFG or NMFS during the consultation process. In addition, the annual report shall evaluate the effectiveness of the WDMP, and recommend any necessary changes to the WDMP, including any proposed additions or subtractions of program participants. Any recommendations for revisions to the WDMP shall include a program implementation plan and schedule. The board may require changes to the WDMP, including but not limited to the risk assessment, corrective action plan, and schedule of implementation, at any time.

(d) The governing body may develop and submit for the Deputy Director for Water Rights' approval, criteria, applicable to any participant in its WDMP, for identifying groundwater diversions that are not hydraulically connected to the Russian River stream

system. The governing body may submit to the Deputy Director a list of groundwater diverters that appear to meet these criteria and could be exempted from this section. The Deputy Director is authorized to exempt the listed groundwater diverters, or identify the reason for not exempting the listed groundwater diverters. Beginning three years from the effective date of this section, if an individual groundwater diverter can independently demonstrate to the satisfaction of the Deputy Director that the diversion is not hydraulically connected to the Russian River stream system, the Deputy Director is authorized to exempt the groundwater diverter from this section.

(e) Compliance with this section shall constitute a condition of all water right permits and licenses that authorize the diversion of water from the Russian River stream system for purposes of frost protection. The diversion of water in violation of this section, including the failure to implement the corrective actions included in any corrective action plan developed by the governing body, is an unreasonable method of diversion and use and a violation of Water Code section 100, and shall be subject to enforcement by the board. The board has continuing authority to revise terms and conditions of all permits that authorize the diversion of water for purposes of frost protection should future conditions warrant.

NOTE: Authority cited: Section 1058, Water Code.
Reference: Section 2, Article X, California Constitution; and Sections 100, 275 and 1051.5, Water Code.

PROOF OF SERVICE

Case: **SC-UK-CV-G -11-0059127-000 - LIGHT, RUDOPLH VS. CALIF STATE WATER RESOURCES**

Document Served: **PROOF OF SERVICE FOR ORDER GRANTING PETITION FOR WRIT OF MANDATE IN CONSOLIDATED ACTIONS**

Service date: **September 26, 2012**

I, Frances Proteau, am a citizen of the United States of America and employed by the Superior Court in the County of Mendocino, State of California. I am over the age of 18 years and not a party to the within entitled action.

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CARYN A. DOWNING, CLERK OF THE COURT

By: _____
Frances Proteau, Deputy Clerk

REVIEW OF THE LAWS ESTABLISHING THE SWRCB'S PERMITTING AUTHORITY OVER APPROPRIATIONS OF GROUNDWATER CLASSIFIED AS SUBTERRANEAN STREAMS AND THE SWRCB'S IMPLEMENTATION OF THOSE LAWS.

SWRCB No. 0-076-300-0

Joseph L. Sax
Project Director

FINAL REPORT

JANUARY 19, 2002

ACKNOWLEDGMENTS

I would like to express my special appreciation to the policy and technical advisory committees who assisted me in developing this Report, though they bear no responsibility for the conclusions or proposals made here, nor of course for any errors I have committed. I wish also to thank those members of the State Water Resources Control Board staff – Erin Mahaney, Andy Sawyer, Paul Murphey, and Lewis Moeller – who generously responded to my many questions, and who went far beyond the call of duty in answering my numerous requests for documents and for information about Board practices.

Members of the Technical Advisory Committee: Carl Hauge, Karen Burow, David Purkey, Steve Bachman, Kit Custis, and Jerold Behnke.

Members of the Policy Advisory Committee: Nancee M. Murray, Anne Schneider, Art Littleworth, Carl Hauge, and Hap Dunning.

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There will always be great difficulty in fixing a line, beyond which the water in the sand and gravels over which a stream flows and which supply or uphold the stream, ceases to be a part thereof and becomes what is called percolating water.

Hudson v. Dailey, 156 Cal. 617, 627-28 (1909)

INTRODUCTION

1. A Brief Description of Groundwater: The Law and the Reality

The law in California requires that water be identified as in one of three categories: surface water, percolating groundwater, and "subterranean streams flowing through known and definite channels" (subterranean streams).[1] For purposes of this Report, the significance of these categories is the following: Only surface water and subterranean stream water are within the permitting jurisdiction of the State Water Resources Control Board (the Board or SWRCB).[2] Appropriation of those waters requires a Board permit, and is subject to various permit conditions.[3]

To put the matter as simply as possible, the above categories do not accord with scientific understanding of the occurrence and distribution of water on and in the earth. To hydrogeologists, water is a continuum. The same water may sometimes be found on the surface of the earth and at other times underground. Water moves by the force of gravity, and whether it is surface water or groundwater at any particular moment depends on the slope (known as gradient) and direction of the medium through which it is moving at a given moment, on obstacles it encounters, and on the topography of the land. Moreover, from a technical perspective, the distinction between percolating groundwater and subterranean streams is meaningless, or nearly so. Water that actually flows like a surface stream beneath the earth's surface, as in lava tubes or limestone caverns, is very rare in California. Virtually all underground water percolates through the ground. It may move more or less rapidly; it may be moving parallel or perpendicular to a surface stream; it may be narrowly confined or broadly diffused underground. From a geological perspective, these factors are simply crude and partial descriptions of the enormously varied behavioral characteristics of subsurface water, depending on a variety of factors, such as the varied

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[1] When the term "subterranean stream" is used in this Report, it will generally be shorthand for the statutory phrase in Water Code § 1200: "subterranean streams flowing through known and definite channels."

[2] The term jurisdiction, or permitting jurisdiction, used throughout the Report requires a cautionary note. Water Code § 1200 defines the scope of Board authority for those provisions in Part II of the Water Code that require Board approval of diversions from a stream, lake, or other body of water. Insofar as there is controversy involving the Board's authority to impose conditions on groundwater in connection with other activities within its authority (e.g., approvals under Water Code § 1211 where percolating groundwater was a source of some of the treated waste water), nothing in this Report is intended to suggest a position on such matters.

[3] There are other important distinctions, but they are not within the scope of this Report, e.g., riparian uses require no permit (Water Code § 1201), and percolating groundwater is not subject to statutory adjudications (Water Code § 2500).

transmissivity of the material in which it is found, the varied obstacles it encounters, and the diverse gradients over which it travels in its movement through the earth. In addition, at various points in time or space, groundwater may be in hydraulic connection with a surface stream, or it may be confined, at least for some distance, beneath a quite impermeable layer. Water underground may, at one place, or during one season, seep into a river through its banks (a gaining river), and at another place or time seep out from the banks into the underground (a losing river). It all depends on whether the saturated area of the ground is above or below the river bank at that point.

The categories that statutes and judicial opinions use, such as "underflow,[4]" "subflow,"

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[4] The term "underflow", though commonly used – and thus necessarily employed repeatedly in this Report – is an unfortunate usage, for several reasons. First, and foremost, it is not a technical term of art used by hydrogeologists. They understand groundwater and surface water to be part of a continuum (at times interrupted), and there is no hydrological line of demarcation between groundwater that is, for example, percolating toward a stream, and groundwater that has become part of the stream as "underflow". As the Arizona Department of Water Resources has explained, "[i]n the ideal, subflow [or underflow] can be visualized as just another part of the stream that lies out of view below the surface. As part of the stream, it also has distinct bed and banks which define its extent. This ideal concept of subflow does exist in narrow bedrock canyon streams where both the surface and subsurface components of the stream are contained within hardrock boundaries. But as these bedrock canyons descend from the mountains, the valleys become alluvial valleys between mountain ranges, where the subterranean component of streams becomes unbounded." Technical Assessment of the Arizona Supreme Court Interlocutory Appeal Issue No. 2 Opinion, In Re The General Adjudication of the Gila River System and Source, Arizona Department of Water Resources (December 15, 1993) (typescript), at 38.

In addition, as noted hereafter in the text, the term has been commonly picked up from a headnote in *Los Angeles v. Pomeroy*, 124 Cal. 597, 57 P. 585 (1899), writ of error dis. sub nom. *Hooker v. Los Angeles*, 188 U.S. 314, 23 S.Ct. 395, 47 L.Ed. 487 (1903) and is often cited in a way that gives an inaccurate sense both of the trial judge's instructions, and the Supreme Court's decision, in that case.

As a legal term, underflow has been defined in various ways. It is said to be water in the soil, sand and gravel immediately below the bed of the open stream (*Verdugo Canon Water Co. v. Verdugo*, 152 Cal. 655, 663, 93 P. 1021 (1908)), which supports the surface stream in its natural state or feeds it directly (*Huffner v. Sawday*, 153 Cal. 86, 92, 94 P. 424 (1908); *San Bernardino v. Riverside*, 186 Cal. 7, 14, 198 P. 78 (1921)). *Pomeroy* is cited for the view that underflow requires that the surface and subsurface be in contact and that the subsurface flow shall have a definite direction corresponding to the surface flow, 124 Cal. 597, 617, 636-37, 57 P. 585 (1899). A commonly cited definition of underflow is taken from Wells A. Hutchins, The California Law of Water Rights (1956), at 422: "The underflow or subflow of a surface stream consists of water in

(continued...)

"subterranean streams," and "percolating groundwater," bear little if any relationship to these geological realities. Indeed, these water law terms are geographic conceptions fundamentally at odds with science's understanding of water's movements. The legal categories seem to assume, for example, that there is a fixed space within which water is the "underflow" of a stream, and beyond that space the water is something else. From a hydrogeological perspective, such geographic categories are dubious at best. From a scientific perspective, efforts to fit water into the law's categories by using these technical-sounding classifications give the enterprise a somewhat daffy air. Is the water moving parallel to the stream, or perpendicular to it? Is the aquifer more like a lake in shape, or more like a river? Is water percolating through the ground rapidly enough to be treated as "flowing" water?

How then does one intelligently examine a statutory provision like Water Code § 1200? This Report is founded on a simple premise. It is that the provision was enacted to achieve some legislative purpose, and that however unscientific or outdated the statutory language may be, it is nonetheless likely that the legislators had some real problem in mind that they were seeking to address. As we shall see, those who drafted the legislation that became the Water Commission Act were not ignorant of the interactive relationship between groundwater and surface water. They knew perfectly well that much "percolating groundwater" was on its way to or from a surface stream, and they knew that water appeared, disappeared and reappeared on the surface as streams flowed. It was, after all, 1913 and not 1319 in which they were drafting legislation. So it seems appropriate to pose the following as the basic question: what were the drafters of § 42 of the Water Commission Act,[5] the original version of today's Water Code § 1200, trying to do, and how might their goal best be accomplished today? Whether that goal remains a desirable one today is a separate question – a question for today's legislature.

2. Questions Addressed in this Report

Six specific questions have been posed as the scope of work for this Report. They are:

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[4](...continued)
the soil, sand, and gravel immediately below the bed of the open stream, which supports the surface stream in its natural state or feeds it directly. To constitute underflow, it is essential that the surface and subsurface flows be in contact and that the subsurface flow shall have a definite direction corresponding to the surface flow. The underflow may include the water moving not only in the loose, porous material that underlies the bed of the surface stream, but also the lateral extensions of the water-bearing material on each side of the surface channel. But it must be moving in a course and confined within a space reasonably well defined, so that the existence and general direction of the body of water moving underground may be determined with reasonable accuracy."

[5] The relevant sentence reads: "Whenever the terms stream, stream system, lake or other body of water or water occurs in this act, such term shall be interpreted to refer only to surface water, and to subterranean streams flowing through known and definite channels."

1. What is the scope of the State Water Resources Control Board's (SWRCB) water right permitting authority over groundwater?

2. What is the current legal test for determining whether groundwater is subject to the SWRCB's permitting authority?

3. Under this legal test, what physical characteristics should the SWRCB evaluate in distinguishing subsurface waters subject to the SWRCB's permitting authority from subsurface waters that are percolating groundwater?

4. What factors has the SWRCB considered in its past decisions regarding groundwater classifications?

5. Should the legal test for determining what subsurface waters are subject to the SWRCB's permitting authority be changed? If so, what legal test would be appropriate?

6. Can quantifiable criteria be established to implement the legal test? What are the quantifiable criteria?

The bulk of this report consists of underlying data and analysis that inform the answers offered to questions 1, 2, 3 and 4. That material is divided into three parts: Part I consists of a review of the judicial decisions that dealt with subsurface water, and that formed the case law background to the Water Commission Act of 1913. Part II comprises a legislative history of the 1913 Act, and reference to subsequent legislation dealing with Board jurisdiction over groundwater. Part III discusses the Board's interpretation of the subterranean stream language of Water Code § 1200 and its predecessor provisions from the beginning to the present time.

Question 5 calls for judgment about a question that must ultimately be resolved legislatively. Part IV of this Report discusses approaches that have been taken in some other western states to deal with the integration of surface water and subterranean water management, and to suggest some changes that the California legislature may wish to consider. Part V discusses other opportunities to manage subsurface water that may be available under existing law and that may be pursued in the absence of legislative change. Part VI is a response to Question 5.

Question 6 asks whether quantifiable criteria can be articulated to implement the subterranean stream provision of the law. Based on the conclusions drawn in this report about the meaning of the provision, an effort has been made to provide such criteria. The proposed criteria have been developed following consultation with the Technical Advisory Committee appointed by the Board. But they do not implement (and there was not) a Committee recommendation. The proposed criteria are mine.

3. Responses to the Questions Posed by the Board

1. What is the scope of the State Water Resources Control Board's (SWRCB) water right permitting authority over groundwater?

Water Code § 1253 grants the SWRCB permitting authority over unappropriated water. Water subject to appropriation is defined in Water Code § 1201 as "[a]ll water flowing in any natural channel" except water that is or may be needed for use upon riparian land or water that is otherwise appropriated.[6] Unappropriated water is defined in Water Code § 1202. The term "water" as utilized in the preceding cited provisions is limited by Water Code § 1200 to "surface water, and to subterranean streams flowing through known and definite channels." Thus the Board's permitting authority over groundwater extends only to the water of unappropriated subterranean streams flowing through known and definite channels, except as it is or may be reasonably needed for useful and beneficial purposes upon lands riparian to the channel through which it is flowing, that is, to use on land overlying a subterranean stream.[7]

2. What is the current legal test for determining whether groundwater is subject to the SWRCB's permitting authority?

The California Supreme Court has not provided a judicial interpretation of the statutory definition of groundwater subject to the Board's permitting jurisdiction. While the Board looks to the decision in *Los Angeles v. Pomeroy*, which distinguished between subterranean streams and percolating groundwater, as authority, that case is not a judicial interpretation of Water Code §1200, or of its predecessor statutory provision.

The current legal test, as articulated by the Board in its 1999 decision in the *Garrapata Creek* case,[8] requires the following physical conditions to exist in order for groundwater to be classified as a subterranean stream flowing through a known and definite channel, and thereby to be subject to the Board's permitting authority: (1) a subsurface channel must be present; (2) the channel must have relatively impermeable bed and banks; (3) the course of the channel must be known or capable of being determined by reasonable inference; and (4) groundwater must be flowing in the channel.

In the *Garrapata Creek* decision, the Board also stated that while a subterranean stream includes "underflow" (which is not a statutory term, though it is commonly used), it is not necessary that

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[6] There is an exemption for small domestic appropriations, which are acquired by registration, Water Code § 1228, et seq.

[7] See note 264, *infra*.

[8] D. 1639 (1999). Board decisions are referred to in this report by the capital letter D., followed by the decision number and the date.

groundwater be underflow to establish the existence of a subterranean stream flowing through a known and definite channel. Underflow was described as having the following physical characteristics: (1) underflow must be in connection with a surface stream; (2) underflow must be flowing in the same general direction as the surface stream; and (3) underflow must be flowing in a watercourse and within a space relatively well defined.[9]

The Board noted both some differences, and some common elements, between a subterranean stream and underflow. A subterranean stream, it said, need not be interconnected with a surface stream. Both a surface stream and underflow, however, must flow in a watercourse. A watercourse must consist of a bed, banks or sides, and water flowing in a defined channel.

Some elements of the current legal test utilized by the Board are more fully defined than others. The standard of "relatively impermeable bed and banks" of a channel is described as material "sufficiently impermeable at the point of diversion to prevent the transmission of all but relatively minor quantities of water through the channel boundary." The Board does not utilize a quantitative measure of difference in permeability. The test is not that the bed and banks be "absolutely impermeable."

There is no similarly spelled-out definition of what constitutes a "channel," of what is required for a channel to be "known and definite," or of how it is determined whether water is "flowing" in a channel. At least some of these criteria have been the subject of considerable controversy in other cases, notably the so-called *Pauma and Pala* case (In the Matter of Application 30038 et al.), in which a Draft Decision was issued on October 25, 1999, as well in some earlier cases noted in the body of this Report. However, the Board's current interpretation of these elements remains to be fully spelled-out. Concern has been expressed that the Board may be taking an excessively broad view of what constitutes a channel and of the existence of flow; and that by focusing as much as it does on the presence of bed and banks, though they may be distant from a stream, the Board may be moving toward a too expansive definition of a subterranean stream. It has been suggested that these interpretations, or proposed interpretations, are at odds both with the statutory mandate and with long-standing Board practice.

3. Under this legal test, what physical characteristics should the SWRCB evaluate in distinguishing subsurface waters subject to the SWRCB's permitting authority from subsurface waters that are percolating groundwater?

I understand this question to ask for an analysis of meaning of the subterranean stream provision of Water Code § 1200; and, based on that analysis, to propose an appropriate test for

[9] This definition actually comes from Instructions XVI and XVII of the trial judge's instructions in *Pomeroy,* and is not characterized there as a definition of "underflow," a term which appears only once in *Pomeroy,* in connection with the Court's comment on Instruction X, see 124 Cal., at 630.

implementing the subterranean stream provision of Water Code § 1200. As spelled out in detail in Part II of this Report, analysis of the background of the 1913 Water Commission Act, and in particular the evolution of the subterranean stream provision of that Act, indicates that evaluation of "physical characteristics" is not the key to a proper interpretation of the statutory provision.

My analysis reveals that the legislative purpose was to protect the integrity of the permitting agency's jurisdiction over surface stream appropriations by preventing unpermitted taking of groundwater that appreciably and directly affects surface stream flows. The concern was essentially to close a loophole that would have been left if any taking of water from a subsurface location would leave the permitting agency powerless in the face of wells or tunnels that were effectively underground facilities for withdrawing stream water. At the same time, it is clear that the legislation was not intended to create permitting jurisdiction over all groundwater whose pumping would in any way, or at any time, affect surface streams. The statute was without doubt meant to leave much tributary groundwater as part of a separate legal regime outside the permit system that was being established. While the "subterranean stream" language in the Water Commission Act was almost certainly intended to focus on areas that were very proximate to the surface stream (the subterranean aspects of surface streams), such as what is called underflow or subflow, it should be kept in mind that modern-day high-powered pumps were not extant at that time. The central concern was impact, however, not proximity.

My conclusion is that the legislation was designed to create an impact test (impact of pumping on surface stream flows), rather than seeking to identify a physical entity with a specific shape, despite the conventional "subterranean stream" language the law picked up from the old treatises. I conclude that a test designed to identify appreciable and direct impact of groundwater diversion on a surface streams represents a more faithful implementation of the legislative purpose than any catalog of physical characteristics.[10]

While any test of impact necessarily involves a judgment about the boundaries of inclusion and exclusion, so does any test based on geography or on physical characteristics, whether it involves flow direction, permeability of an asserted bed and banks, identification of a channel, or whether certain groundwater is or isn't "underflow." Since the groundwater and surface water within a watershed essentially constitute a continuum, any test intended to separate one part of the groundwater from another ("percolating" vs. "flowing"), or to distinguish groundwater from surface water, inescapably requires a judgment that reflects a purposive goal, rather than reflecting a technical line of demarcation that hydrogeologists or other scientific experts utilize and for which there is a technically accepted definition. Indeed, even in states where groundwater and surface water management is fully integrated, policy-dominated judgments must be made

[10] Insofar as such a test would enlarge Board jurisdiction somewhat, it raises the perplexing question of how to deal with longstanding uses, formerly considered outside the Board's jurisdiction, but now deemed to be jurisdictional. As to "grandfathering" existing uses, see text at notes 211, *infra.*

about the point at which pumping impacts on surface streams are sufficiently attenuated in time or impact that they should not be considered.[11]

The response to Question 6, below, offers a suggested approach for the Board in drawing the required line distinguishing subsurface waters subject to the SWRCB's permitting authority from subsurface waters that the law classifies as percolating groundwater.

4. What factors has the SWRCB considered in its past decisions regarding groundwater classifications?

Two factors have been found wherever the Board has taken jurisdiction of what is determined to be a subterranean stream: a finding of (1) bed and banks; and (2) water flowing along the line of a surface stream (though sometimes very slowly). A third factor – the presence or absence of a channel – has been a subject of controversy from the beginning. In addition, in almost all cases where the Board took jurisdiction, hydraulic connectivity showed that the pumping would impact a surface stream. Connectivity is a factor that is always taken account of, and appears to be influential, though the Board has not articulated surface stream impact as itself a test of jurisdiction. There are, however, cases where the Board has taken jurisdiction where there was no finding of such connectivity and impact, and cases where it has declined jurisdiction where that element was present.

The classic case for finding jurisdiction is where subsurface water is pumped from a narrow alluvial valley enclosed by a steep rocky canyon, and where the subsurface water is moving along a closely confined path paralleling the line of a surface stream. The 1926 *Sheep Creek* case exemplifies such circumstances,[12] and one can find similar cases down through the decades.[13] Described as the underflow of the surface stream, the subsurface flow in that case was "very slow", but it was said to be definite, and was within a channel – a closely confined path – formed by the walls of a canyon that ranged from ¼ mile to 1 mile in width. Though the decision contains no finding of relative impermeability, it quotes the language of "impervious sides and bed" from the *Pomeroy* headnotes as describing the setting in the case. As to impact, it also quotes the *Pomeroy* headnotes, which speak of "caus[ing] the water of the stream to leave its bed to fill the void caused by such [groundwater] diversion."

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[11] See text at notes 235, 263, *infra*.

[12] Decision No. 3883, D. 119 (1926), discussed text at note 173, *infra*.

[13] E.g., Stony Creek (Colusa County), Order WR 80-11 (1980), discussed in text at note 177, *infra*; Laguna Creek (Santa Cruz County), Memo from Charles NeSmith, Associate Engineering Geologist, Files 262.0 (44-16-01), Water Rights Complaint – California Department of Fish and Game vs. Stephenson Ranch (Santa Cruz Biotechnology) Regarding Diversions from Laguna Creek in Santa Cruz Country (August 23, 2001).

The most troublesome cases for the Board seem to have been those where the claim is that there is no "channel," though the other factors – bed and banks, and flow, as well as impact on a surface stream – have been present. The record of the very first subterranean stream case, in 1924, contains a staff report recommending against taking jurisdiction because the groundwater is in a broad valley described by the staff as "an underground lake." The Board did, however, assert jurisdiction, perhaps because neither side objected (indeed, it seems the two contending sides wanted the Board to resolve their conflict).

In 1938, a case involving the San Luis Rey River again raised the question whether the fact that the subsurface water was found within a broad valley that was not channel-like, i.e., narrowly confined, was jurisdictionally disqualifying.[14] The Board held that it was not. The Board took jurisdiction, stating, "while the underground water is concluded to be a definite stream, yet the bottoms along the river constitute reservoirs of some magnitude just as are found in a surface stream in its wide, deep and slow moving reaches."[15] The Board took special note of the hydraulic connection, or impact factor, noting that the "stream and the underground water function as a closely related unit."

The issue arose again in 1960, in the *Cache Creek* case, where doubts were raised about the width of the asserted channel and the resulting asserted lack of flow.[16] The Board formally rested its finding of no jurisdiction on the slowness of the flow and the breakup of the canyon walls by side canyons. In the course of its decision, the Board asked, "[w]hen is a given area a stream, and when is it an underground basin? Does the word 'flowing' include water that is moving very slowly? When a given area containing slowly moving water has impermeable sides and bottom, must those impermeable sides and bottom be construed as the bed and banks of a stream...?"[17] In that case, the answer was "no". The circumstances suggested that the pumping was not impacting the surface stream, which may have influenced the decision against jurisdiction.

Hydraulic connection between the subsurface water and the surface stream, such that pumping is seen as significantly impacting the surface stream, is commonly an indication that the Board will find jurisdiction in an otherwise marginal case – as in the 1938 case noted above involving the San Luis Rey River; or in the more recent *Carmel River* case (though the jurisdictional finding there was uncontested);[18] and it may be explanatory of the 1999 Draft decision in the *Pauma and Pala*

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[14] D. 432 (1938), discussed in text at note 195, *infra*.

[15] D. 432, at 14-15.

[16] D. 968 (1960), discussed in note 178, *infra*.

[17] *Id*., at 3.

[18] Order No. WR 95-10 (1995), discussed in text at note 189, *infra*.

case.[19]

On the other hand, the Board has taken jurisdiction of cases where there was no evidence of hydraulic connection (the pumping was from a confined aquifer), and where the presence of anything ordinarily thought of as a channel was doubtful.[20] And it has denied jurisdiction for lack of a "known and definite channel," even where pumping might be depleting the stream.[21] The common explanatory element in these two cases is "bed and banks." In the former case, bed and banks were found; and in the latter there was nothing that could qualify as bed and banks. If there is a single dominating factor in the Board's current jurisdictional decisions, it seems to be a focus on the presence or absence of a bed and banks. The presence of something that qualifies as a bed and banks seems to generate a rather generous attitude toward finding a channel, and the presence of flow. The presence of a hydraulic connection between the subsurface water and a surface stream appears as an added factor in favor of a jurisdictional finding.

5. Should the legal test for determining what subsurface waters are subject to the SWRCB's permitting authority be changed? If so, what legal test would be appropriate?

In theory, there is no doubt that hydraulically connected groundwater and surface water ought to be managed in a single integrated system, and that has been the general direction in which many states have moved. There are several models that offer California useful ideas.[22] But this State has a long and deep history of resistance to such integration, and the prospects of achieving legislative change that wouldn't be piecemeal or riddled with destructive exceptions seems very dim within the foreseeable future. In addition, California's exception of riparian uses (which cases indicate includes overlying applications of groundwater) from its permitting system provides another reason to doubt the prospects of full integration of administration under a Board permitting system.[23] For these practical reasons, I suggest that efforts at improving management of groundwater be directed elsewhere than at legislation to enlarge the Board's permitting jurisdiction over what is now called percolating groundwater.

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[19] Discussed in text following note 158, *infra*.

[20] D. 1589 (1982), Chorro and Morro Creeks.

[21] Pilarcitos Creek, San Mateo County, SWRCB letter of Jan. 9, 2001 (363:CLC:262.0(41-08-03)), at 2. Earlier, the Board refused jurisdiction of a well within 18 feet of a creek pumping tributary water, because the groundwater was seeping, not flowing with the stream. It told the protestant it would have to go to court to protect its stream rights against the pumping. Decision A. 6017, D. 225 (1929) (Metcalf Creek, San Bernardino County).

[22] Nebraska, Oregon, and Colorado, discussed in text following note 250, *infra*, offer a variety of promising examples.

[23] See note 264 and Part VI, *infra*.

Instead, I suggest a three-prong approach: (1) Improvement of the existing method for implementing Water Code § 1200, along the lines proposed in this Report; (2) Active use by the Board of its existing jurisdiction under Water Code § 275 to deal with waste, unreasonable use, unreasonable methods of use, and implementation of the public trust, which offers considerable authority to protect surface resources from groundwater diversions;[24] and (3) Additional attention to basin-wide management, using as a model the more successful managed Southern California basins.[25] Comprehensive basin management comprehends not only regulation of groundwater and surface water, but other techniques that are becoming increasingly important, such as conjunctive use, control of subsidence and saltwater intrusion, aquifer quality control, pump taxes or other fees to limit use and support importation of new supplies, etc. While recognizing the difficulty and cost of settling rights within an entire basin, the successful precedents established in some California basins seem to offer the best hope for achieving genuine comprehensive management in this State, taking account of California's historic experience with efforts at groundwater law reform.

6. Can quantifiable criteria be established to implement the legal test? What are the quantifiable criteria?

Perhaps. As was noted above, and will be explained in detail in the body of the Report, the legislative purpose underlying the subterranean stream language of Water Code §1200 was to protect the surface stream permitting jurisdiction from subversion by those who might directly benefit from the stream without having to obtain a permit like other surface diverters, while not subjecting all groundwater, or even all tributary groundwater, to the permitting system they were establishing. The legislative goal was to pose the question, when should a well be treated as essentially a subterranean component of a surface stream; that is, which wells are appreciably and directly (both in place and time) impacting the surface stream?[26] That is not a question technical experts can answer, though experts can tell us what we are likely to include or exclude within any line that we draw in an effort to be true to the legislative intent.

In an effort to find workable criteria that would approximate the legislative goal as closely as

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[24] See, however, note 287, *infra.*

[25] See generally William Blomquist, Dividing the Waters: Governing Groundwater in Southern California (1992).

[26] Because I conclude that this was the legislative intent, the so-called "bed and banks" test of jurisdiction is inappropriate, nor can legislative intent be implemented by efforts to define what constitutes a "definite channel[]," or when groundwater water is "flowing" through such a channel, notwithstanding the literal language of the statute. It should be emphasized that the literal terms of a statute sometimes simply do not describe legislative intent. See *Andrus v. Charlestone Stone Products Co.,* 436 U.S. 604 (1978) (holding that groundwater is not a "valuable mineral" within the meaning of the General Mining Law of 1872, 30 U.S.C. § 22).

possible, experts on the Technical Advisory Committee were consulted. The following does not represent their recommendations, either individually or collectively. Indeed, there was no single view taken by the Committee, which is perhaps a reflection of the difficulty in this context of sorting out technical from interpretive and policy perspectives.

It may well be that no shorthand criteria will prove generally applicable in a satisfactory manner. Technical Advisory Committee members often emphasized how various stream conditions can be from place to place, and from season to season; and how much difference it makes whether there are few or many wells in an area, etc. As one member put it, any simple test must confront the fact that "there is a significant problem in studying surface water-groundwater interactions because the evidence is not readily visible, the hydraulics are complex and dynamic, the impacts can be felt over a broad area with no single point of diversion from the stream, and because of the time delay between pumping and impact."[27]

What follows – with all due cautions – are criteria I suggest for the use of presumptions to assist in determining jurisdiction.[28] No doubt they will benefit from refinements based on experience, and from adaptations reflecting conditions in differing river systems.[29] They are not entirely quantitative, in particular the terms such as "thickness" or "substantial" used below. The purpose of these terms is to provide guidance to the Board as it seeks to implement the legislative will. It may find, based on its experience, or with further technical assistance, that in some river systems or areas it can appropriately utilize a numerical value as a guide, and thus evolve toward a more fully quantitative test of presumptive jurisdiction.[30] Ultimately, however, as noted above, and as will be discussed more fully in the body of the Report, the legislative purpose was to protect its permitting authority over surface stream waters from subversion, that is, to identify those

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[27] Memo from Kit H. Custis, DOC-Division of Mines and Geology, Dec. 28, 2001, at 2.

[28] I received a number of helpful memos from Technical Advisory Committee Members, both suggesting how to determine certain measures (e.g., a stream recharge area), noting concerns with various suggested quantitative criteria, and offering alternative criteria. These memos are reprinted in Appendix E.

[29] The occurrence, movement, and availability of groundwater are all determined by the availability of a water supply and by the rock types that constitute the local geology. In California the available water supply from precipitation and surface runoff, and the geology vary considerably from place to place within the state. This variation in water supply and geology requires that any consideration of groundwater issues must include a detailed understanding of both the local water supply and the local geology. A technical approach used to determine the relationship between groundwater extraction and stream flow must be suitably designed to fit the local groundwater hydrology and the local geology.

[30] My assumption is that if the Board pursues this approach it will implement it through formal regulations, following appropriate public processes.

groundwater diversions that in some "substantial" way undermine that authority. No magic number can do that job.

1. A well 1,000 feet or less from a designated surface stream recharge area is presumptively within the Board's jurisdiction,[31] if either (a) a substantial percentage of the well's annual flow is extracted from the stream recharge area (determined by using the Jenkins method or some similar reproducible method); or (b) the well produces substantial stream depletion determined as of the period of the most critical flows of the stream system it impacts. The Board shall bear the burden of making these determinations.

2. If either (a) the well is screened below a clay layer of such thickness, and where conditions denote lateral continuity, indicating lack of well impact on the stream; or (b) the well does not create a measurable drawdown at the edge of the stream recharge area, indicating lack of hydraulic influence from the stream, the presumption of jurisdiction shall be rebutted. A party opposing a presumption of jurisdiction shall bear the burden of rebutting the presumption.

3. Whenever a well is found to be presumptively jurisdictional, any well owner may have individual pump tests performed to determine actual well impacts, for the purpose of rebutting any of the foregoing presumptions. Such tests shall be of reasonable duration and intensity. The costs of any such tests shall be borne by the party ordering the tests.

4. Whenever a well is found to be presumptively non-jurisdictional, the Board (within the scope of its ability under existing law to gather information)[32] or any protestant may have individual pump tests performed to determine actual well impacts, for the purpose of rebutting any of the foregoing presumptions. Such tests shall be of reasonable duration and intensity. The costs of any such tests shall be borne by the party ordering the tests.

5. Following any such tests, and after considering the evidence before it, the Board shall make a final determination of jurisdiction.

6. The jurisdictional presumptions of ¶ 1, above, shall not apply in cases of

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[31] According to technical experts I consulted, in water table situations when setting observation wells in pump tests, drawdown is near zero at that distance, an experience that has been confirmed by modelling. Drawdown, or changes in the water table adjacent to the stream recharge area, is an indicator of hydraulic influence of the well's pumping.

[32] See note 287, *infra.*

long-standing hydrological disconnection.[33]

It should be noted that a determination that a well is jurisdictional does not mean that it is in fact adversely affecting uses of the surface stream. It only means that the well is sufficiently within the impact-orbit of the stream, that the Board has jurisdiction to consider well impacts in the same way that it considers impacts from proposed surface diversions.

PART I:

THE LEGAL BACKGROUND OF THE WATER COMMISSION ACT

1. The *Pomeroy* Case

If there is any point about which all sides in the debates over subterranean streams agree, it is that one has to look to the decision in *Los Angeles v. Pomeroy*[34] for legal guidance in deciding whether certain subsurface waters are, or are not, a subterranean stream under California law.[35] Before turning to that much-cited case, a few preliminary comments are in order. First, the *Pomeroy* decision is not a legally binding precedent. It was decided prior to the enactment of the governing statute[36] and its predecessor provision,[37] and therefore it does not represent the

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[33] See text at note 211, *infra*.

[34] 124 Cal. 597, 57 P. 585 (1899), writ of error dis. sub nom. *Hooker v. Los Angeles*, 188 U.S. 314, 23 S.Ct. 395, 47 L.Ed. 487 (1903).

[35] For example, in a statement at a public workshop held by the SWRCB on April 24, 2000, the Department of Water Resources stated that "the appropriate legal test to be applied in distinguishing between percolating water and subterranean streams was set forth by the California Supreme Court in *Los Angeles v. Pomeroy* more than 100 years ago." Statement of the Department of Water Resources, State Water Resources Control Board Workshop, 24 April 2000, at 1. See also *Id*., at 6: "In determining the legal classification of groundwater, the Board and its predecessors have relied on the California Supreme Court's 1899 decision in *Los Angeles v. Pomeroy* which established the distinction between subterranean streams and percolating groundwater."

[36] Water Code § 1200. See also §1221: "This article shall not be construed to authorize the board to regulate groundwater in any manner." As this provision makes clear, under the Water Code a "subterranean stream flowing through known and definite channels" is not legally

(continued...)

Supreme Court's interpretation of the legislature's intent in enacting the Water Commission Act in 1913. Second, it may well be that *Pomeroy* has been more often plucked for its quotable language than studied for its meaning and context (many commentators quote the language of its headnotes rather than the text of the opinion), and that at least some of what has been attributed to it over the years may be misleading. Third, any effort to ascertain the significance of *Pomeroy* to the 1913 law needs to take account of subsurface water law developments in the California Supreme Court between 1899 and 1913. Fourth, and finally, it is important to understand what the legislature was trying to do when it enacted the statutory provision in question, rather than just assuming it meant to codify the *Pomeroy* opinion. The following pages explore each of these matters.

Pomeroy was an eminent domain valuation case. In order to improve its municipal water supply system, Los Angeles had condemned a narrow strip of land comprising 315 acres, averaging some ¼ mile in width,[38] adjacent to the Los Angeles River just above where it passes through the narrows out of the San Fernando Valley, between the eastern extremity of the Cahuenga Mountains and the Verdugo hills. The question in the case was how to value the land taken. It was determined that Los Angeles had a paramount pueblo right to the water of the Los Angeles River. If the water beneath the condemned land was water of the Los Angeles River, the City was entitled to it and the condemnation award could not include the sales value of the water under the land for use elsewhere. Notably, the case had nothing to do with state regulatory jurisdiction over groundwater. The question was simply whether the water beneath the defendants' land was part of the Los Angeles River (Los Angeles wins), or whether it was part and parcel of the condemned land (defendants win).

The physical situation in the case was that the water of the Los Angeles River had its source in the mountains surrounding the San Fernando Valley, water that went underground into the alluvium of the Valley, and then by gravity flow found its way to the River. The Court acknowledged that all, or virtually all, the groundwater from the San Fernando Valley watershed found its way into the Los Angeles River. The defendants' land lay on both sides of the River, and the subsurface water beneath it was "in intimate contact" with the surface flow, and flowing in the same direction

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[36](...continued)
considered "groundwater".

[37] The original statute read: "Whenever the terms stream, stream system, lake or other body of water or water occurs in this act, such term shall be interpreted to refer only to surface water, and to subterranean streams flowing through known and definite channels." Statutes 1913, ch. 586, § 42 (Approved June 16, 1913, in effect August 10, 1913).

[38] 124 Cal., at 604, 606.

at a rate about 1/1000 the rate of the surface stream.[39] The Court held that the evidence sustained a finding that this subsurface flow was a subterranean stream. The bulk of the Court's opinion examines the question whether the law with respect to subterranean streams was correctly stated in the trial judge's instructions to the jury.

The narrow question in the case was whether the subsurface water in question was part of the surface stream of the Los Angeles River. For that reason the instructions speak to evidence relating to the question whether the water in question was an immediate subsurface element of the surface stream, that is, what is usually called underflow.[40] For example, the trial judge told the jury that if it found the water moving underground was "in the same general direction as the surface stream and in connection with it,"[41] then the water should be considered as part of the watercourse. That instruction, and its approval by the Supreme Court, does not decide one way or another whether the presence of subsurface water flowing in the same direction as the surface stream is a necessary element of any subterranean stream.[42] There is, however, at least one thing the Court does make clear. Nothing in the case is intended as a determination that all tributary

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[39] The court said the surface stream flowed 2-3 feet/second, and the subsurface flow was 14-17 miles/year. *Id*., at 617. This was probably a misstatement, see Statement of Dennis E. Williams, State Water Resources Control Board Workshop, 24 April 2000, transcript, at 58 ("...Pomeroy...estimated...groundwater was flowing...200 to 250 feet per day....Groundwater flows a few feet per day").

[40] In defining "underflow," reference is usually made to the elements mentioned in Instruction XVI in the *Pomeroy* decision: groundwater must be connected to the surface stream, flow in the same direction as the surface stream, be confined to a reasonably well-defined space, and be moving in a course. *Los Angeles v. Pomeroy*, 124 Cal., at 623-624.

[41] 124 Cal., at 624.

[42] *Pomeroy* quoted from Kinney's first edition, published in 1894, Clesson S. Kinney, A Treatise on the Law of Irrigation (1894), § 48, 69-70. Kinney had a rather formal and elaborate conception of subterranean streams, which he spelled out at length in his second edition (Clesson S. Kinney, A Treatise on the Law of Irrigation, vol. II (1912), at § 1161, pp. 2106-07). He included known and unknown, dependent and independent, subterranean streams. Underflow is the classic example of what he calls a known, dependent subterranean stream. While what Kinney had primarily in mind were simply the subsurface elements of more-or-less perennial surface streams, according to him a subterranean stream may also be entirely independent of any surface stream, so long as it ascertainably has the channel-like characteristics of surface streams. Such flows, which Kinney calls "independent [of surface] streams" may be identified by "the topographical features of the country." Kinney, 2d ed., at § 1165, at 2117. Kinney cites for this point *McClintock v. Hudson*, 141 Cal. 275, 74 P. 849 (1903).

underground water should be classified as a subterranean stream.[43]

Taken all in all, *Pomeroy* can be read broadly or narrowly, and neither reading can be said definitively to be right or wrong. The case itself deals only with the underflow of a gaining stream,[44] but it purports to set out more generally "the proper definition of a subterranean stream ", which it does by quoting from Clesson Kinney's treatise on the law of irrigation.[45] In so doing, it employs terms that are capable of variable interpretations, but which the Court either does not define, or defines ambiguously. For example, the Court does not indicate what sort of movement is required for subsurface water to be "flowing," a matter of some importance since virtually all groundwater is in motion to some extent. It says a channel must be "defined," and defined means

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[43] 124 Cal., at 631-32. As the issue is sometimes raised whether the legal definition of a subterranean stream might embrace the whole of the Central Valley or any other broad alluvial valley enclosed by mountains and thus arguably having a bed and banks, the instructions in *Pomeroy* are striking: Having just described a "watercourse," as above, the trial judge goes on to say that "[w]ater moving by force of gravity in a valley or basin of wide extent,...and moving generally through the whole or through a large portion of the basin...composed of alluvial or other deposit lying throughout the entire basin...do not constitute a watercourse...." *Id*., at 627. The Supreme Court underlines this point, noting that the trial judge "was not giving, or intending to give, a definition which would make the whole San Fernando basin a subterranean stream. The instructions...are applicable...exclusively to the comparatively narrow outlet of the valley...between the rocky and comparatively impervious mountain sides on either hand... [including] water moving in a definite direction...[and] sides and bed to the channel in which it is moving..." *Id*., at 631-32. Well before *Pomeroy*, California court cases had already decided to reject integrated management of surface and groundwater, even where knowledge of the hydrological impact was clear and undisputed, *Gould v. Eaton*, 111 Cal. 639, 645, 44 P. 319 (1896), and despite a view that such a rule was not required by precedent, and was unwise. *Southern Pacific Railroad Co. v. Daffier*, 95 Cal. 615, 619-20, 30 P. 783 (1892). Explicit reference to these precedents in *Pomeroy* makes clear that the *Pomeroy* Court was not seeking to use the subterranean stream category to bring about integration of surface rights with uses of tributary groundwater.

[44] There seem to be no early cases finding a subterranean stream that involved anything other than underflow. For example, only a few months after the *Pomeroy* decision, the Court held that the subterranean flow in the bed of the San Gabriel River was underflow constituting a subterranean stream, and not percolating water that belonged to the owner of the soil. *Vineland Irrigation Dist. v. Azusa Irrigating Co.*, 126 Cal. 486, 494, 58 P. 1057 (1899).

[45] See note 42, *supra*.

"contracted and bounded,"[46] but it does not further define those terms. Whatever contracted and bounded means, the Court acknowledged that in the *Pomeroy* case the "contracted and bounded" area was as much as two and a half miles in width,[47] which is hardly what most people would think of as a contracted channel. Moreover, one is left unsure whether it is essential to the decision that within such a channel "there was a subsurface flow corresponding with the surface flow...."[48] If so, that would significantly narrow the potential for a broad area of an alluvial valley to qualify as a bounded and contracted channel. As to the "sides and bed" to the channel,[49] the Court describes them as "comparatively impervious,"[50] giving no further definition to that characterization.

The plain fact is that while the outcome in *Pomeroy,* in favor of Los Angeles, made good sense, the decision's legal effort to define a part of the groundwater continuum as a "subterranean stream" was both a hydrogeological and a public policy fiasco. Virtually everyone acknowledges this. What is less often noted is that the *Pomeroy* test was soon abandoned by the California Supreme Court. In fact, it is almost certainly the case that the *Pomeroy* court itself realized that the subterranean stream category it had fashioned was an unfit tool for water management. After all, the judges in the *Pomeroy* case were perfectly well aware that the water in the Los Angeles River, and its underflow, and all the rest of the surface and subsurface water in the San Fernando Valley, was part of single, continuous system. The *Pomeroy* Court acknowledged that fact explicitly. It knew full well that the "percolating" water outside of the acreage in the case was on its way to those lands where it would be magically transformed into "subterranean stream" water. Why, then, did it write the opinion it did? After all, unlike today's Board and courts, it had no subterranean stream language in a statute that it was bound to interpret and implement. It was making law in the common law tradition.

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[46] 124 Cal., at 633.

[47] *Id.*, at 632.

[48] *Id.*, at 634.

[49] *Id*., at 632.

[50] *Ibid.* Despite the common use of the word "impermeability" in discussions of the *Pomeroy* case rule, neither the instructions, nor the Supreme Court opinion uses that word. The Supreme Court, attributes to the trial court a standard of "a well-defined channel with <u>impervious</u> sides and banks" *Id*., at 631 (emphasis added), though the word "impervious" never appears in the trial court's instructions. The trial court said only that the sides and banks "may consist of any material which has the effect of confining the waters within circumscribed limits." *Id.*, at 623 (Instruction XV). In any event, in the very next paragraph the Supreme Court describes the channel as being the "comparatively impervious mountain sides on either hand." *Id*., at 632. See note 146, *infra*.

2. The *Pomeroy* Case in its Historical Context

The traditional common law definition of subterranean streams was very narrow and essentially limited to flows in limestone regions.[51] Why didn't the Court in *Pomeroy* leave it at that, and instead adopt a common sense test based on whether the water in question was tributary to the surface river, and whether its pumping would adversely affect the rights Los Angeles held in the river? That would have been a straightforward, hydrologically and legally rational approach, and would have avoided the need to wrestle with the obviously unwieldy concept of a "subterranean stream."

We now know the answer. It was provided a few years later by the trial judge in *Pomeroy*, Lucien Shaw. Shaw subsequently became a Justice of the California Supreme Court, and wrote several important groundwater opinions, including the decision in *Katz v. Walkinshaw.*[52] The explanation is ironic in the extreme, because the justification for what the Court did in *Pomeroy*, and for the rule it fashioned – which still dominates California groundwater law a century later – was repudiated by the California Supreme Court in 1903. Why did the Court do what it did, and what happened next? The answer is fascinating.

In 1899, when *Pomeroy* was decided, it was still widely believed that the common law doctrine of absolute ownership was the law governing groundwater in California.[53] Under that doctrine, a landowner could pump and bear no responsibility for the impact on other pumpers, however great the damage to them, so long as he was not actuated by malice.[54] Indeed, the trial judge in *Pomeroy* drew on the decision in *Hanson v. McCue*[55] in his instructions, a California case that cited absolute ownership as the governing rule for groundwater. If that was the law, then a landowner overlying such water, so long as not actuated by malice, could pump and use the water without regard to its impact on others. Under the rule stated in the *Hanson* case in 1871, only if the landowner was pumping from a subterranean stream could he be restrained from harming

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[51] The conventional cases spoke of those genuine underground flows "in limestone regions." And the courts recognized that "[u]nderground currents of such a description are exceptional in their nature....." *Haldeman et al v. Bruckhart*, 45 Pa. 514, 518 (1863).

[52] 141 Cal. 116, 74 P. 766 (1903).

[53] *See City of San Bernardino v. City of Riverside*, 186 Cal. 7, 14, 198 P. 784 (1921).

[54] The English common law rule for groundwater is generally traced back to the 1843 decision in *Acton v. Blundell* 12 M. & W. 324 (Meeson and Welsby), reprinted in CLII The English Reports 1223 (Exchequer Division VIII, 1915). There was recognized a subterranean stream exception to this rule, *Chasemore v. Richards*, 7 H.L. Cas. 349, 1 Engl. Rul. Cas. 729, 754 (1859), but the presence of such streams was considered quite exceptional.

[55] 42 Cal. 303, 10 Am.Rep. 299 (1871).

another who had a right to the water with which his pumping interfered. The *Hanson* case seems to be the first California decision to use the sort of formulation that appeared in *Pomeroy* and then later showed up in California statutory law: "a subterranean stream of a defined character, and flowing in a defined channel".[56]

Under the absolute ownership legal rule articulated in the *Hanson* case, if the water under the defendants' land in *Pomeroy* was percolating groundwater, the landowner could pump it no matter that it was draining water from the Los Angeles River. If absolute ownership was the law in California, it was essential to determine if the water in question was, or was not, percolating groundwater. Only if it was not, and was instead "subterranean stream" water, could Los Angeles be secure in its rights in the Los Angeles River. The assumption that absolute ownership was the law governing groundwater is thus what created the need for a subterranean stream doctrine.[57] The irony of *Pomeroy* is that absolute ownership wasn't the law in California after all.

Though the *Pomeroy* Court understood the hydrological realities in the case before it, it accepted the premise that underlay Judge Shaw's instructions, which was that percolating groundwater was subject to the absolute ownership rule. On that premise, either Los Angeles had to lose a case that the Court undoubtedly believed that the city deserved to win, or the Court had to look to a legal theory that solved the immediate problem before it, but created a hydrologically untenable distinction among groundwater at different stages of its voyage down through the San Fernando Valley. The *Pomeroy* Court chose to decide in favor of a result that protected Los Angeles' treasury at the expense of a coherent legal theory. Since *Pomeroy* did not actually involve a dispute over water, it left to another day the question how much protection Los Angeles would be given against pumpers generally in the San Fernando Valley, that is, how much tributary groundwater would be found to be "subterranean stream" water.

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[56] 42 Cal., at 308. It is perhaps worth noting that in its characterization of subterranean streams, the Court in *Hanson* seems to have had in mind something much more like a true river underground: "Underground currents of water... are known to exist in considerable volume, particularly in limestone regions." *Ibid*. But "limestone in California is insignificant as a water-bearing formation." California's Ground Water, Dept. of Water Resources Bulletin No. 118 (Sept. 1975), at 15. "[D]efinite underground streams are few and of rare occurrence," Samuel C. Wiel, II Water Rights in the Western States (3d ed., 1911), § 1077, at 1011-12.

[57] To be sure, any jurisdiction that had separate legal regimes for groundwater and surface water (even if absolute ownership was not the groundwater rule), had to have some way to draw a line between what was groundwater and what was surface water. It was early recognized that some water, though physically beneath the surface of the earth, was functionally so much part and parcel of the surface stream that it was prudent, not to say essential, to manage it integrally with the surface stream. But, as we shall see, that did not mean one needed the artifice of a "subterranean stream" doctrine such as that fashioned by Kinney.

3. Doing the Job Pomeroy Failed to Do: *Katz v. Walkinshaw* and *Los Angeles v. Hunter*

Only four years after the *Pomeroy* decision, a far more famous case was decided by the California Supreme Court, *Katz v. Walkinshaw.*[58] The facts were simple enough. Plaintiff was pumping groundwater and using it on his overlying land. Defendant was pumping groundwater from under his nearby land, and taking it off the overlying land for use. Plaintiff claimed that defendant's pumping dried up his wells, and that he was entitled to relief. The defendant asserted that California followed the absolute ownership doctrine of groundwater law, that "each landowner owns absolutely the percolating waters in his land, with the right to extract, sell, and dispose of them as he chooses, regardless of the results to his neighbor...."[59] Plaintiff denied that absolute ownership was the law in California, but he had a second theory as well. He also claimed that they were both pumping from an underground stream, and so, in any event the law governing percolating groundwater, even if it was absolute ownership, didn't apply.

What makes the case especially significant for our purposes is that the Court found it need not decide whether the water in question was a subterranean stream or percolating groundwater, because absolute ownership wasn't the law of percolating groundwater in California. Thus the defendant would lose whether the water in question was percolating water or the water of a subterranean stream. Of course everyone today knows that *Katz v. Walkinshaw* is the case that declared the correlative rights doctrine as the law governing competing groundwater pumpers.[60] What is not so well remembered is that the decision broke sharply with tradition and precedent, rejecting claims that absolute ownership must be the law of percolating groundwater because that was the common law rule, because California had adopted the common law, and because a previous Supreme Court decision (*Hanson v. McCue*) had said it was the law (though in dictum). The rejection of the common law absolute ownership rule in *Katz* was at the time considered "novel and of the utmost importance"[61] and the case was decided by the Court upon rehearing, following exhaustive briefing.

The relevance of the groundbreaking decision in *Katz* is that it made the doctrinal gymnastics of the *Pomeroy* case unnecessary, and reduced the subterranean stream category to a virtual

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[58] 141 Cal. 116, 74 P. 766 (1903).

[59] 141 Cal., at 121.

[60] Perhaps not everyone. One still finds people quoting the absolute ownership language that appeared in Instruction XII in *Pomeroy*, which the Supreme Court expressly disavowed as the law in *Katz v. Walkinshaw*, 141 Cal., at 132. See letter to State Water Resources Control Board from William H. Baber III, for the Subterranean Streams...Workshop (April 18, 2000), at 2.

[61] 141 Cal., at 120.

irrelevance. If landowners pumping groundwater – even percolating groundwater – must respect the rights of other water-rights holders whom their pumping injures, then it makes no difference in a case like *Pomeroy* whether the water in question was a subterranean stream or percolating water. Since Los Angeles had a paramount right to the waters of the Los Angeles River, any diversion of groundwater that impaired that right would be a violation of Los Angeles' right under the rule of *Katz v. Walkinshaw.*

Essentially what *Katz* did was to determine that the resolution of conflict between contending water users should be based on the impact of one use upon another, rather than upon some *ex-ante* classification of the source. This change was calculated to bring the legal rules into congruence with the hydrological realities; and in doing so to eliminate the legal fiction that groundwater movement was unknowable in favor of case-specific factual inquiries: was the water's movement known or practically determinable? If so, what were the impacts? And if there were impacts, were they legally redressable?

If the *Katz* decision had preceded *Pomeroy*, the subterranean stream concept in California law might well have faded into the mists of legal history. As the Court put it in *Katz*, "averment[s] that ...water constitute[s] part of an underground stream may be regarded as surplusage."[62] That statement is especially notable because the author of the *Katz* opinion was none other than Lucien Shaw, who had been the trial court judge in *Pomeroy*. It was Judge Shaw's instructions that were the subject of the decision in *Pomeroy*. And it was Shaw who relied on the absolute ownership doctrine from *Hanson v. McCue* in his instructions,[63] which may have been the very thing that led the *Pomeroy* Court to rely on the subterranean stream finding, and to equivocate about the status of all the rest of the percolating, tributary groundwater in the San Fernando Valley. Yet four years later it was this same Lucien Shaw, now a Justice (and later Chief Justice) of the California Supreme Court, who wrote the opinion in *Katz v. Walkinshaw* stating that the "subterranean stream" category was effectively "surplusage." Indeed, in a law review article he wrote many years later, Shaw restated the holding of *Pomeroy* in terms that brought it into line with *Katz* and subsequent decisions. That case, he said, stood for the proposition that "persons having rights in a natural stream were threatened with injury by extraction of the percolating [!] water which sustained and supported the stream in its flow."[64]

Why, then, did Shaw give the instruction he did in *Pomeroy*, which made the distinction between a subterranean stream and percolating ground water so important? Shaw gave the explanation in his opinion in *Katz.* Speaking of himself, he said: "Inasmuch as the writer of this opinion [in *Katz*] was also the writer of the instruction under consideration [in *Pomeroy*], it may be proper to say

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[62] *Id*., at 121.

[63] Instruction No. XII, at 124 Cal., at 622 ("absolute owners").

[64] Lucien Shaw, The Development of the Law of Waters in the West, 10 Cal. L. Rev. 443, 458 (1922) (exclamation added).

that he did not give the instruction because he approved that part of it restating the doctrine of *Hanson v. McCue*. The instruction was given because [it] had been requested by the appellants in the case, and [Los Angeles] consented that that part should be given in substance rather than take the chances of a reversal of the case, should the supreme court hold its refusal to be erroneous [that is, should the supreme court approve the absolute ownership doctrine]."[65] In short, Los Angeles was worried that absolute ownership might be held to be the law of percolating groundwater in California, and if it were, then Los Angeles could only prevail if the water under the land being condemned was not percolating groundwater, but was part of a subterranean stream. To be on the safe side, it agreed to the instruction, and the *Pomeroy* Court, unwilling or unready to repudiate the absolute ownership doctrine, assumed its validity, and was thus obliged to draw the subterranean stream/percolating groundwater distinction.

It wasn't until Shaw's opinion in *Katz* that the Court decisively repudiated absolute ownership. Any doubt that the subterranean stream issue was no longer considered significant to groundwater litigation in California was removed in subsequent Supreme Court decisions. In a case decided less than a month after *Katz,* Justice Shaw wrote: "The case of *Katz v. Walkinshaw*...establishes a rule with respect to waters percolating in the soil, which makes it to a large extent immaterial whether the waters in this land were or were not a part of an underground stream, provided the fact be established that their extraction from the ground diminished to that extent, or to some substantial extent, the waters flowing in the stream."[66] Then in 1909, in another groundwater case, the Court said: "There is no rational ground for any distinction between such percolating waters and the waters in the gravels immediately beneath and directly supporting the surface flow, and no reason for applying a different rule to the two classes,...if, indeed, the two classes can be distinguished at all."[67]

That same year the Court decided *City of Los Angeles v. Hunter*.[68] *Hunter* dealt with the question raised but left in limbo in *Pomeroy*: What right did landowners in the San Fernando Valley further

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[65] 141 Cal., at 131.

[66] *McClintock v. Hudson,* 141 Cal. 275, 281, 74 P. 849 (1903). The Court made this statement in response to a claim by a surface riparian user that a neighboring landowner was unlawfully interfering with the plaintiff's right by pumping and taking water offsite for use, because the groundwater being pumped was a "subterranean stream" drawing from the surface stream.

[67] *Hudson v. Dailey*, 156 Cal. 617, 628, 105 P. 748 (1909). The category had not wholly disappeared, it seems. See *Arroyo Ditch & Water Co. v. Baldwin*, 155 Cal. 280, 100 P. 874 (1909), though the *Arroyo Ditch* decision's use of the subterranean stream category is at odds with the great weight of California Supreme Court opinions of that era.

[68] 156 Cal. 603, 105 P. 755. Notably the decision in the *Hunter* case was written by Justice Frederick W. Henshaw, who participated in both *Pomeroy* and *Katz.*

from the stream than those in *Pomeroy* (though still within the several-miles-wide banks area identified in *Pomeroy*), have to pump tributary groundwater that diminished flows in the Los Angeles River? The facts were these: Los Angeles brought suit against owners of some 5,000 acres in the San Fernando Valley who were pumping water asserted to be tributary to the Los Angeles River, to quiet title to its paramount right to use of the waters of the River. The principal claim of the defendants was "[t]hat the waters are strictly percolating waters, not belonging to the subterranean flow of the stream, but if concededly on the way to join and swell such flow, still percolating waters, to the use of which, as owners of the land, they have an absolute indefeasible right."[69]

The Court rejected this claim, holding it was immaterial whether the waters in question were considered percolating or not. Since "[t]hese waters percolate...in the sense that they form a vast mass of water confined in a basin filled with detritus, always slowly moving downward to the outlet [which is the Los Angeles River]," [70] then insofar as Los Angeles has paramount rights to the use of all the waters of the River, "none of these so-called percolating waters may be withdrawn to the invasion and injury of such right."[71] It was held unnecessary, as in *Katz* and *McClintock*, to classify the water either as percolating or as a subterranean stream.

When Kinney, on whose 1894 treatise the *Pomeroy* Court had relied, published his second edition in 1912 he acknowledged the change that had occurred. Citing the more recent California cases, such as *Los Angeles v. Hunter*, he explained that only a limited class of percolating waters, "diffused percolating waters," "are considered as a part of the very soil itself and belong to the realty in which they are found." Picking up the test of *Hunter*, he explained that "these [percolating] waters are those which, as far as known, do not contribute or <u>are not tributary</u> to the flow of any definite stream or body of surface or subterranean waters."[72] Though unwilling to let loose of the old terminology, Kinney acknowledged that the groundwater question was becoming a matter of evidence based on the ability to determine hydrological relationships, rather than a formal classification based on the geography of the water's movement:[73]

> It is plain to see that, as the years go by, the class of diffused percolating waters will be growing smaller and smaller. This is due the scientific investigations of the movements of percolating waters through the ground, and also to the discoveries which are constantly

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[69] *Id*., at 605.

[70] *Id*., at 607.

[71] *Id*., at 608.

[72] Clesson S. Kinney, A Treatise on the Law of Irrigation, vol. II (1912). See 2 Kinney § 1188, pp. 2152 (emphasis added).

[73] *Id.*, at 2153.

> being made that certain waters which were once considered mere percolations flowed in defined subterranean channels which have become known....In time, if the courts are as active in establishing new rules governing subterranean waters within the next few years as they have been in the past ten years, which rules have but kept pace with the scientific investigations upon the subject, this class of subterranean waters will pass from the class of those flowing in unknown courses to those flowing in known courses, and the "secret incomprehensible influences," and "practical uncertainties" will become comprehensible influences and practical certainties.

The newer California judicial approach that Kinney acknowledged, which focused on whether groundwater was known to be contributing to a surface stream, as the line of demarcation, continued into modern times. In 1943, in *Los Angeles v. Glendale*,[74] the Supreme Court stated unequivocally that Los Angeles' pueblo right in the Los Angeles River extended to all the groundwater in the San Fernando Valley upon which the flow of the River depended; and it made clear, by citing *Hunter* as authority, that it did not view that case as limited to groundwater in the southeast corner of the Valley within the bed and banks area described by *Pomeroy*. The Court said:[75]

> It has long been established that as successor to the pueblo of Los Angeles, the city of Los Angeles has a right, superior to that of a riparian or an appropriator, to satisfy its needs from the waters of the Los Angeles River [omitting citations]. Because the flow of the river is dependent on the supply of water in the San Fernando Valley, it has also been held that the pueblo right includes a prior right to all of the waters in the basin. (Los Angeles v. Hunter, 156 Cal. 603 [105 P. 755]).

In 1975, in *Los Angeles v. San Fernando*,[76] the Supreme Court reaffirmed *Glendale* explicitly. But it did something else as well. It made clear that the scope of Los Angeles' pueblo right grew out of the scope of the waters of the Los Angeles River, and that the scope of the Los Angeles River was determined by the extent of the groundwater that was tributary to the River. In other words, for determining pueblo rights, the Los Angeles River consists of its surface flow and the groundwater tributary to it. The Court decided that the subterranean extent of the Los Angeles River is measured by the tributary nature of the groundwater in the San Fernando Valley, the very thing that Pomeroy said it was *not* deciding. Revealingly, both the *Glendale* and *San Fernando* cases cite *Hunter*, not *Pomeroy*, as authority for the expansive view of the subterranean extent of

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[74] 23 Cal.2d 68, 142 P.2d 289 (1943).

[75] *Id.*, at 73 (emphasis added).

[76] 14 Cal.3d 199, 537 P.2d 1250 (1975).

the Los Angeles River.[77] It is important in this respect to note that *Glendale* and *San Fernando* do *not* simply say that pueblo rights extend to groundwater beneath the pueblo boundaries. The Court conceived of the pueblo right as including within the surface stream its tributary groundwater – the "waters of the Los Angeles River and the waters supplying it."[78] The cases are about "rights in the Los Angeles River,"[79] "the river to which the pueblo right attaches."[80] That, of course, is a fundamentally different view from that inherent in the 1894 Kinney classification of waters, and in the boundary that the Court in *Pomeroy* was at pains to identify, when it said that its decision was not meant to embrace the entire San Fernando Valley.

But – and this is the most important "but" in this Report – as it turned out, the legislation upon which Water Code § 1200 rests did not follow in the path that Justice Shaw and the California Supreme Court's subsequent pueblo rights cases set out for it. Instead, by a circuitous path, the legislature was led back to the distinction and the formulation that the *Pomeroy* Court had used. How that happened is the subject of the next section of this Report.

PART II:

THE STATUTORY RESPONSE

1. The Water Commission Act of 1913

Prior to 1911, all appropriation rights to surface water were acquired under sections 1410 to 1422 of the Civil Code, which essentially was a law requiring filing of a notice of appropriation. Failure to comply made appropriators vulnerable to subsequent claimants who had complied. There was no state administration of water rights. Groundwater was simply pumped by overlying landowners without any state administration or regulation. In 1911 the legislature established a State Conservation Commission to make a study of the need of laws for the preservation and control of the use of the natural resources of the State (one of which was water), to report to the Governor and to recommend measures to the legislature.[81] George C. Pardee, a progressive Republican,

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[77] 23 Cal.2d, at 73. See also 14 Cal.3d, at 248.

[78] 14 Cal.3d, at 212.

[79] *Id.*, at 241, n. 23.

[80] *Id.*, at 251.

[81] Ch. 408, Statutes of 1911 (April 8, 1911). At the same time the legislature established a State Board of Control (the next year its work was taken over by the State Water Commission), (continued...)

who had been Governor of California in 1903-07, was appointed chairman of the Commission. The other two members were Francis Cuttle and J.P. Baumgartner. The Report of the Commission, transmitted on January 1, 1913,[82] and its legislative proposal for water, was the source for the bill that ultimately became the Water Commission Act. Section 42 of that Act is, with very slight changes, today's Water Code § 1200. The inspiration for the enactment of a comprehensive water law was an extraordinary document, Report of Irrigation Investigations in California, done under the direction of Elwood Mead.[83]

The original legislative draft prepared by the Conservation Commission explicitly provided a permit system both for surface and for underground waters, and the two categories were dealt with in separate, similar[84] sections of the draft bill. Just as the bill recognized riparian uses of surface water, and did not subject them to permitting, so it recognized the right of overlying landowners to use underground water on overlying land without permitting. But it did require those seeking either surface stream appropriations, or groundwater appropriations for use off the overlying land, to obtain appropriation permits. In addition, the bill specifically granted the Commission authority to protect those with surface stream rights against off-tract underground pumpers "where it is claimed that such development and carrying away of water is diminishing the supply of water of such riparian owner or appropriator of water from the streams of water or underground water."[85]

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[81](...continued)
which had authority to accept applications for the use of water for power purposes, which could grant term licenses for 25 (later extended to 40) years. Ch. 41, Extra Session, 39th Legislature (Jan. 2, 1912). See Report of the State Water Commission of California, Published April 1, 1914 (Sacramento, State Printing Office, 1914), at 7.

[82] Report of the Conservation Commission of the State of California, January 1, 1913, Transmitted to the Governor and the Legislature January 1, 1913 (1912), at 19-42. No official version of the Commission's legislative recommendation is extant. A version found in the Charles David Marx Papers, at Stanford University, SC 161, Series VIII, Box 1, and reproduced here as Appendix A, is undoubtedly the Commission's bill, as explained more fully below.

[83] Bulletin No. 100, U.S. Department of Agriculture, Report of Irrigation Investigations in California (Washington, D.C., Government Printing Office, 1901). Elwood Mead, a pioneer in western water law, was the first state engineer of Wyoming, and later Commissioner of the Federal Bureau of Reclamation.

[84] There was some odd lack of parallelism. While the bill required registration of proposed riparian uses and abolished unused surface riparian rights after four years of nonuse, no such limitations were imposed on overlying uses of groundwater.

[85] Sec. 17.

In short, the Commission bill sought to get rid of distinctions between groundwater and surface water legal regimes, and to institute integrated, parallel systems. But because it still recognized underground water and surface water as distinct categories, it had not really rid itself of the question, what is groundwater, and what is surface water, despite its attempt to do so.[86] Section 8 of the bill, which provided "Underground water, for the purpose of this act, is defined as any water that occurs or is found beneath the surface of the ground," generated a lengthy and fascinating discussion in hearings held by the Commission. The predictable question was, if a surface stream moves underground for a certain distance, and then again rises to the surface, may one put a pump in the below-surface area and then be subject to the underground water provisions of the act, rather than the surface water provisions?[87] The Commission debated the question, is there water that "occurs or is found beneath the ground" that should not be treated as underground water, but as surface water?

The following excerpts from a hearing held on the Commission's original bill on May 28, 1912, are exceptionally revealing of how those involved in the development of the 1913 legislation were thinking about the issue at the time:

The Chair of the Commission, former Governor George Pardee, was going through the Commission's draft bill section by section, and read out Section 8: "Underground water, for the purpose of this Act, is defined as any water that occurs or is found beneath the surface of the ground."

....

[86] Samuel Wiel, a prominent San Francisco attorney and writer on water law, was in active consultation with the Commission, and had suggested, unsuccessfully, a "consolidated" system. Wiel says that his "suggestions were not acted upon by the Commission and form no part of the bill presented to the legislature, nor of the statute passed." Samuel C. Wiel, A Short Code of Underground Water, 2 Cal. L. Rev. 25 (1914). Wiel's notion was that "[a] definite body of water upon the surface, and the underground water proximately connected therewith in natural occurrence, constitute a consolidated underground and surface water-supply" and that rights should "extend to the whole and every part of a consolidated surface and underground water-supply...without distinction between the surface part and the underground part." *Id.*, at 26.

[87] It is not clear what exactly the differences in result would have been, since in general the bill sought to integrate the two sources, but the bill seems to have anticipated at least one difference: Under § 17 of the bill, groundwater appropriators making off-tract uses are made subordinate to surface-stream riparians whose supply their appropriations diminish. However, there is nothing in the bill that makes surface-stream appropriators subordinate to overlying on-tract users of groundwater when the surface-stream appropriations diminish their supply, though groundwater appropriators appear to be thus subordinated under § 15(a).

MR. KEECH:[88]....The sub-surface stream is deemed to be part of the stream; one minute it is in the open and another minute it is below the surface. The vested rights in a stream under the riparian law is the stream consisting of the running open water on the surface and also of the sub-surface water in the same bed.
MR. BAUMGARTNER: As we have handled "Stream flow" in the Bill, does it interfere with the sub-surface stream?
MR. KEECH: You have handled "stream" so far under the term of riparian rights only, and the riparian rights include that sub-surface flow and is sustained by the courts, and sustained by constitutional provision. Now you propose to take out and destroy it as a stream flow and put in and classify underground water with sub-surface flow.
MR. Pardee: How would this do: [Underground water...is defined as any water that occurs or is found beneath the surface of the ground] outside limits of defined stream.
....
MR. CUTTLE: All I seek is to determine what is underground stream and what is percolating water.
MR. KEECH: ...This sub-surface flow is an all important matter and it is so radical a departure from the law that I do not think it would stand. I think you have attempted to incorporate riparian law in accordance with the decisions of the courts, but now you take that underground flow right out of the rule and class it with water with which it has never been classed; and since you provide for both kinds of water, why have you made that radical change?
MR. PARDEE: Put right at the end of the sentence "exterior to banks of streams." ["Underground water, for the purpose of this Act, is defined as any water that occurs or is found beneath the surface of the ground exterior to banks of streams."]

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[88] Hearing of May 28, 1912, 2 p.m., beginning at 8, see Appendix D, *infra*. Stenographic transcripts of these hearings were found in Oakland in the Pardee Home Museum Papers, Water Conservation, Box 29. They are attached in full here (including those portions that deal with matters other than groundwater) as Appendix D.

The cast of characters in the hearings is as follows: Pardee is the Chair of the Conservation Commission, and, as noted above, Francis Cuttle and J.P. Baumgartner were the other two Commission Members. E.E. Keech was a lawyer practicing in Santa Ana, who represented water users in San Bernardino, Riverside, and Los Angeles Counties. Samuel Wiel, as noted above, was a very prominent San Francisco lawyer and a prolific writer on water law. Frank H. Short of Fresno was a prominent water lawyer who represented Central Valley agricultural interests. Mr. Tait was probably C.E. Tait, who was senior irrigation engineer, in the office of public roads and rural engineering, at the U.S. Department of Agriculture. He was a member of a Commission that issued a report on the utilization of the Mojave River for irrigation in Victor Valley in 1917. I have not been able to identify Mr. Lane. He might have been Franklin K. Lane, who was Secretary of the Interior in President Wilson's Cabinet, and previously a water lawyer in San Francisco. However, Lane was a member of the Interstate Commerce Commission, and in D.C. from 1905-1913, when he became Interior Secretary.

> MR. KEECH: I should say [except] "Sub-stream flow." You have not defined stream flow, but nevertheless it is defined under the law. You have not defined stream, but that is a term known to the law. Either would be satisfactory to me.
> MR. PARDEE: You want it confined to the banks of a stream?
> MR. KEECH: Yes, that is all right.....
> [It was then suggested that confining sub-stream flow to the banks of the stream was too narrow a definition, narrower than the Court had already determined in *Los Angeles v. Pomeroy*].
> MR. KEECH: What would you say?
> MR. SHORT: I would say stream flow and nothing more.
> ...
> MR. TAIT: I would say just [...water that occurs or is found beneath the surface of the ground] "other than stream flow".
> MR. CUTTLE: Would not this difficulty crop up of determining what is underground stream flow or percolating water?
> MR. SHORT: You cannot get rid of this difficulty. The rights of one kind of water is of one nature, and of the other kind of water of another nature. You want to leave the stream unimpaired and call all the other kind of water underground water.
> ...
> MR. WIEL: I suggest this Bill have two or three chapters, underground water and stream flow, –and provide that no water that directly effects a surface flow shall be affected by this [underground] chapter....
> MR. SHORT: My suggestion would be that the Act, the general scope, should apply to all waters now unappropriated as stream flow, and to all underground waters other than stream flow. When you say that you have done the best you can.

It is clear from this colloquy that the men who drafted the Conservation Commission's bill understood that any line separating groundwater from surface water was a human construct made for some managerial purpose, rather than a line separating two distinct hydrological entities. Notably, no one made reference to the formalism of Kinney, or to traditional conceptions of "subterranean streams." They seem to have understood perfectly well that water was a continuum. They conceived their task as drawing a functionally useful, if hydraulically arbitrary, line at what was effectively part of the stream flow. Their purpose was to define what uses would come within the bill's provisions dealing with "underground water" (such as § 13), and which with "appropriators of waters from the streams" (such as § 17). As Samuel Wiel (the leading water law authority of his day, and a participant in the above-quoted colloquy), put it, for that purpose what was needed was a definition sufficient to protect streams against pumping that "directly effects a surface flow."[89]

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[89] Wiel personally opposed drawing any distinction between ground and surface water, though that was never the position of the Commission. In this same colloquy Wiel said, "I would

(continued...)

Both the Commission's original bill, and the above discussion, demonstrates that these water experts, as of 1913, did not at all think that groundwater was too mysterious in its ways to be subject to legal control. The commonly heard notion that people back then still believed groundwater was too occult and mysterious to be managed is simply wrong.[90] As we shall see shortly, the legislative reluctance to institute integrated management was fundamentally based on legal reservations, not technical or managerial ones.

By the time the Commission's bill was introduced in the Assembly some seven months later, it had been extensively revised.[91] Though we have the bills themselves, and the votes on various amendments, the full history of the legislation's development during the legislative session is lost (or at least has not yet been found), though we do have numerous newspaper reports on the bill's progress through the legislature. Most importantly, we have the bill originally drafted by the Commission, and a full transcript of the hearings (from which the above excerpts were taken) in which many – probably most – of the most influential figures participated. It appears that there was another somewhat modified version that appeared between the time of the Commission draft and the first introduced bill, and there is a law review commentary discussing it in some detail,[92] but the draft itself has not been found. From the commentary, it appears to have been very similar to the bill introduced in the Assembly. As can best be gleaned from the law review text, that draft contained nothing new or significant relating to groundwater.

No explicit evidence of authorship has been found as to any of the bill drafts or amendments, but an undated document supporting the law, written just prior to the time it was submitted to a public referendum in 1914, has been found among Governor Pardee's papers. That document says "This Water Commission Law was drawn by the State Conservation Commission, aided by a

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[89](...continued)
not make any distinction between stream flow and underground water, make no distinction whatever, but take water supply. If water supply is partially underground and partially on the surface, there is no reason why people should not enjoy it whether underground [or] in the stream. There should be a right in the supply regardless of whether underground or surface." pp. 12-13. To which Mr. Keech replied, that such a proposal "...is a departure from this Bill and is a radical construction." p. 13.

[90] The usual source for this belief is an 1850 Connecticut case, in which the court said groundwater influences "are so secret, changeable and uncontrollable, we cannot subject them to the regulation of law, nor build upon them a system of rules, as has been done with streams upon the surface." *Roath v. Driscoll*, 20 Conn. 533, 541 (1850).

[91] The original Commission bill, and the bill as first introduced, are set out in full as Appendices A and B-1.

[92] A.E. Chandler, The Water Bill Proposed by the Conservation Commission of California, 1 Cal. L. Rev. 148 (1913).

number of prominent attorneys, among whom may be mentioned Judge Curtis H. Lindley, of San Francisco; Judge Farraher, of Siskiyou; E.E. Keech, of Santa Ana." In Pardee's hand there is an insert at this point saying "Mention any others you may think of."[93]

Assembly Bill No. 642, was introduced on January 23, 1913, by Assemblyman W.A. Johnstone.[94] The bill seems to follow Wiel's advice given in the hearings (though not his more general groundwater proposals in his 1914 law review article).[95] The bill makes no distinction between surface water and ground water, but simply covers "water" generally. It establishes a permit system for the appropriation of all water which has never been appropriated or applied to riparian use,[96] recognizes existing appropriations, and abolishes unused riparian rights after five years from the time the bill is enacted.[97] In result this is not different in substance from what the original Commission bill sought to do, as it would have created an appropriation permit system for both groundwater and surface water, though unlike the original Commission draft, it did not take up groundwater and surface water in separate provisions. By creating a unified system of appropriation applicable to all water, the bill as introduced avoided the need to define or to distinguish surface water from underground water, the issue that had so troubled the Commission members and their advisors during the hearing quoted above. Section 42 of the introduced bill simply says "The word 'water' in this act shall be construed as embracing the term 'or use of water'; and the term 'or use of water' in this act shall be construed as embracing the word 'water'".

That approach did not last for long. The very first amendment to the bill, dated April 2, added the following sentence to Section 42: "Whenever the terms stream, stream system, lake or other body of water occurs in this act [and those were the operative terms for water in the bill], such term shall be interpreted to refer only to surface water." Surprisingly, this significant change from both

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[93] A copy of the letter is on file with Joseph Sax. A book by Franklin Hichborn, Story of the Session of the California Legislature of 1913 (San Francisco, Press of the James H. Barry Company, 1913), at 153, also says "Francis Cuttle...had much to do with the framing of the measure." (Hichborn covered the legislature for the Sacramento Bee).

[94] Johnstone became Chair of the State Water Commission in 1915, succeeding Professor Charles David Marx of Stanford University. Johnstone and Pardee knew each other, and some correspondence between them (though not on this subject) is among the Pardee papers.

[95] See note 86, *supra*.

[96] In what is probably an unintended omission, it does not explicitly recognize overlying on-tract uses of groundwater, the analogue of riparian rights on a stream. But the bill never mentions groundwater, underground water, or subsurface water in any form. It is simply implicitly incorporated in the overall definition of water.

[97] §§ 11, 34.

the Commission draft and the bill as introduced, sweeping away governance of groundwater, appears to have generated no controversy, and to have been acceptable to the supporters of the bill.[98] The most likely reason is that they had been persuaded that subjecting groundwater to the same permitting system as surface water exceeded the state's authority. And thereby hangs a most significant tale.[99]

While I have found nothing documenting the thinking of those who drafted the amendment, there is some highly revealing material in the Commission's hearings during the previous year, and no doubt those who participated in the Commission's hearings also participated in the development of the bill as it moved through the legislature. On the same day that the colloquy excerpted above took place, there was also a discussion of the scope of legislative permitting authority over groundwater. The Commission's discussion had moved on from § 8 to § 11 of the bill. That section, dealing with groundwater, provided:[100] "Owners of overlying land shall have the right to use such underground water on such overlying land only, and such use shall be for useful and beneficial purposes only, and may be had without appropriating the same or filing notice of appropriation." Section 13 said: "The right to appropriate underground water for use on other than overlying land may be acquired by filing application for appropriation of such underground water with the said Water Commission...and complying with all conditions required from appropriation of water from streams of water...." And § 27 of the bill gave the Water Commission broad discretion to impose conditions through adoption of rules and regulations that limited the extent and purposes for which appropriations could be made.

These provisions generated a lively discussion about the nature of a landowner's existing property right to use groundwater. All agreed that beneficial overlying uses should be recognized, and that any uses had to respect the rights of others, as *Katz v. Walkinshaw* had held. The question was whether the legislature had the authority to subject non-overlying uses to a discretionary permit system parallel to that which would apply to surface streams. The claim effectively was that there was an important legal difference between the status of surface streams, whose unappropriated water belonged to the public, and underground water in which – though subject to correlative rights – the overlying owner held a property interest. If there was a pre-existing property right

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[98] Hichborn, *supra* note 93, at 150, notes that amendments proposed by the Conservation Committee were adopted "without difficulty."

[99] One bit of evidence in support of the view that the concern was about the scope of state authority is that when this amendment was adopted, the title of the bill was also changed. A sentence was added to the beginning of the title saying "To Regulate the Use of Water Which Is Subject to Such Control by the State of California, and in That Behalf."

[100] During the hearing Governor Pardee suggested the following change: "Owners of overlying land shall have the right to use such underground water on such overlying land only, and such use shall be for useful and beneficial purposes only, provided such use is for domestic purposes only." Hearing, 2 p.m. (May 28, 1912), at 17.

(even though it was not the absolute ownership of the common law, and was correlative with other rights as per *Katz)*, then arguably the effort to give a Commission fully discretionary permitting authority – to deny a permit for some reason other than to protect another's water rights – was at odds with the landowner's property interest in groundwater beneath his land.

Wiel started the discussion, saying "[i]f you give somebody the right to appropriate water you assume the right to take it away from them."[101] And Frank Short added, "Here [in the bill] it says they cannot take water from land and put it upon other land. Now [under existing law], they have the unrestricted right to take water from any land and put it upon any other land...."[102] Then, following some further discussion of this point, Short made the following statement:[103]

> MR. SHORT: ... A man has as much right to extract water as coal[,] oil or any other part of the substance of this land, and the only limitation in the doing of that is he must not take it in such a way as to injure his neighbor. That is the settled right in property. Over the water percolating the ground he has the power the same as over other property; it is no more a jurisdiction over the underlying, percolating water than it is over any other substance in the ground. ...
>
> MR. LANE: ...The only question is, would it be unconstitutional as restricting the use of property, if it required the owner of lot A to get a permit before he could transport it to lot C. That goes to the constitutionality and not to the question of policy.[104]
>
> ...
>
> MR. PARDEE: Who owns the water underground?[105]
>
> MR. SHORT: The land owner.
>
> MR. PARDEE: The ownership of the corpus of the water?
>
> MR. SHORT: Sure, yes sir. When you say that something which is now permitted by law cannot be done, and do say that something different can be done in a different way, it seems to me the Legislature would have no authority to do that.
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> ...

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[101] Hearing, 2 p.m. (May 28, 1912), at 18.

[102] *Id.*, at 19.

[103] *Id.*, at 21.

[104] *Id.*, at 21-22.

[105] *Id.*, at 26-27.

MR. SHORT: If the law gives the right, as the law now is, we would not object to restriction possibly, but to say it is unlawful without appropriation to take water from overlying land to some other land, it would prohibit the use of underground water.

...

MR. SHORT: What we object to is that we cannot use water where we now have the right to its use, and this law would do away with a right that now exists.[106]

MR. CUTTLE: Write a section for that.

MR. SHORT: All right, I will do that.[107]

...

This discussion suggests that Short, who was an influential representative of Central Valley agricultural interests, had raised doubts in the minds of the legislation's supporters about the constitutionality of imposing a discretionary permit system on the use of groundwater on non-overlying land.[108] Of course, the Commission had never intended to require a permit for use on

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[106] *Id.*, at 28-29.

[107] *Id.*, at 29. While no documentation of Short as a draftsman has been found, Short did write a letter to the Commission several months after the hearings, in which he again indicated his concern about the underground water provisions: "What I especially wish to impress, however, is that there appears to be no sufficient or controlling reason for attempting to change the laws with respect to subterranean or underground waters at all, as at present decided, it is perfectly well understood, clearly definite and sufficient for all purposes...and I wholly fail to see that anything further is desirable. I have given this subject considerable thought and study since the proceedings before the Commission, and I am more than ever convinced that the proposed legislation as to underground waters, except in so far as it relates merely to the exercise of public authority thereover [he had elsewhere distinguished authority to regulate to protect others' rights, for example, versus discretionary permitting to determine whether water could be taken at all] should be entirely eliminated as wholly unnecessary and hurtful." Letter dated July 18, 1912, Frank H. Short to State Water Commission, at 4-5, in Pardee Home Museum Papers, Water Conservation, Box 29 (copy on file with Joseph Sax).

[108] Short's view drew on language that percolating water belongs to the owner of the soil, common in cases decided when absolute ownership was still thought to be the rule in California; e.g., *Gould v. Eaton*, 111 Cal. 639, 644 (1896). It appears to have been taken as authoritative, despite the decision in *Katz v. Walkinshaw*, note 58 *supra*, and even though in 1911 (two years previously) California had amended Section 1410 of the Civil Code to read: "All water or the use

(continued...)

overlying land (which was considered a parallel to riparian uses of surface water).[109] Therefore, it was not surprising that an amendment to limit the coverage of the bill to surface waters[110] was proposed during the legislative debate. There seems to have been no controversy over this amendment,[111] suggesting that Short's legal argument was persuasive. It should be emphasized that Short's claim was a limited one. He did not assert that there was no regulatory authority over non-overlying uses of groundwater, or that such uses could not be integrated with surface water rights. He was simply objecting to giving a permitting agency discretionary authority to deny altogether such a use, except where it was necessary to protect some other right in that water, such as a correlative right by another groundwater user.[112] Short was thus apparently making a claim that the plenary power and proprietary interest in surface waters (which belonged to the people of the State) did not extend to groundwater; and that property rights in groundwater were, though not absolute, nonetheless an extant incident of landownership. Though such a claim would hardly be likely to prevent a grant of discretionary permitting authority under contemporary understanding of state legislative authority,[113] it apparently was persuasive to legislators back in 1913.[114] And it seems to explain why California decided to grant permitting jurisdiction over

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[108](...continued)
of water within the State of California is the property of the people of the State of California, ..." Cal. Stats. 1911, c. 407, p. 821. See Cal. Water Code § 102.

[109] They certainly knew the recent decision in *Hudson v. Daily*, 156 Cal. 617, 628, 105 P. 748 (1909), in which that very issue arose.

[110] The amendment read: "Whenever the terms stream, stream system, lake or other body of water occurs in this Act, such term shall be interpreted to refer only to surface water." Assembly Bill No. 642, amendment of April 12, 1912, § 42.

[111] Hichborn, *supra* note 93, at 150. Regarding the April 30th amendment, see note 116, *infra*.

[112] While § 15 of the water bill, as introduced, gave the commission discretion ("The...commission may in its discretion allow...the appropriation of unappropriated water..."), the enacted version omitted discretion even over surface water appropriations ("The...commission shall allow...the appropriation of unappropriated water...").

[113] Since a version of the language that appears today as Water Code § 102 had been enacted in 1911, Short may have been pressing the point a bit far even back then..

[114] A review of contemporary newspaper accounts in the Fresno Republican, Oakland Enquirer, Sacramento Bee, San Francisco Daily News, and San Francisco Call, has turned up no indication of any controversy over changes in the bill regarding groundwater coverage. For example, the Oakland Enquirer of April 21, 1913, p. 6, has an article entitled "Conservation Bill
(continued...)

surface water, but not over groundwater.[115]

In any event, the result of the legislative decision created the need to distinguish groundwater from surface water, again raising the problem that had come up during the discussion of the Commission's original draft. What, if any, water beneath the surface of the earth should be included in the term "surface water," and subject to permitting jurisdiction? Certainly, no one wanted a user to be able to circumvent the law simply by diverting from a reach of a surface stream where the water sank below the surface before emerging again, or by sinking a well in a riverbank. This issue was addressed on April 30, when the following underscored language was added to Section 42: "Whenever the terms stream, stream system, lake or other body of water or water occurs in this act, such term shall be interpreted to refer only to surface water, and to subterranean streams flowing through known and definite channels."[116]

This, of course, is the *Pomeroy* language that was ultimately enacted as the Water Commission Act of 1913, and that remains today, with only insubstantial change, as Water Code § 1200. Strikingly, the subterranean stream language appeared for the first time at a late stage in the evolution of the law. It never came up in the Commission's report, in its original bill, in any of three Commission hearing sessions on the bill, or in the bill as first introduced in the Assembly, even though, as we have seen above, efforts to distinguish surface water and underground water

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[114](...continued)
Amended and Strengthened". It says "[t]here was a preliminary hearing given to the elaborate measure in the Assembly a few days ago, but there was a continuance of the subject granted for the purpose of making changes which were considered advisable. The committee worked Saturday as also last night on the subject, with the result that it was the opinion of some of the assemblymen who had opposed certain features when the bill was before the Assembly, the measure had been strengthened in a satisfactory manner and that a number of the features which had not appealed favorably to some of the members of the lower house had been so rewritten as to satisfy the most insistent of the critics. The amendments were ordered printed and the measure, as amended, will come up for passage in a few days...." Similarly, *id.*, April 22, 1913, p. 3: "...the amendments proposed yesterday...were of a minor character, none of them touching any of the main features of the proposed enactment." Of course the bill was still too strong for its opponents, *id.*, April 27, 1913, p. 19; April 29, 1913, p. 1.

[115] While the legal concern expressed was limited to discretionary permitting authority (that is, e.g., a right to deny an appropriation altogether in the public interest), the legislative result, of course, was to deny any permitting jurisdiction at all over (percolating) groundwater, and that has remained the law.

[116] Though the language was offered by Assemblyman Henry Ward Brown of San Mateo (California Assembly Journal, 40th Sess., 1913, April 30, 1913, p. 2336), an opponent of the bill, it appears to have generated no objection, either by proponents or opponents. Brown was a lawyer, and a graduate of Hastings College of the Law.

engaged the bill's drafters at some length in the May 28th hearings the previous year. None of the suggested phrasing put forward in that hearing, such as "surface water and sub-stream flow" or "surface water and subsurface water within the banks of streams" or "surface water and underground stream flow" appeared in the final bill as enacted.

Why did the bill's draftsmen use the *Pomeroy*/Kinney language, rather than one of the formulations that had been suggested in the previous year's hearings? No documentation has been found to answer this question, or to explain the reasoning for any of the other amendments made to § 42 of the bill.[117] The likeliest explanation is that rather than seeking to devise their own language to identify the subsurface water that should be included within the surface water system (and recognizing from the previous year's hearing the difficulty of fashioning satisfactory language), they simply plugged in familiar language that was already a part of water law terminology, "subterranean stream [etc.]." The use of that language – so patently inapt and inept to us today – seems to have generated not a word controversy in a bill that was otherwise so controversial and divisive that it only became law by virtue of a public referendum.[118]

There is nothing to suggest that the draftsmen intended to codify the *Pomeroy* case, or any particular reading of it. Nor, it seems, did they concern themselves with the geologic perplexities they were creating in treating groundwater and surface water as separate entities. Most likely, once they were persuaded that there were constitutional problems in creating an integrated system (which is what the Commission and the Johnstone bill had originally sought), they simply reconciled themselves to a bifurcated system, and sought to make sure that they had prevented the most egregious opportunities for people to subvert the surface water permitting system. The subterranean stream language of *Pomeroy* was the only established verbal tool for doing so, as it clearly covered what had been described in the hearings as "sub-surface flow" of surface

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[117] A (highly opinionated) discussion of the controversy over the bill can be found in Hichborn, *supra*, note 93 at 137-73, but it deals almost exclusively with the maneuvering of various factions, rather than with the specifics of the amendment process. Hichborn says there were two legislative meetings on the bill (pp. 145, 165). No transcript or other record of them has been found, but there is a lengthy report in the Sacramento Bee of March 19, 1913 (at 1) of the first meeting, held on March 18, 1913. A letter from Assemblyman Johnstone to Governor Pardee, dated April 4, 1914, gives the final votes on the bill and a brief discussion of two proposed Senate amendments (not dealing with groundwater), commenting "[t]hese are interesting to indicate hidden influences in the consideration of the measure." Pardee Papers, Pardee House Museum, Water Conservation, box 29 (copy on file with Joseph Sax).

[118] See Amendments to Constitution and Proposed Statutes with Arguments Respecting the Same, to be Submitted to the Electors of the State of California at the General Election on Tuesday, November 3, 1914 (State Printing Office, 1914)

streams[119], or what Wiel had earlier described as a line that would protect streams against pumping that "directly effects a surface flow."

In short, all the evidence we have indicates that the legislative language was designed to exclude groundwater generally, except for that which was functionally part and parcel of a surface stream – in the sense of pumping that directly affected surface flow. Probably – though there is no evidence one way or another – the legislators would also have meant to include true subterranean streams, such as flows in limestone caverns or lava tubes, which would be "independent" subterranean streams under Kinney's classification. But even in 1913, it was clear that such features were few and of rare occurrence in California.

The Water Commission legislation was extremely controversial, though not on the subterranean stream issue. Its far more significant provisions sought to control monopolization of water by riparian landowners (a matter that would ultimately be resolved by a Constitutional Amendment several decades later),[120] and to get rid of unused riparian rights (a provision held unconstitutional,[121] but ultimately effectively achieved by California Supreme Court interpretation).[122] The bill passed the Assembly by a vote of 44-30, and the Senate version by 28-6. The Assembly then concurred on a 41-10 vote (41 votes being required for passage). The bill was signed by the Governor on June 16, 1913, but then was subjected to a referendum following an all-out effort by the law's opponents. It was approved by the people on November 3, 1914 by a margin of 50.7% to 49.3%,[123] and became effective on December 19, 1914.

2. Subsequent Legislative Developments

Almost as soon as the Water Commission law was enacted, proposals emerged to revise it and to create an integrated management system for surface and groundwater. As early as 1916, the report of a legislatively created Water Problems Conference recommended that groundwater be

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[119] Hearing, 2 p.m. (May 28, 1912), at 8 et seq.

[120] California Constitution, Art. X, Section 2. See *Herminghaus v. Southern California Edison Co.*, 200 Cal. 81, 252 P. 607 (1926).

[121] *Tulare Irr. Dist. v. Lindsay-Strathmore Irr. Dist.*, 3 Cal.2d 489, 531, 45 P.2d 972, 989 (1935).

[122] *In re Waters of Long Valley Creek Stream System*, 25 Cal.3d 339, 158 Cal.Rptr. 350, 599 P.2d 656 (1979).

[123] A Study of Ballot Measures: 1884-1986, Compiled by the Office of the Secretary of State, March Fong Eu, Sacramento, CA (n.d.).

made appropriable and "placed under the control of the State Water Commission."[124] In 1917, the State Water Commission's annual report cited "the need of ground water legislation," and opined that "surface and ground water supplies are so intimately related physically that one can not be completely regulated and administered without similar control of the other....[T]he fact that the water passes beneath the surface and is for a time hidden from view to again reappear farther down the stream, does not offer a logical reason for its exemption from control and regulation."[125]

In 1957, the State Water Plan observed that "[w]hile it is not an immediate problem, it is evident that effective administration of the development and utilization of ground water resources, either by the State or by local agencies, or by both, will become mandatory as the stage of full water development is approached. When it becomes necessary to operate the major ground water basins for import-export purposes as envisioned under The California Water Plan, requisite authority to do so must exist....The following items are suggested for consideration in this connection: ... The requirement of permits and licenses for the appropriation of ground water."[126]

In 1971, the Chair of the Assembly Committee on Water made two very modest legislative proposals: including groundwater in the existing statutory adjudication procedures, and requiring pumpers statewide (and not just in four southern counties)[127] to file statements of the amounts they were pumping. His suggestions did not get enacted. Two years later, Ronald Robie, a respected water law expert who became Director of the Department of Water Resources (and later a judge), gave an address in which he said, "...'ad hoc' solutions are not satisfactory. I find it curious that although regulation of surface waters is properly a responsibility of the State, groundwater regulation is somehow viewed as a 'local' concern....The result is uncoordinated

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[124] Report, State Water Problems Conference, November 25, 1916, at 65. The Report said "[t]he conference therefore has recommended legislation which will recognize the doctrine of prior appropriation as applied to underground water, so that the one who first develops it shall be entitled to so much water as is necessary for the beneficial use of the project to which it is applied....[T]he appropriation of underground water, like the appropriation of surface water, should be placed under the control of the State Water Commission, but...no owner of land of 160 acres or less, should be compelled to apply to the Water Commission for permission to develop the water lying under his own land for use upon that land...." *Id*., at 65-66.

[125] Report of the State Water Commission of California, Published January 1, 1917 (Sacramento, State Printing Office, 1917), at 74.

[126] Bulletin No. 3, The California Water Plan, State of California, Department of Water Resources, Division of Resources Planning (May 1957), at 221.

[127] Water Code § 5000(c). Carley V. Porter, What's in the Legislative Cards for Ground Water, Proceedings of the 8th Biennial Conference on Ground Water, University of California Water Resources Center (1971), at 63, 65-66.

administration of interrelated resources."[128]

Four years later, the background study for the Governor's Commission to Review California Water Rights Law posed the question, "Should permits be required for new wells where critical groundwater problems exist or are threatened? For new wells in all basins? For all wells, new and existing, where critical groundwater problems exist or are threatened? For all wells in all basins?"[129] The Commission itself, however, acknowledged what had become the political reality when it came to groundwater law reform. After noting that "[m]ost other western states have integrated groundwater into state-level appropriation permit systems," it noted that "California's experience with groundwater management...differs from that of other western states." It therefore concluded "that local management, if it is properly undertaken, offers the best opportunity for workable and effective control," and to make clear that it was not calling for anything like a general permitting system, it said "the Commission...intends that proposed legislation not require any unnecessary management actions in areas without critical long-term overdraft, subsidence, or water quality problems."[130]

The Governor's Commission correctly read the California legislative situation. No pleas for integrated management of surface and groundwater generated statutory change. In a progress update ten years later, attorney Kevin O'Brien reported "[t]he California Legislature has flirted with the concept of ground water management during the past several legislative sessions. To date, no comprehensive ground water management legislation has been adopted."[131]

On the contrary, the legislature made clear its disinclination to enact comprehensive legislation or to expand the Board's permitting jurisdiction over groundwater.[132] The subterranean stream

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[128] Ronald B. Robie, Carley Porter Memorial Luncheon Address, in Proceedings, Ninth Biennial Conference on Ground Water, University of California, Water Resources Center (1973), at 146.

[129] Governor's Commission to Review California Water Rights Law, Anne J. Schneider, Groundwater Rights in California, Background and Issues (Staff Paper No. 2, July, 1977), at 96.

[130] Final Report, Governor's Commission to Review California Water Rights Law (December 1978), at 166, 167.

[131] Kevin M. O'Brien, The Governor's Commission Revisited: Ten Years of Not So Benign Neglect in California Ground Water Law, in Johannes J. DeVries, ed., Sixteenth Biennial Conference on Ground Water, University of California, Water Resources Center (1988), at 50 (citations omitted)..

[132] A useful, succinct review of legislative activity appears in Anne J. Schneider, Groundwater Management Options – Vision vs. Reality, in, Water Rights, Water Wrongs:

(continued...)

provision of Water Code § 1200 remains virtually unchanged from what it was in 1913. Indeed, in a variety of statutory provisions as well as legislative studies, the legislature's posture toward statewide groundwater management has been set down unambiguously:

- In 1962, an Assembly Interim Committee Report, concluded: "In most areas of the State, the key to the solution of ground water problems lies in local attitudes and political feasibility....Water agencies expressed a strong desire to solve their problems themselves and to manage ground water basins locally. The committee agrees that local management is desirable and ...provides simplified solutions to many of the ground water basin management problems."[133]

- In 1984, in legislation granting area-of-origin rights to a variety of water systems as against future export projects initiated after a certain date, the legislation was careful to distinguish between surface water appropriations dated by the time of "applications [before the Board] to appropriate," and groundwater appropriations, dated by the time they are "initiated" [outside of any permitting process].[134]

- Because the Article containing the area-of-origin law was codified in the midst of a chapter of the Water Code that deals with the Board's administrative responsibilities, the legislature added § 1221, stating "This article shall not be construed to authorize the board to regulate groundwater in any manner."

- The provision that grants the Board authority over general adjudications of stream systems specifically excludes "an underground water supply other than a subterranean stream flowing through known and definite channels."[135]

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[132](...continued)
Learning From the Past, Looking to the Future, Forum Sponsored by the San Francisco Estuary Project, the Water Education Foundation, the Commonwealth Club of California and Friends of the San Francisco Estuary, Nov. 2, 1999, at 41-46.

[133] Assembly Interim Committee on Water, California Legislature, Ground Water Problems in California (vol. 26, Assembly Interim Committee Reports No. 4, Dec. 1962), at 8, 46.

[134] Water Code §§ 1215, 1216.

[135] Water Code § 2500.

- In one instance where it did give authority to adjudicate a river, the Scott River, including interconnected groundwater, the legislature specified that the decision was "necessary...for a fair and effective judgment of ...rights" in that particular river, but declared it "necessary that the provisions of this section apply to the Scott River only."[136] Ironically, the studies that led to the Scott River legislation demonstrate that the legislature has been fully and unambiguously informed of the inadequacies of the bifurcated (groundwater and surface water) system it had created.[137]

- Even where the legislature has wanted the Board to act generally as to groundwater – as with water quality adjudications – it has been careful to require it to go to court,[138] and to defer to local public agencies.[139]

- Where the legislature wants to include "percolating groundwater" within the coverage of a statute, it does so explicitly, as in a law requiring recordation of certain groundwater extractions. In that law, the definition section says "'[g]round water' means water beneath the surface of the ground whether or not flowing through known and definite channels."[140]

- Finally, the legislature has made clear its view that its preferred way of dealing with groundwater is through local, basin-specific management, a

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[136] Water Code § 2500.5.

[137] "...[P]umping of groundwater as well as underflow reduces the surface flow of the various streams and the main stem of Scott River....It became apparent...that underground water was an important part of the water supply problem in the stream system and that in order to properly determine the rights to water from the stream system, interconnected underground water should be included." State Water Resources Control Board, Division of Water Rights, Report of Investigation Pursuant to Petition for Adjudication, Scott River, Siskiyou County (December 1971), at 5-6. See also California State Water Resources Control Board, Report on Hydrogeologic Conditions, Scott River Valley, Scott River Adjudication (November 1975).

[138] Water Code § 2100.

[139] Water Code § 2101(b).

[140] Water Code § 5000(a); see also Water Code § 1005.4. Water Code § 12922 expresses the public interest in protecting groundwater basins from critical conditions of overdraft depletion, sea water intrusion or degraded water quality, but it is just a declaration of the public interest, not a grant of jurisdiction to the Board.

position it has held quite consistently over many years.[141]

This brief review makes clear that the legislature has repeatedly been made aware of the Board's limited jurisdiction over groundwater under Water Code § 1200, and has shown no inclination to expand that jurisdiction beyond the legislative goals that led to the language in the 1913 statute.

PART III:

THE BOARD'S CURRENT IMPLEMENTATION OF THE LAW GOVERNING SUBTERRANEAN STREAMS FLOWING THROUGH KNOWN AND DEFINITE CHANNELS

As noted at the beginning of this Report, in answer to Question 2, the Board's interpretation of Water Code § 1200,[142] treats the decision in *Los Angeles v. Pomeroy*[143] as stating the governing

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[141] Water Code §§ 10750-10756; Assembly Interim Committee on Water, California Legislature, Ground Water Problems in California (vol. 26, Assembly Interim Committee Reports No. 4, Dec. 1962), at 47-48.

[142] Over the years, the Board guidance document, with titles that are variations of "General Information Pertaining to Water Rights," has had a provision dealing with "Appropriation of Underground Water," but that provision has never sought to define the scope of the statutory construct "subterranean stream" in any detail, nor does it give much hint of how the Board approaches uncertain cases. The 1923 version says "...attention is called to the fact that the jurisdiction of this office is limited by the following sentence in section 42 [now section 1200] of the ...Act: [quoting]....It is therefore unnecessary to apply if the waters to be developed are merely percolating waters." (p. 27). In 1925, it added: "... the Division does not encourage the filing of applications to appropriate from springs or wells upon one's own land, unless there is a possibility that someone else may...establish an adverse claim." (p. 30-31). By 1956, the following language, appeared: "Whether underground water is moving in 'subterranean streams...' is determined by the facts in each case. Where this is the case, such water is subject to appropriation under the Water Code....If it is proposed to use ground water on nonoverlying land, and the source of the water is a subterranean stream...an application...is required." (p. 40). The current version, dated January 2000, has changed yet again, omitting reference to case-by-case analysis, but adding reference to "ground water basin." It states that "jurisdiction...is limited...to 'subterranean streams... ', and explains that "[u]nderground water not flowing in a subterranean stream, such as water percolating through a ground water basin, is not subject to the SWRCB's (continued...)

law.[144] It reads that decision as requiring the following physical conditions to exist for groundwater to be classified as a subterranean stream flowing through a known and definite channel:[145]

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[142](...continued)
jurisdiction. Applications to appropriate such water, regardless of use, should not be submitted." (p. 8).

[143] 124 Cal. 597, 57 P. 585 (1899), writ of error dis. sub nom. *Hooker v. Los Angeles*, 188 U.S. 314, 23 S.Ct. 395, 47 L.Ed. 487 (1903).

[144] In fact that case was decided before the first statute, the predecessor to Water Code § 1200, was enacted, and *Los Angeles v. Pomeroy* was not a statutory interpretation case, so strictly speaking it is not a binding interpretation of the statute. Technically, the Board recognizes this and says in its *Garrapata* decision (*supra* note 8, at 3) that the decision in *Los Angeles v. Pomeroy* sets forth "the distinction between subterranean streams and percolating groundwater," and thus is relied on to define the requirements for finding a "subterranean stream...." under the statute. It may seem surprising that no Supreme Court case after 1914 has authoritatively interpreted the subterranean stream language of the Water Code. One theory is that since the Court has shown itself willing to protect surface stream rights against groundwater pumping, and *vice versa*, the scope of Board permit jurisdiction over groundwater has simply not loomed large in terms of protecting rights. See, e.g., *Eckel v. Springfield Tunnel & Dev. Co.*, 87 Cal.App. 617, 262 P. 425 (3d Dist. Ct. App. 1927); *McClintock v. Hudson*, 141 Cal. 275, 74 P. 849 (1903); *Miller v. Bay Cities Water Co.*, 157 Cal. 256, 107 P. 115 (1910).

[145] D. 1639 (1999) (*Garrapata*). This statement of the Board's interpretation of Water Code § 1200 is repetitive of the material responding to Question 2, text at note 8 *supra*. It is included here so that the main body of the Report can stand alone.

While interpretation of its jurisdiction over groundwater is based on the Board's understanding of the mandate of Water Code § 1200, it was for some time Board policy to accept a permit application for groundwater that did not meet the Water Code standard for a subterranean stream if the applicant affirmatively wished to have a permit. The Board explained this policy many years ago: "Applications are occasionally received for waters to be developed from wells or other works drawing from a body of broadly diffused percolating water. In such instances, if the applicant desires, the application is allowed in order to establish a public record of the initiation of the use of the water." Third Biennial Report of the State Water Commission of California, 1919-1920 (Sacramento, California State Printing Office, 1921), at 17. As it explained in its Rules as early as 1925, note 142, *supra*, this could be a means to prevent others from obtaining adverse possession rights. Though there is no current written policy on this matter, Board staff reports that – depending on available resources – the Board would take a look at the facts, and would not accept an application that clearly involves percolating groundwater. As a practical matter, resources are not usually available to make field examination of unprotested

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- A subsurface channel must be present.
- The channel must have relatively impermeable bed and banks.
- The course of the channel must be known or capable of being determined by reasonable inference.
- Groundwater must be flowing in the channel.

The Board also takes the position that while in *Los Angeles v. Pomeroy* the Court stated that the bed and banks of a subterranean stream must be impermeable,[146] it should recognize that all geologic materials are permeable to some extent. Therefore, the Board interprets the law so that if the rock forming the bed and banks is relatively impermeable compared to the aquifer material filling the channel, it infers that a subterranean stream exists.

In addition, underflow is not considered coextensive with the definition of subterranean stream, but only as one category thereof.[147] The Board notes that underflow was defined in *Los Angeles v. Pomeroy* as having the following physical characteristics:

- Underflow must be in connection with a surface stream.
- Underflow must be flowing in the same general direction as the surface stream; and
- Underflow must be flowing in a water course and within a space reasonably well defined.

Under these definitions, according to the approach the Board takes, all underflow constitutes a subterranean stream within the meaning of *Los Angeles v. Pomeroy*, but something can qualify as a subterranean stream without being underflow. Thus, underflow is viewed as a subset of a subterranean stream flowing in through a known and definite channel. Under, the Board's interpretation of the law it is not necessary that groundwater be underflow to establish the

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[145](...continued)
applications.

[146] The Board is aware that the term actually used in *Los Angeles v. Pomeroy* is "impervious," not impermeable, but it treats them as synonymous, and uses impermeable because it is used more commonly in scientific literature. Draft Decision, In the Matter of Applications 30038 [et al.], Waste Management, Inc., et al., Applicants; Yuima Municipal Water District, Protestant; Pauma Valley Water Co., Interested Party (Nov. 23, 1999), at 6 n.2 (*Pauma and Pala* case). As is noted in the discussion of *Los Angeles v. Pomeroy*, it is doubtful that the Court intended to impose a test of impervious or impermeable. In fact it only found the channel there to be "comparatively impervious." See note 50, *supra.*

[147] *Garrapata*, *supra* note 8, at ¶ 3.3.1. This position had been set out the previous year in a Memo from the Office of the Chief Counsel, Memo dated Sept. 18, 1998, from Barbara J. Leidigh, Senior Staff Counsel, to Ed Dito, Division of Water Rights, regarding permitting of underground water in the Russian River Valley, at 4.

existence of a subterranean stream flowing through a known and definite channel. However, a review of many cases reveals that the most frequently encountered groundwater cases in which the Board takes jurisdiction are in fact "underflow" cases,[148] and that, at least in early cases, if groundwater (though tributary to a stream) didn't flow along it as underflow, jurisdiction was denied.[149]

1. Recent Board Decisions

a. Garrapata Creek

The 1999 *Garrapata* decision[150] is illustrative of a contemporary case in which the Board determines whether a subterranean stream is present.

In non-technical terms, the physical situation in the case was the following. Garrapata Creek is a perennial surface stream near the coast that empties into the Pacific Ocean. The stream drains a watershed about 10 miles square that consists of a rather steep canyon rising on both sides of the stream. The canyon consists of solid rocky walls that meet below the bottom of the Creek in a sort of U-shape. In the canyon bottom adjacent to the stream is an area of relatively flat land that experts describe as "an unconsolidated deposit of cobbles, gravel, sand and clay," or technically "alluvium." The source of this alluvium is material eroded from the rocky canyon and carried down by the Creek. The area of the alluvium represents the meandering course that the river has taken over time, and at flood stages, laying down a river valley above the bedrock.

Compared to the rocky canyon walls, this alluvium, which is about 50 feet thick in the Garrapata Creek watershed, is highly permeable, so that a well drilled into the alluvium below the water table produces water when pumped. Such a well was drilled into the alluvium near Garrapata Creek.

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[148] Illustratively, a case involving shallow wells near, and within the floodplain of, the Big Sur River in Monterey County, was one where "The Division [of Water Rights] conducted a field investigation of the complaint [by the Department of Parks and Recreation asserting adverse impacts to public trust resources in the river and lagoon areas] and found that [an individual's] wells divert from the underflow of the Big Sur River," and that therefore an application to appropriate was required for uses on nonriparian lands. Letter dated Jan. 17, 2001, from Harry M. Schueller, Chief, Division of Water Rights, SWRCB, to Mr. James Hill, ref. no. 363:CLC:262.0(27-06-01), at 1. The case is also typical in that the wells were found to be impacting the River. A hydrologic investigation report "concluded that water pumped by the ...wells is induced river seepage. Therefore, [the] wells are hydrologically connected to the Big Sur River." Letter dated Dec. 27, 2000, from Lewis Moeller, Chief, Hearing Unit, to Mr. James J. Hill, re: Water Right Application 30166 of James Hill (El Sur Ranch)...," at 1.

[149] Decision A. 6017, D. 225 (1929) (Metcalf Creek, San Bernardino County).

[150] *Garrapata*, *supra* note 8.

The real question of interest in the case was whether, and to what extent, such a well impacted flows in the surface stream, but the prior question for the Board was whether it had jurisdiction over the pumping at all, and that question turned on whether the groundwater being pumped came from a "subterranean stream" within the meaning of Water Code § 1200.

To determine its jurisdiction, the Board said it had to answer four questions: (1) is there a subsurface channel; (2) if so, does it have relatively impermeable bed and banks; (3) is the course of the channel known or capable of being determined by reasonable inference; and (4) is groundwater flowing in the channel. Interestingly, only questions 1, 3, and 4 are drawn from the statutory language of Water Code § 1200 – channel, known and definite, and flowing. The second question – relating to bed and banks – is derivative. The definition of a channel requires that it be confined, the source of the bed and banks requirement. That requirement in turn produces the need for a judgment about how "impermeable" a bed and banks has to be.

As to three of the four questions posed by the Board in *Garrapata*, there was no dispute.[151] Both sides in the case apparently agreed that the narrow area of alluvium at the bottom of the canyon paralleling the Creek was a channel. They agreed as well that groundwater was flowing in the channel, and that the groundwater was flowing "toward the ocean, in the same fashion as the surface stream...though flowing with much less velocity than the surface stream."[152]

The principal point of contention in the case was whether the alluvium from which the well was pumping had "relatively impermeable" bed and banks, which the Board defined as follows: "is the [material comprising the bed and banks] sufficiently impermeable at the point of diversion to prevent the transmission of all but relatively minor quantities of water through the channel boundary....[T]he test is not that the bed and banks be absolutely impermeable, but rather, relatively impermeable compared to the alluvium filling the channel." The Board conceded this was a subjective test, as no appellate court or Board decisions have quantified differences in permeability.[153] The Board concluded that the relative impermeability test was met because "the

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[151] *Id*., at ¶ 3.3.2..

[152] *Ibid.*

[153] There is at least one case in which a court treated the juncture of older (less permeable) and younger (more permeable) alluvium as the determinant of a bed and banks. *United States v. Fallbrook Public Utility Dist.*, 347 F.2d 48, 56 (9 Cir. 1965). Notably, technical experts agree that "the diversity of California's geology make the use of a 'young' versus 'old' formation type distinction inappropriate in a statewide application." Memo from Kit Custis, Senior Engineering Geologist, to Department of Fish and Game, Sept. 14, 2001 (on file with Joseph Sax); "...whether the sediments surrounding the stream are younger or older alluvium is irrelevant in my mind." Memo from Karen R. Burow, U.S.G.S. to Technical Advisory Committee, Aug. 31, 2001 (on file with Joseph Sax); "...the assumption...that there is an erosional inner alluvial valley in most basins

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alluvium was recharged principally through the shallow percolation of rainfall through the zone of weathered bedrock, colluvium and soil, and through infiltration from surface flow in Garrapata Creek," and not from openings in the bedrock constituting the canyon walls and bottom."

The test of impermeability of bed and banks would seem to be a further refinement of the question whether there is a channel, or what the statute calls a "known and definite channel." However, nothing in the statute itself requires a measure of impermeability. The Board seems to have adopted a stepped analysis: the law requires a channel; a channel must have bed and banks;[154] bed and banks are defined by capacity to confine flow.

The Board's seeming emphasis on "bed and banks" and on relative impermeability as the standard for testing the statutory requirement of a channel may be highly significant. The central controversy over the scope of "subterranean stream" in the statute centers on whether the Board is likely to take jurisdiction over groundwater pumping in broad alluvial valleys where it has not ordinarily exercised its jurisdiction in the past, rather than taking jurisdiction only over pumping in the near vicinity of surface streams.[155] If the Board were to take the view that a channel must fit

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[153](...continued)
that is filled with 'younger alluvium'. California streams and rivers do not necessarily follow this assumption." Memo from Dr. Steven Bachman, to Joseph Sax, Aug. 15, 2001 (on file with Joseph Sax).

The Board in *Garrapata* utilized several tests to support its finding of "relative" impermeability: (1) evidence that the type of rock in question that comprised the bed and banks was of low permeability, as little as 1% or 2% compared to sand and gravel, which ranged around 20%; (2) sampling of the actual rock in the watershed which was found to have little faulting, and of the faulting found much of it was filled with clay, indicating little capacity for water to permeate through it; (3) well tests into the bedrock demonstrated very low pumping capacity, another measure of relative impermeability (being several orders of magnitude lower than a well in the alluvium); (4) modeling suggesting that water reaching the surface stream did not come through the bedrock, but from the alluvium; (5) consideration of chemical differences between well water and water in the surface stream was not indicative that stream water came from some other source than the alluvium (i.e., through fractures in the bedrock). *Garrapata*, *supra* note 8, at ¶ 3.3.2.

[154] *Hutchinson v. Watson Slough Ditch Co.*, 16 Idaho 484, 488, 101 P. 1059, 1061 (1909): "water flowing in a definite channel, having a bed and sides or banks ...."

[155] In *United States v. Fallbrook Public Utility Dist.*, 347 F.2d 48, 56 (9 Cir. 1965), the court distinguished a case involving the Santa Ana River system (*Orange County Water Dist. v. City of Riverside*, 173 Cal.App.2d 137, 174, 343 P.2d 450 (4th Dist. Ct. App. 1959)) in which "the basins were huge subterranean lakes" that were "relatively stationary," and where it was determined they did not constitute a jurisdictional subterranean stream, as contrasted with the
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the definition of being like "a trench, furrow, or groove" or "a tubular passage"[156] – that is, something essentially long and narrow – it would doubtless be drawn toward the more restricted view of its jurisdiction that some urge, sticking to the immediate confines of the channels of surface streams. On the other hand, if a channel can be quite broad and un-furrow-like, so long as it is enclosed by relatively impermeable beds and banks, subterranean stream jurisdiction could be quite extensive.

Garrapata, however, is not a very good test case, for two reasons: First, there was no dispute over the presence of a channel and flow; and second, and more importantly, it is the type of case that engenders the least controversy about the meaning and application of Water Code § 1200. There is general agreement that where a stream is contained within a narrow bedrock canyon in which the streambed occupies most of the canyon bottom, a so-called "bed and banks" test is an appropriate measure of jurisdiction, because the presence of a "channel" is indisputable. The understanding is that the relatively narrow band of alluvium within the highly impermeable canyon walls and bottom is (1) essentially the buried portion of the stream, where the subterranean water in the alluvium is moving with the stream (usually relatively rapidly down a fairly steep gradient); (2) is in hydraulic contact with the stream; and (3) pumping of such water is likely to have a direct impact on the surface stream.

In such circumstances, assuming a highly impervious enclosure, the subsurface water fits everyone's legal definition of a "subterranean stream flowing through known and definite channels," and satisfies even those who claim that the "subterranean stream" definition should be limited to what is called the underflow of surface streams. The groundwater in such situations is seen as constituting the immediate subterranean component of the surface stream (even though it is understood that water constitutes a continuum and technically speaking there are no such distinct boundaries). In addition, so long as the pumping is within the alluvium, and the alluvium is essentially isolated by the bedrock from all water sources except the stream, the pumping is likely to be immediately impacting the surface stream, which creates the strongest claim for regulatory intervention.

In such situations, it is generally accepted that the Board need only ask two questions: (1) is the alluvium within "bed and banks" that essentially isolate it? and (2) is the pumping from this isolated alluvium?[157] Controversy begins when the Board is seen as limiting its inquiry to these questions

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[155](...continued)
coastal basin of the Santa Margarita River system. The court noted also that its finding of a subterranean stream was supported by hydraulic connectivity, stating that the "wells...lie not on the fringes of the Coastal Basin but within or closely adjacent to the river itself." 347 F.2d, at 56.

[156] American Heritage Dictionary (3rd ed., 1992), at 320.

[157] Another recent narrow bedrock canyon case, still at the staff decisional level, contains a
(continued...)

when it deals with cases other than those set in narrow bedrock canyons, and something other than underflow is involved.[158] That is exactly what happened in the hotly-disputed *Pauma and Pala* case.

b. Draft Decision, Pauma and Pala Basins

A draft decision issued in 1999, and still not made final, is illustrative both of the interpretive difficulty that Water Code § 1200 can present, and of the fractious disputes it can generate over the way in which the Board should be exercising its jurisdiction. The Board received applications from several mutual water companies to appropriate water from a subterranean stream in the upper part of the San Luis Rey River in San Diego County. The applications were protested both by a water district and a water company which divert water in that same area, but which never applied for appropriative water rights. The protestants contended that they were pumping percolating groundwater, and that the water the applicants sought to pump was percolating groundwater as well.

The *Pauma and Pala* case presented a factual situation that differs at least in degree from the great majority of subterranean stream cases that have come before the Board during the past three-

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[157](...continued)
report by the staff geologist stating, "in accordance with...*Garrapata Creek*, the beds and banks of a subterranean stream are determined by a sufficient difference in the permeability of local rock materials such that the subterranean stream is reasonably confined to the known and definite channel." Memo from Charles NeSmith, Associate Engineering Geologist, Files 262.0 (44-16-01), Water Rights Complaint – California Department of Fish and Game vs. Stephenson Ranch (Santa Cruz Biotechnology) Regarding Diversions from Laguna Creek in Santa Cruz Country (August 23, 2001), at 5.

[158] The notion that underflow is just one category of subterranean stream is not new, however. See D. 968 (1960) (Cache Creek Tributary), at 3-4.

The issue whether surrounding mountain ranges other than in a narrow canyon could qualify as "bed and banks" was being explored within the Board Staff in the year preceding preparation of the *Pauma and Pala* draft decision. Memo from the Office of the Chief Counsel, *supra* note 147, at 5. It had presumably been noted that there were many permits for groundwater diversions in the Russian River Valley. The Memo reported that while there were hundreds of groundwater permits on the main stem of the Russian River, 70 to 80 percent were for underflow, and that there had been no controversy about the propriety of groundwater permitting in the Russian River Valley. The Memo concluded with a statement of "... reasons why permits are necessary. First, the characteristics of much of the Russian River are similar to the Los Angeles River as described in *Pomeroy*. There are mountains along the sides of the valley that contribute runoff and may represent the bed and banks...." *Id.*, at 4-5. The Memo concludes that under *Pomeroy*, "the bed and banks can be established by reasonable inference, and may consist of the surrounding mountain ranges...." *Id.*, at 6.

quarters of a century. It was neither a conventional underflow-type case,[159] nor did it involve subsurface water moving through a long and narrow alluvial valley enclosed by steep canyon walls, and constituting channel flow in the conventional sense of the term.

The case arose when Waste Management of California, Inc. filed an application to appropriate groundwater for use at a proposed solid waste landfill. The point of diversion was to be a well located some 50 to 100 feet from the San Luis Rey River. While the applicant believed that the water beneath the proposed site may be percolating water, it filed for a permit to preserve its priority of right in the event the proposed diversion was found to be from a subterranean stream within the meaning of Water Code § 1200. A number of other applications were also filed to appropriate water from wells in the Pala and Pauma Basins. The applications were protested by other water users who had not sought permits for their diversions, who asserted that the water applied for was percolating groundwater.

The water-bearing alluvial areas in the Pauma and Pala Basins along the San Luis Rey River are 6.5 to 7.5 miles long and from 0.5 to 3.0 miles wide,[160] with narrows at both their upstream and downstream ends. The basins have several other unusual features as well. Because the downstream movement of the subsurface water was partially blocked by a rise in the underlying bedrock (presumably the reason for the lateral spread), the movement of the water within the basin was particularly slow, making it appear – in the view of some protestants in the case – more like an underground lake or reservoir than a stream.

The protestants focused on these unusual features in concluding that the Pauma Basin could not qualify as a subterranean stream within the meaning of Water Code § 1200. Essentially their legal points were: (1) that the water was too slow-moving to constitute flow (sometimes not moving downstream at all when pumping lowered the water table); (2) that the shape of the basin meant it

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[159] The Board geologist's memorandum recommendation to the Board concluded, however, that "the groundwater in the alluvial aquifer of the Pala basin is...underflow of the San Luis Rey River " based on a finding that "the subterranean channel is a flow boundary, groundwater in the alluvium is confined to a well defined space and is moving in a course... and [] the direction of groundwater flow is generally in the same direction as the... River." Memorandum to files of Julie Laudon, Associate Engineering Geologist, re: Application 30038 (January 21, 1992).

[160] A U.S. Geological Survey Report shows the Pauma Basin as approximately 7-7.5 miles long, 50% of which is about 1 mile wide and with alluvium 650-750 feet thick; and 50% of which is 2-2.5 miles wide and between 400-450 feet thick. The Pala Basin is approximately 6.5 miles long, 50% of which is 1.5-2 miles wide and 250-500 feet thick; 35% of which is .5-.75 miles wide and about 250 feet thick; and 15% of which is 2.5-3 miles wide and about 200 feet thick. Hydrologic – and Salt – Balance Investigations...Lower San Luis Rey River Area, San Diego County, California, U.S. Geological Survey Water-Resources Investigations 24-74 (October, 1974) (the "Moreland" Report).

wasn't a stream flowing through a channel – that is, that it wasn't longish and narrowish enough to be a channel; (3) that the enclosing bedrock was not sufficiently impermeable (they used the term "absolutely impermeable") to constitute a channel's bed and banks; and (4) that the water within the asserted channel was not all moving parallel to the stream.

The Board's draft decision found nonetheless that there was groundwater flowing in a known and definite channel. It said that "[a]s with surface streams, which may include deep lakes impounded by a rim of bedrock or other obstructions, there may be constrictions in a channel or wider and deeper areas in the channel of a subterranean stream."[161] The fact that the watercourse is wide or narrow, or balloons out at points, was not deemed determinative.[162] What seems to have been crucial was evidence that water was moving along a particular path, though that path need not have had any particular form, nor been narrowly confined.

While the flow of the water within the basin was not uni-directional, it ultimately moved downstream. There was testimony that "at the margins of the valley, groundwater is flowing roughly perpendicular to the bed of the channel, but that as it reaches the middle of the valley, the direction of the groundwater flow turns and flows downstream."[163] The draft decision concluded that "[t]he net groundwater flow direction is downstream,"[164] as part of its finding that there was water flowing through a known and definite channel. There were also some clay layers within the basin that partially confined some of the water in the alluvium, which one expert witness suggested

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[161] Draft Decision (Nov. 23, 1999), at 26. This was the position taken by the Board in an earlier decision dealing with the Bonsall Basin on the same river downstream of the Pauma Basin, where the subterranean stream question had arisen and been decided in favor of jurisdiction despite evidence that the bedrock of the narrows had partially obstructed underground flow. D. 432 (1938), reaffirmed in Order of the State Water Rights Board, dated June 26, 1962. The case is discussed in text at note 195, *infra*.

[162] Cf. the 9th Circuit's *Fallbrook* decision, *supra* note 155, distinguishing the Santa Ana (*Orange County Water Dist.*) case on precisely this ground, 347 F.2d, at 56.

There is language in a number of cases – such as *Pomeroy,* 124 Cal. at 631-32; *Los Angeles v. Hunter*, 156 Cal. at 607; and *Eckel v. Springfield Tunnel & Dev. Co.*, 87 Cal.App. 617, 622 (3d Dist. Ct. App. 1927); as well as the pre-rehearing opinion of Justice Temple in *Katz v. Walkinshaw*, 141 Cal. at 139-140, indicating that water in a lake-like basin is percolating water, though the precise question of the significance of size and shape of a basin has never been before the California Supreme Court.

[163] Draft Decision, at 31.

[164] *Ibid.*

made it "a quiescent basin"[165] rather than a stream, but the draft found a subterranean stream nonetheless, noting that the clay layer was not continuous and that there was continuity between the alluvium above and below it.

The draft then concluded that the bedrock in the hills enclosing the valley constituted the bed and banks of the channel. The standard the draft applied was that there must be a bed and banks that are "relatively impermeable compared to the overlying aquifer material."[166] While there was considerable testimony about the permeability of the crystalline rock that constituted the bedrock as a result of fractures in it, the draft decision concluded that as a whole it was not water bearing despite local fracturing, and that it passed the "relative impermeability" test.

One may look at the concerns of the protestants in two different ways. One perspective would focus on their concern about a perceived expansiveness in the interpretation of the terms "flowing" and "channels" in Water Code §1200: a very generous test of flow; the sufficiency of a finding that the "net groundwater direction is downstream," as opposed to a claimed requirement that the hydraulic gradient of any water flow be parallel to the surface flow of the stream; and the application of the bed and banks test to a rather broad alluvial valley, rather than just a "narrows" type area.

Another perspective on the dispute is that the protestants believed the pumping was not significantly affecting the surface stream, and that the Board was deviating from its actual functional approach, which was to employ the subterranean stream definition only to protect surface streams from pumping that immediately and directly affects them. Focus on such impact seems not to have been central to the *Pauma and Pala* analysis, at least for the Board's geologist, who testified as follows:[167]

> Water rights professionals often use the term 'underflow' as jargon for a subterranean stream. However, the two terms can indicate different physical conditions. The most important difference between a subterranean stream and underflow is that interconnection with a surface stream is not a defining characteristic of a subterranean stream, but it is for underflow. Thus, not all subterranean streams constitute the underflow of surface streams.

A confined aquifer in the vicinity of a surface stream, otherwise meeting the subterranean stream standard, but the pumping of which has no direct impact on the stream, would, under this view, come within the Board's permitting jurisdiction.(The deeper underlying issue may be a difference

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[165] *Id.*, at 32.

[166] *Id.*, at 23.

[167] Quoted in the Legal Brief of the Division of Water Rights in the *Pauma and Pala* case, at 6 (December 1, 1997).

of view about how to deal with cases of long-standing hydrological disconnection, where decades of pumping have dramatically changed the groundwater/surface water relationships, an issue noted at the very end of Part III of this Report, below).

While contemporary connection to a surface stream is not a factor under the language of Water Code § 1200, it appears to have been an element in every subterranean stream case in California I have been able to find,[168] going all the way back to *Pomeroy*. Thus, while the Board staff was – strictly speaking – correct in saying, as it does in a proposed amendment to the draft decision, that

> ...this decision follows established precedent, does not change existing law, does not expand the test regarding what constitutes a subterranean stream, and does not expand the permitting authority of the SWRCB[169]

in practice the position taken in the *Pauma and Pala* draft embraces a more inclusive view of subterranean streams than the Board has utilized in the past.

What the protestants see in the *Pauma and Pala* case is the prospect of the Board administratively expanding its *de facto* jurisdiction in a way that could lead to its regulating groundwater pumping quite broadly (how broadly no one can say, as the fears are about something that might happen, not something that has happened), utilizing a Pauma-and-Pala-like expansive definition of a "flow[] through [a] known and definite channel." The Board, on the other hand, says it is just implementing the statute, and that (contemporary) connectivity with a surface stream is simply not an element of a subterranean stream under the terms of the statutory provision. Both positions are right! They are simply right about different things.

The *Pauma and Pala* draft opines that underflow is a subcategory of subterranean streams, but that underflow does not exhaust the category of subterranean streams. The significance of this view, it would seem from reading the draft decision, is that a subterranean stream need not be "in connection with" a surface stream,[170] need not be flowing in the same direction as a surface stream, and need not be "within a space reasonably well defined."[171]

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[168] See, e.g., D. 1585 (1982), at 34 (Salinas River), Order WR 82-12 (1982). A possible exception is D. 1474 (1977), at 13, 1977 WL 22457 at 6. See also D. 1474, at 7,10, 1977 WL 22457 at 3,5.

[169] Draft amendment to the draft decision (dated Jan. 24, 2000, from Assistant Chief Counsel Andrew H. Sawyer).

[170] Presumably this is what hydrogeologists mean when they speak of hydraulic continuity.

[171] Insofar as the draft decision purports to rely on *Pomeroy*, it should at least be noted for the record that *Pomeroy* never *says* that underflow is only one subset of a subterranean stream;

(continued...)

All this is only to suggest that it is not unreasonable to claim that the *Pauma and Pala* draft decision involves an interpretive expansion of the Board's longstanding approach to Water Code § 1200.

2. Older Board Decisions

Most older subterranean stream cases involved streams in narrowly constricted canyons, or (similarly to *Pomeroy*) groundwater under a narrow strip of land at the entry or exit of a broad alluvial valley, where the groundwater was moving parallel to the stream.[172] While the Board has never set down a standard for determining whether water is "flowing" within a channel, or for the shape of the channel, nonetheless, in all but one case, the channel in the case before the Board was more "riverlike" than "lakelike," and the flow of the water seems to have been essentially unimpeded through relatively coarse younger alluvium. The one notable exception is a downstream portion of the same river involved in the *Pauma and Pala* case, the San Luis Rey River in San Diego County. The channel-shape issue also arose in an old case involving the Tia Juana River, discussed below. In general, however, older subterranean stream cases involve water within the immediate orbit of a surface stream.

While the following discussion in the text focuses on only a handful of illustrative cases, numerous other related decisions are identified and noted in the footnotes.

a. Sheep Creek, San Bernardino County

A 1926 decision, involving Sheep Creek in San Bernardino County, is typical of many of the older cases.[173] The subsurface water in question was described by the Board as "underflow" (a term

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[171](...continued)
and the trial judge's instructions never *say* that without the three elements of underflow, subsurface water can still be a subterranean stream. See 124 Cal., at 624, Instructions XVI and XVII.

[172] While movement parallel to the stream was mentioned as a supportive evidentiary fact in *Pomeroy*, it was not stated as a requirement.

[173] Decision No. 3883, D. 119 (1926). Examples of typical cases are D. 1142 (1963) ("applicant...to drill a well adjacent to the Russian River"); D. 1110 (1963) ("[t]he remainder of the supply to the well is derived from the underflow of the...Russian River ... and it is to this extent only that the appropriation is within the Board's jurisdiction."); D. 1337 (1969) ("the Board...finds that the applicant's well does not draw upon the underflow of either...River...and that the source is not within the jurisdiction of the Board.") See also Staff Memo from Lewis Moeller to Files, re: Report of Investigation Big Sur River in Monterey County, April 12, 1992 ("Staff concludes that both the...[w]ells are pumping from the underflow of the Big Sur River and (continued...)

found in many Board decisions).[174] It was underground water moving through an area about 660 feet wide, and 200 feet in depth, under and along the line of the surface stream, down a gradient of about 300 feet per mile, within a canyon ranging from ¼ mile to 1 mile in width and 4 miles in length. Though the Board made no finding about permeability, it concluded that "the underground flow passes through a known and definite channel and although the rate of the flow may be very slow and may be said to 'percolate' through the gravels, it is nevertheless flowing toward the desert through a definite channel formed by the walls of the canyon on either side."[175]

The features which make this seem a familiar subterranean stream case are that the subsurface water is moving parallel and proximate to a surface stream within a rather narrow valley of highly permeable younger alluvium that is relatively long and narrow (channel-like).[176] The groundwater is following the lines of former surface channels created by the river's historic meandering as it exited a canyon, which lines are broadly parallel to the stream across the alluvial fan, so that the dominant groundwater movement is parallel to the surface stream course through the valley, and moves downgradient with the stream. These are places where abundant groundwater is found, and as pumping continues and the water table declines, the river becomes a losing stream, to the detriment of downstream surface water uses.

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[173](...continued)
not from percolating groundwater."), p. 4.

[174] A Memo from the Office of Chief Counsel, *supra*, note 147, says "the SWRCB has been issuing permits to appropriators of water from the underflow of the Russian River...since the 1920's...70 percent to 80 percent are for underflow...[though] it appears that there was no controversy [as to whether the water was a subterranean stream]." Memo, at 4. The Memo, *id.*, also cites cases that "refer to the underground portion of a stream as 'underflow:' (See *Anaheim Union Water Co. v. Fuller* (1907) 88 P. 978...; *Hudson v. Dailey* (1909)105 P. 748; *Perry v. Calkins* (1911)113 P. 136 ; *Larsen v. Apollonio* (1936) 55 P.2d 196." In fact neither *Hudson* nor *Larsen* use the term "underflow".

[175] D. 119, *supra* note 173, at 11.

[176] E.g., Lagunitas Creek, in Marin County: a well 50 feet from the edge of a creek in alluvial deposits at the lower end of a relatively narrow valley, in sand and gravel with high permeability and hydraulic connections with the surface waters. See Order WR 95-17, In the Matter of Fishery Protection [etc.], Order Amending Water Rights [etc.], at 28-29. Other examples are San Simeon Creek and Santa Rosa Creek in San Luis Obispo County, coastal streams narrowly confined, where applications were filed to appropriate underflow, and the Board took jurisdiction, though without any explicit finding of a subterranean stream, D. 1624 (1989) (Santa Rosa Creek) and D. 1477 (1977) (San Simeon Creek). See also Santa Ynez River, D. 1486 (1978) (application to appropriate underflow).

b. Stony Creek, Colusa County

Stony Creek in Colusa County was involved in a court case that was referred to the Board as referee by the Superior Court in 1978. The referee report,[177] adopted by the Board, is considerably more detailed than most Board decisions, and it describes a case exactly like the situation mentioned above: a surface stream exiting a narrows into a valley from ½ to 1 mile wide where the alluvial fan containing younger and highly permeable alluvium is enclosed by considerably less permeable, older alluvium surrounded by bedrock. A well drilled into the recent alluvium some 1,300 feet from the stream channel is determined by pumping tests and chemical analysis of the water to be getting its recharge directly out of the sides of the surface stream, and with little if any influence from other sources. The physical setting comfortably fits the legal understanding of a California subterranean stream – subsurface water moving along a known and definite, closely confined path. It also is conformable to a hydrological standard for integrating management of subsurface pumping that directly impacts surface flows with the management of the affected surface stream, and could be read as indicating that a test of whether water is jurisdictional is whether the surface stream is directly contributing to the water being pumped.[178]

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[177] Order WR 80-11, Order Adopting Report of Referee, in *County of Colusa v. Westcamp* (Superior Court, County of Colusa, No. 14932) (State Water Resources Control Board, June 19, 1980).

[178] Impact alone, however, is not understood to be sufficient, where there is nothing that can be characterized as a channel. For example, in a recent situation where a complaint was filed and a staff investigation was made (Pilarcitos Creek, San Mateo County), the Board staff recommended declining jurisdiction. In that situation, the alluvial land flanking the stream was not enclosed by a rocky canyon or bowl. Instead, the river flowed down from mountains on the east and emptied into the Pacific Ocean. Over the years the river had meandered north and south and created a fairly broad alluvial plain which sloped down toward the ocean. The claim was that pumping from the alluvium caused water from the surface stream to move out from its bed into the alluvium to replace the pumped water, and as a result flows in the stream declined, causing, among other things, damage to the fishery resources in the stream. The staff concluded that jurisdiction should be declined on the ground that inasmuch as "the alluvial aquifer in the area of the ...well field is not bound by a known and definite channel, water extracted from the aquifer is not subject to the Board's permitting jurisdiction." It noted that subsurface water must be "bound by definable beds and banks" to sustain jurisdiction, and that no information was submitted by the complainants to support such a finding. Memo from Cori Condon, SWRCB, to Joseph Sax, Feb. 9, 2001, at 13 (on file with Joseph Sax).

See also D. 968 (1960), involving an underground source tributary to Cache Creek in Kern County. Plainly the source was tributary to the surface stream, but the Board found no jurisdiction because of the slowness of the flow ("substantially less than 100 feet a day") (*note*:100 feet a day is actually very rapid movement for groundwater, groundwater typically moves about 1,000 feet per year, so this may be a misprint. See note 39, *supra*); the width of the

(continued...)

In its decisions in cases such as this one, the Board does not expressly attach any significance to the width of the canyon; as in *Pomeroy* itself, one is left to wonder whether rocky hills miles apart. enclosing a significantly wider alluvial valley, are to be understood to be the banks of a subterranean stream.[179] The Board seems not to have taken such an expansive view of its jurisdiction, as the decisions appear in fact (if not in theory) to give considerable weight to a well's capacity to have a direct and essentially immediate impact on the surface stream, rather than simply following out the expansive implications of the "bed and banks" formulation.[180]

c. Chorro and Morro Creeks, San Luis Obispo County

Though impact of pumping on a stream seems to be present (and important) in most cases where

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[178](...continued)
canyon (1,600-3,000 ft); and the breakup of the canyon walls by side canyons. In its decision, the Board asked, "[w]hen is a given area a stream, and when is it an underground basin? Does the word 'flowing' include water that is moving very slowly? When a given area containing slowly moving water has impermeable sides and bottom, must those impermeable sides and bottom be construed as the bed and banks of a stream...?" In this matter, the answer was "no," and the Board did not examine the asserted impact on the surface stream at all.

[179] See text at note 47, *supra.*

[180] D. 1595 (1983) (Springs Tributary to the Klamath River), at 9. The Board took jurisdiction upon finding that the flow "contributes to the [surface] River," even though "[t]he [subsurface] channel is not pronounced." It did not make an analysis either of the presence of bed and banks, or of relative permeability.

Even in the case involving what may be its most expansive interpretation of a subterranean stream, the San Luis Rey River below Monserate Narrows (see D. 432, at 10, discussed in text at note 195, *infra*), the functional relationship between pumping and the surface stream seems to be paramount. For example, the 1962 Board Order in that case noted: "The conclusion is inescapable that during periods of normal rainfall and runoff the stream and underground water function as a closely related unit with the effects of surface flow extending from bank to bank." In the matter of Permit 5227 et al., Order Extending Time to Complete Application of Water to Beneficial Use Under Permits 5228 and 5229, State Water Rights Board, June 26, 1962, at 13 (emphasis omitted).

That also seems to have been the understanding of the courts in the early days. Though not a Board jurisdictional case, *City of San Bernardino v. City of Riverside*, 186 Cal. 7, 14, 198 P. 784 (1921), has interesting language. The Court, citing *Pomeroy, inter alia*, says: "When a stream runs over porous material saturated with water, and the underground waters support the stream, either by upward or lateral pressure, or feed it directly, persons having rights in the stream will be protected against a depletion thereof by adverse diversions of such underground waters, if they are injured thereby. There may be a point of distance from the stream at which a diversion of such underground water will have so little effect on the stream that it will not be actionable."

the Board takes jurisdiction, there are exceptions where the Board has taken jurisdiction despite the absence of hydrological connection. For example, in a 1982 case, involving Chorro and Morro Creeks in San Luis Obispo County, the staff finding was that the Board should take jurisdiction because "the extent and direction of underflow can be readily defined within the...watershed" and "the bed and banks can be ascertained ...," even though it seemed doubtful that the wells were impacting the surface stream because the area from which they were pumping was overlain by a thick layer of low permeability silts and clays.[181] As the report put it, "[l]ocal water level data indicate that these silts and clays hydraulically separate the basal aquifer from the surficial channel deposits of" the surface stream.[182] The report concluded that "[t]here is no definitive information pertaining to whether subsurface water in that area may be found in direct hydraulic continuity with surface flows of the river."[183] Subsequently the Board took jurisdiction on the ground that there was a subterranean stream flowing through known and definite channels.[184]

Though finding that the subsurface flow was within well-defined beds and banks of rocks, the Board did not indicate the distance between the banks. One expert witness described the width of the recent alluviums as ranging from 1,000 to 3,000 feet.[185] A map included as Figure 1 in the subsequent substantive decision in the case indicates (with what precision is unknown) that the watershed boundaries were about .5 miles on one side of certain of the wells in question, and perhaps as much as 2.5 miles on the other side.

d. Tia Juana River, San Diego County

An unsigned memorandum by an attorney for the Board's predecessor, the Division of Water Rights, Department of Public Works, prepared on January 16, 1924 in regard to what was

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[181] Internal Memo from Gil Torres to Mr. Walt Pettit, Division of Water Rights, regarding "Applications 24239 [et al.], Chorro and Morro Creeks, City of Morro Bay, San Luis Obispo County" (Jan. 7, 1977), at 1, 2. In the substantive decision in the case, however, it was determined that at least some of the wells were causing a direct reduction of streamflow of about 0.1 cfs in Chorro Creek from pumping a well at 0.53 cfs. D. 1633 (1995), at 11. The Board made clear that though the term "underflow" was used in the case it was not meant to have a restrictive meaning, but was used to refer to the broader category of subterranean stream flowing through known and definite channels, *Id*., at 2, n.1.

[182] Internal Memo, *supra* note 181, at 1.

[183] *Ibid*.

[184] D. 1589 (1982).

[185] Transcript of testimony of John F. Mann, Jr., Before the State Water Resources Control Board, Division of Water Rights, In the Matter of Applications 24239 [et al.], Chorro and Morro Creeks, Jan. 12-13, 1977, at 76.

described as the first application received for a permit to appropriate underground water, urged the Board to take a limited view of its jurisdiction, focusing on the actual facts of *Pomeroy* for guidance, rather than the more inclusive language in some of the headnotes. He said that it was inappropriate to use the general words in headnotes 15 and 16 of *Pomeroy* to justify taking jurisdiction over "a catchment basin, a detritus filled valley, or an underground reservoir or lake constituted of water filling a porous formation of gravels....[S]uch basins or reservoirs are not subterranean streams merely because they have a bottom and sides and contain a water bearing formation through which the water moves, percolates or flows in a definite general direction, that is toward the lower end of the basin....Nor does the court indicate in [*Pomeroy*] that it considered the entire area covered by the narrows, which was in places from 2 ½ to 3 miles wide, a subterranean stream....[I]t is deemed conclusive that the Division of Water Rights can not under the guise of an expanded definition of 'a subterranean stream...' bring within its jurisdiction the waters of typical underground basins, reservoirs or lakes."[186] Despite the attorney's strong memo urging the Division to decline jurisdiction, a permit was granted for what was described in one brief as "an underground lake, a natural reservoir...where a great natural dam or plug of adobe fills the mouth of the river...."[187] The case may be of little precedential importance, since neither side urged the Division to decline jurisdiction; only the Division's attorney appears to have been concerned about setting a bad precedent.[188]

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[186] Memorandum re Jurisdiction Over Applications To Appropriate Underground Water, at 4, unsigned and undated signature line for "Attorney for Division," stapled to Personal Memorandum (Do not file) re Application Number 1851, Reference to Memo. date of Jan. 16, 1924, re jurisdiction over applications to appropriate underground water, dated January 17, 1924, also with unsigned signature line for Attorney for Division. The dated memo refers in the text to the Tia Juana River Valley application of the Coronado Water Company. The January 17th memo is initialed SEB, undoubtedly referring to Spencer Burroughs who was attorney for the Division at that time.

[187] The quote is from the "Brief of Protestor Herbert Peery" in re Application No. 1851, stamped received by the Dept. of Public Works, March 5, 1923, at 1. The permit is No. 1724, granting application 1851 by the Coronado Water Company to appropriate groundwater in the Tia Juana River Valley. The permit was abandoned by the successor permit holder, California Water and Telephone Co., in February 1962.

[188] A private water company wanted to install wells in the valley where existing farmers' alfalfa was being root-irrigated by the existing high water table, which they feared would be drawn down. Their claim was that overlying uses should be protected against export appropriations. (Of course they should. The real question was whether they were entitled to have the "natural" level of the water table maintained. This controversy arose in 1923, prior to the constitutional amendment that is now Article X, § 2). In any event, both sides apparently wanted the State to take jurisdiction and to give its stamp of approval to their position, rather than litigating the question privately. The attorney who wrote the memo urged (in addition to his legal

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e. Carmel River, Monterey County

In this case, testimony offered that the subsurface flow of the Carmel River was a subterranean stream was not contested, and "accordingly" – without drawing any conclusions of its own – the Board found it to be a subterranean stream and subject to Board jurisdiction.[189] The case, therefore, is of no precedential importance. It is nonetheless interesting because it illustrates the tension created when a setting that does not have the geographic elements of a conventional subterranean stream case[190] is combined with strong concerns about the impact of pumping on a stream. The alluvial valley in question was about 15 miles long and .5 to 1 mile wide, the valley floor consisting all of younger alluvium ranging in thickness from about 1 foot to 200 feet near the river mouth. The river channel itself ranged from 20-150 feet in width. Pumping impacts on the stream were a central concern.[191] The case is also illustrative of the disagreement commonly found in cases over the presence of confined or partially-confined aquifer conditions. The highly various and complex conditions within different aquifers can generate diverse conclusions from technical experts as to whether, and to what extent, pumping from beneath more-confining layers within an aquifer is impacting a surface stream.[192]

The following is from a memo to the Board from the Chief of the Division of Water Rights in the Carmel River case:[193]

> It can be concluded that a classification of the basin as underflow or as groundwater would be a very close call. Litigation might be necessary to finally settle the question, and the burden of proof would fall on the Board, were we to find the

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[188](...continued)
argument) the State not to become implicated in this essentially private fight.

[189] Order No. WR 95-10, at 12-13, 1995 WL 464902 at 5 (1995).

[190] I.e., a physical-proximity/underflow type case.

[191] See G.M. Kondolf, et al., Effects of Bank Storage and Well Pumping on Base Flow, Carmel River, Monterey County, 91 J. Hydrology 351 (1987).

[192] See, e.g., Carmel River Watershed Management Plan, Working Paper Number Six, Legal Status of Carmel Valley Groundwater, prepared for the California Department of Fish and Game by the Monterey Peninsula Water Management District, John Williams, Resource Analyst, September 1983, at 31-34.

[193] Quoted in Carmel River Watershed Management Plan, *supra*, at 33. Note the use of "underflow" here as a synonym for the statutory subterranean stream definition; and the Board's recent insistence that underflow is only one subcategory of subterranean stream. It is hardly surprising that outsiders have been confused.

water to be underflow and attempt to require the company to file water right applications. The presumption would be that the water is in a groundwater basin and not part of a flowing stream.

f. Sacramento River Groundwater Transfer, Yolo County

This was the only decision found that can be read to conclude openly that the fact of "direct surface stream impact" from pumping is irrelevant to the Board's jurisdiction over groundwater, though the jurisdictional question is only adverted to in an aside. The matter arose in the context of the 1977-78 drought, and involved a proposed pumping operation that would have created a cone of depression whose effect would likely have drawn a good deal of water out of the surface flow of the Sacramento River. The decision suggests that such impact does not trigger jurisdiction under Water Code § 1200. "In reviewing this program," it said, "we have been mindful of our limited jurisdiction over percolating groundwaters and recognize that no application for a permit to appropriate percolating groundwater is required by law....It should be noted that the Governor's Commission to Review California Water Rights Law is studying the issue of groundwater rights. To the extent that such review may lead to approaches to coordinate surface and groundwater rights, problems such as those raised by the instant proposal could be resolved in a more orderly manner."[194]

g. San Luis Rey River, San Diego County (Mission and Bonsall Basins)

While most "direct impact" cases seem to fit into conventional subterranean stream settings – such as wells in the alluvium of a narrow coastal river canyon, or wells so proximate to the river that they easily qualify as underflow – occasionally more perplexing cases arise. In such instances, while pumping clearly threatens a "direct impact" on surface stream interests, the river valley is fairly broad and the wells aren't pumping what is commonly understood to be underflow. Perhaps the most notable example of such a case is a 1938 decision of the State Engineer,[195] reconsidered and reaffirmed in 1962,[196] dealing with the status of groundwater in the downstream reaches of the San

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[194] D. 1474 (1977), at 13, 1977 WL 22457 at 6. See also D. 1474, at 7,10; 1977 Westlaw 22457 at 3,5.

[195] D. 432 (1938).

[196] In the Matter of Permit 5227 et al. (Order Extending Time to Complete Application of Water to Beneficial Use Under Permits 5228 and 5229 (State Water Rights Board, June 26, 1962)). As a result of substantial pumping and a series of dry years (15 or more years), the factual situation had changed (at least for the time). It was apparently alleged that the ground water table was much lower, and groundwater direction had shifted, so it was urged the Board should relinquish jurisdiction. See Memorandum [to the Files?], regarding Permits 5227, 5228 and 5229 (continued...)

Luis Rey River,[197] the same river that was at issue in the 1999 *Pauma and Pala* draft decision. Basically the question was whether proposed municipal pumping projects for growing north San Diego County communities sought by Fallbrook, Oceanside, and Carlsbad would interfere with existing downstream irrigators, and risk infiltration of seawater into the aquifer. The Board found there would likely be such interference. It took jurisdiction of the proposed wells on the ground that they pumped from a subterranean stream, and the Board limited operation of the wells in order to protect existing surface water rights.

The area in question was defined by a river that widened and then constricted as it went through several narrows on its way to the ocean. Above the narrows the water spread underground in basins averaging about one mile wide,[198] with water rising to the surface as it reached the narrows, then sinking underground again at the downstream end of the narrows, and into another basin.

This was plainly not a narrow alluvial valley with a well in the immediate physical environs of a river; but rather a substantial well field across a rather broad alluvial plain. Fallbrook, for example, proposed to drill ten wells in the valley bottomlands. The 1938 decision strongly suggested the Board's appreciation that this was not the usual subterranean stream case. For example, it said, "while the underground water is concluded to be a definite stream, yet the bottoms along the river constitute reservoirs of some magnitude just as are found in a surface stream in its wide, deep and

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[196](...continued)
(Applications 8156, 8205 and 8418), from Charles M. Harris, Associate Engineer, Water Resources, concurred in by Lee W. Carter, Senior Engineer, Water Resources (Jan. 3, 1962), at 14-15.

[197] Permits 5228 and 5229 dealt with the Mission Basin, and Permit 5227 dealt with the Bonsall Basin. The Board considered them together in 1961 because "the physical characteristics of Bonsall and Mission Basins appeared to be similar." Order Extending Time [etc.], *supra* note 196, at 2. Interestingly, the Board says that in 1938 the State Engineer concluded that the Bonsall, Mission, *and* Pala sectors and their connecting narrows constituted an underground channel with known and definite banks and bottom. *Id.*, at 9.

[198] In the 1938 decision, D. 432, the Board said the areas in question were bottoms in three sectors, one of which averaged a maximum width of 3,800 feet in an area six and one-quarter miles long; another with a maximum width of 6,500 feet and five miles long; and a third was about 600-700 feet wide and five miles long. The average depth of the alluvium ranged from under 100 to about 200 feet. All through this area the alluvium was "most of the time full of water to or near the surface." D. 432 at 11. See Order Extending Time, *supra* note 196, at 13.

slow moving reaches."[199] Then it added, while the "[m]ovement downstream is very slow"[200] underground water was appearing on the surface at several narrows, evidencing the presence of an "underground channel...too narrow to carry the flow which is moving through the wider and deeper channels above and below."[201] While this description depicted a setting quite different from the sort of "underflow" that had been involved in the *Pomeroy* case, the Board found there was "an underground stream in a definite channel." The channel's width varied considerably from a few hundred feet to a maximum of more than a mile. Nonetheless, the Board found it had the necessary bed and banks consisting of "bedrock hills of granite or other material descending sharply to the trough and definitely marking the banks...[and] [t]he same bedrock would be found to continue across the bottom."[202]

That the decision was unconventional is evidenced by the fact that the same areas of the San Luis Rey River that were discussed in the 1938 decision (the downstream Mission and Bonsall Basins) came before a Superior Court in 1959, and again before the Board in 1962.[203] The trial judge had concluded in a memorandum opinion "that ground water in the Mission Basin does not constitute a subterranean stream flowing in a known and definite channel."[204] The Board, however, reaffirmed the 1938 decision. It again noted that movement of the subterranean water was slow,[205] but it did not find that fact disqualifying. It said all the elements were necessary to find a subterranean stream within the meaning of § 1200 of the Water Code. During normal years when the water table was high, and ignoring changes in water movement brought about by pumping's cones of depression, it said, there was frequent contact between the subsurface water and the surface flow, and the direction of movement was the same in both instances, moving downgradient with the stream. As to the existence of a channel, it noted that the width of the banks in *Pomeroy* was 1½ to 2 miles, and in another Supreme Court case,[206] 700 to 1800 feet in width, while here it was on average

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[199] D. 432, at 14, 15.

[200] *Id.*, at 13.

[201] *Ibid.*

[202] *Id.*, at 12.

[203] Order Extending Time, *supra*, note 196. The case is cited in the order as *San Luis Rey Water Conservation District v. Carlsbad Mutual Water Company*, San Diego Superior Court No. 184855, memorandum opinion dated November 18, 1959.

[204] Order Extending Time, *supra* note 196, at 2.

[205] About one-third of a mile per year *(Id*., at 7).

[206] *Verdugo Canon Water Co. v. Verdugo*, 152 Cal. 655, 659 (1908).

"only about one mile wide."[207] It then announced (in the single sentence it underscored in its opinion) what was apparently a strong influencing factor for it: "The conclusion is inescapable that during periods of normal rainfall and runoff the stream and underground water function as a closely related unit with the effects of surface flow extending from bank to bank."[208]

That underscored sentence suggests that though it did not track the usual physical shape of subterranean stream cases, in fact the 1938 Bonsall Basin case was functionally an underflow case, that is, one where pumping the wells anywhere within the basin ("from bank to bank") was directly impacting the surface stream,[209] and that therefore the subterranean waters were effectively a subterranean element of the surface stream. In that respect the Bonsall Basin case was within the mainstream of Board decisions both before and after it.

The 1962 decision also posed an extremely important question that has not often been considered, but becomes crucial if stream impact is acknowledged as the determinant of jurisdiction. That question is whether a well should be viewed as pumping from a subterranean stream if the qualifying criteria are not presently being met, but were being met under earlier conditions before there was extensive pumping. An example would be where pumping has lowered the water table, changed the direction of flow, and several hydrological connectivity which previously existed and would be restored if pumping were substantially constrained. This is not a matter that has been settled, either in Board or judicial decisions, but there is a staff expression of opinion dealing with the variant situation where an extended drought, along with pumping, has dramatically changed natural conditions in the basin. A staff report prepared for the 1962 consideration of Board jurisdiction over groundwater in the Mission Basin reads as follows:[210]

> Therefore, in re-examining the analysis leading to Decision #432 in the light of present conditions, it is concluded that the basic natural factors have not been altered, but that a prolonged period of very low precipitation combined with steady pumping has caused a temporary overdraft condition which could and probably will be corrected upon resumption of normal rainfall and runoff....Such a situation would cause a recurrence of the factors necessary to a complete legal definition of an underground channel. As a result of these considerations, it is believed that the Board would be remiss in its responsibilities were it to relinquish jurisdiction.

There are a number of places in California where widespread pumping over the years has lowered

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[207] Order Extending Time, *supra* note 196, at 13. Mission Basin is about 9 miles long.

[208] *Id*., at 13 (emphasis in original).

[209] "...it is clear that the ground water table would be affected directly by surface flows in the river and vice versa when the ground water table is near the surface..." *Id.*, at 13.

[210] Memorandum [to the Files?], *supra* note 196, at 15.

the water table and reversed the gradient that existed before pumping began.[211] Continuation of that pumping may have no current adverse impact on surface stream flows. But if that pumping were to cease or cut back, eventually the water table would rise and contribute significantly to surface stream flows, which have been historically diminished by pumping. Thus the question of "hydraulic connection" has temporal and cumulative elements to it. From a legal perspective, the question is whether and to what extent longstanding uses should be accepted, under "grandfathering," in order to minimize disruption of established human communities and economies.[212] These perplexities, among others, lead to the suggestions, made earlier in response to Question 6 that jurisdictional decisions should not be used to reverse long-standing situations of hydrological disconnection; and also to the proposal made below in Part VI,[213] suggesting comprehensive basin management, rather than legislatively expanded permitting jurisdiction, is the preferred long-term solution to overpumping.

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[211] E.g., *United States v. Fallbrook Public Utility Dist*., 193 F.Supp. 342, 353 (S.D. Cal. 1961), rev'd in part on other grounds, 347 F.2d 48 (9 Cir. 1965). The impacts of such sustained pumping are noted and described in G. Mathias Kondolf, Surface-Ground Water Interactions: Some Implications for Sustain ability of Ground Water Resources, Proceedings of the 19th Biennial Ground Water Conference, JJ DeVries, J. Woled, eds., Water Resources Center Report No. 84, Univ. of Cal., Davis (1994), at 135.

[212] If the Board adopted an expanded view of its jurisdiction, affecting some existing pumpers who had never applied for permits, there would – it seems – be some ability to prefer existing users to new applicants, notwithstanding application date, and perhaps to grant priorities to existing pumpers who are new applicants that reflect their actual relative date of beginning pumping. "Water Code Section 1450 states that any application properly made gives to the applicant a priority of right as of the date of the application until such application is approved or rejected. The SWRCB has the authority, however, to modify the relative priority of applications. (Water Code Section 1257)." D. 1632 (1995) (New Los Padres Project of Monterey Peninsula Water Management District, Carmel River, Monterey County), at 43, 1995 WL 464946. Such authority, however, would not help those making unpermitted diversions from subterranean streams as against those with already permitted or licensed rights. See also note 303, *infra.*

[213] See item 6 in response to Question 6, following note 30, *supra;* and point (3), text at note 306, *infra.*

PART IV:

GROUNDWATER LAW IN OTHER STATES[214]

1. Arizona

Arizona's experience deserves extended consideration both because it is the only other state with a statute like California's,[215] and because its courts and Department of Water Resources have dealt extensively and recently with the definition of subterranean streams (which their statute calls "underground channels," and which their courts call "subflow"). In contrast to the experience in California, Arizona's Supreme Court interpreted its statutory provision in major decisions on several occasions, starting in 1931,[216] and then again in 1993[217] and 2000.[218] The Court's decisions

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[214] For related literature on groundwater law in other states, see Robert Jerome Glennon & Thomas Maddock, III, The Concept of Capture: The Hydrology and Law of Stream/Aquifer Interactions, in Forty-Third Annual Rocky Mountain Mineral Law Institute (1997), at 22-1 – 22-89; Herman Bouwer & Thomas Maddock III, Effects of Groundwater Pumping on Streamflow: Legal and Hydrologic Aspects, Proceedings of the 21st Biennial Ground Water Conference, University of California Water Resources Center Report No. 95 (1998) 9; Robert J. Glennon & Thomas Maddock, III, In Search of Subflow: Arizona's Futile Effort to Separate Groundwater from Surface Water, 36 Ariz. L. Rev. 567 (1994); John D. Leshy & James Belanger, Arizona Law Where Ground and Surface Meet, 20 Ariz. St. L.J. 657 (1988); Douglas Grant, The Complexities of Managing Hydrologically Connected Surface Water and Groundwater Under the Appropriation Doctrine, 22 Land and Water L. Rev. 63, 64 (1987); Frank J. Trelease, Conjunctive Use of Groundwater and Surface Water, 27 Rocky Mtn. Min. L. Inst. 1853, 1857-58 (1982); Barbara Tellman, My Well v. Your Surface Water Rights: How Western States Manage Interconnected Groundwater and Surface Water, U. AZ Water Resources Res. Center, Issue Paper No. 15 (June 1994); David H. Getches, Water Law in a Nutshell, at 272 et seq. (3d ed. 1997).

[215] A.R.S. § 45-141(A): "The waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels...are subject to appropriation..."

[216] *Maricopa County Municipal Water Conservation Dist. No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931) (hereafter *Southwest Cotton*).

[217] *In re the General Adjudication of...The Gila River System*, 175 Ariz. 382, 857 P.2d 1236 (1993) (hereafter *Gila River II*).

[218] *In re the General Adjudication of...The Gila River System* (hereafter Gila River IV), (continued...)

have also been the subject of extensive law review discussion,[219] and of an unusually detailed and candid analysis by the Arizona Department of Water Resources (ADWR).[220]

The Arizona experience is especially interesting because its recent judicial decisions arose out of an effort to develop workable, objective criteria to be used in deciding what groundwater wells should be treated as pumping from "definite underground channels," the statutory provision that parallels California's subterranean stream definition in Water Code § 1200.

By way of introduction, it should be noted that since the 1931 decision in the state's leading case, *Southwest Cotton*, Arizona seems to have essentially abandoned any search for subterranean streams as such, and limited the application of its statute to those underground waters that constitute what it calls "subflow."[221] It is not entirely clear why it has done this. *Southwest Cotton* itself was a subflow case, and that may be the only sort of subterranean stream issue that has come before the Arizona courts. In any event Arizona has concluded that a broad alluvial valley cannot meet the definition of an underground channel,[222] a proposition that it notes is supported by *Pomeroy's* view of the San Fernando Valley.[223]

The history of judicial interpretation of Arizona's statute is instructive. Arizona's bifurcated system applies appropriation law to surface water and a different rule to groundwater. What underground water, then, if any, should be managed under the appropriation system? The leading case that addresses that question, *Southwest Cotton*, can be read as both sophisticated and naïve. In one

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[218](...continued)
198 Ariz. 330, 9 P.3d 1069 (2000), cert. denied sub. nom. *Phelps Dodge Corp. v. United States*, ___ U.S. ___, 121 S.Ct. 2576, 150 L.Ed.2d 739 (2001) (asserting that judicial interpretations of subflow in the 1993 and 2000 decisions of the Arizona Supreme Court constituted a sudden and unpredictable departure from prior precedent and thus constituted an unconstitutional taking without compensation).

[219] Glennon & Maddock, (1994), *supra* note 214. Glennon & Maddock (1997), *supra* note 214. Bouwer & Maddock (1998), *supra* note 214.

[220] Preliminary Report on Proposed Criteria to Identify Stream Subflow, Arizona Department of Water Resources (November 5, 1993) (typescript); Technical Assessment of the Arizona Supreme Court Interlocutory Appeal Issue No. 2 Opinion, In re The General Adjudication of the Gila River System and Source, Arizona Department of Water Resources (December 15, 1993) (typescript).

[221] *Southwest Cotton*, 39 Ariz., at 96.

[222] *Id.*, at 89-90.

[223] *Id.*, at 97-98.

respect, it seems to take a very contemporary and hydrologically informed position. The Court's answer is that those waters which are "as a matter of fact...part of the surface stream"[224] should be managed under appropriation. The way to determine the identity of such waters, the Court said, is by asking, does "drawing off the subsurface water tend to diminish appreciably and directly the flow of the surface stream? If it does, it is subflow, and subject to the same rules of appropriation as the surface stream itself."[225]

In other words, the Court interpreted its subterranean stream category as designed to protect the integrity of its surface stream appropriation system. Thus, it concluded, all uses that appreciably and directly affect surface streams should be managed integrally with the surface stream system. Thus understood, the court's interpretation seems both rational (it approaches the issue functionally rather than definitionally), and workable (though the system is a continuum throughout the watershed, one need only manage for significant interference, rather than for any and every impact, however remote in quantum and time).

To this point, *Southwest Cotton* seems to have taken a thoughtful, functional approach to the problem – embracing within the surface water system only pumping that "appreciably and directly" affects the flow of surface waters, and defining such pumping as "subflow." But then the Court took a turn in another direction. Drawing on the formalistic treatise writer Kinney, the Court added that subflow may be defined as "the bed of the stream, or the lands under or immediately adjacent to the stream."[226] By adding a locational element to its conception of subflow, the Court shifted from a functional definition to a geographical one. While one need not necessarily read the opinion that way (for example, the Court said "in <u>almost all cases</u> the so-called subflow is found within, or immediately adjacent to, the bed of the surface stream itself," suggesting that proximity is simply a guide to answering a functional question, rather than a requirement in and of itself[227]), that *is* the way the subsequent Arizona Supreme Court has read it, assuring that what might have been a hydrologically and administratively workable standard, would become a more formalistic, geographically driven test.[228]

Because of its geographic-test interpretation of *Southwest Cotton*, in 1993 the Arizona Supreme Court rejected a carefully developed trial-court-fashioned test that was designed to be functional (asking whether the pumping was appreciably and directly diminishing the surface stream), on the ground that it used an impact test, rather than the geographical one that *Southwest Cotton*, in its

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[224] *Id*, at 96.

[225] *Id*., at 97 (emphasis omitted).

[226] *Id.*, at 96.

[227] *Id*., at 97 (emphasis added).

[228] *Gila River II*, 175 Ariz., at 390-91.

view, required.

The trial court had determined that wells withdrawing water from the younger alluvium within the stream basin should be presumed to be pumping appropriable subflow if:[229]

> As to wells located in or close to that younger alluvium, the volume of stream depletion would reach 50% or more of the total volume pumped during one growing season for agricultural wells or during a typical cycle of pumpage for industrial, municipal, mining, or other uses, assuming in all instances and for all types of use that the period of withdrawal is equivalent to 90 days of continuous pumping for purposes of technical calculation.

The Supreme Court rejected that test, holding that location, not impact, was decisive. It said, "*Southwest Cotton*...did not purport to identify subflow in terms of an acceptable amount of stream depletion in a given period of time. It sought to identify subflow in terms of whether the water at issue was part of the stream or was percolating water on its way to or from the stream."[230] The Court thus ruled that the trial judge must be guided by the language in *Southwest Cotton* stating "that subflow is found within or immediately adjacent to the stream bed."[231]

In a report issued following the Supreme Court's 1993 decision, designed to guide the trial court on remand in fashioning a legally acceptable definition of subflow, the ADWR identified a number of respects in which the Supreme Court had perpetuated "the arbitrary nature of the bifurcated system" in Arizona, and imposed legal concepts "at odds with hydrological reality."[232] What is arbitrary about the decision, the ADWR said, is the notion that there is such a thing as water "more closely associated with the stream than with the surrounding alluvium,"[233] which is how the Court defined subflow. As the Report gently put it, "[h]ydrologists generally agree that in perennial and intermittent stream environments water is interrelated and interconnected."[234]

In other words, if one wants to make distinctions about water within a single interrelated system such as a stream and the watershed of which it is a part, the recommended way to do so is to draw lines based on hydrological distinctions, such as impact of pumping on streamflow measured over

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[229] *Id.*, at 385 (quoting trial court).

[230] *Id.*, at 391-92.

[231] *Id.*, at 391.

[232] Preliminary Report, *supra* note 220, at 1.

[233] *Id.*, at 4 (quoting *Gila River II*, 175 Ariz., at 391, 144 Ariz. Adv. Rep., at 23).

[234] *Id.*, at 1.

specified time periods. As the Report indicates, while any such approach incorporates a policy decision, cutting off consideration of impacts at some selected point – the hydrologic system being essentially a continuum – using impact over time at least draws the line in terms of managerial realities that reflect hydrological significance, rather than a merely arbitrary geographic line. Some such policy decision must be made in every water management system.[235]

In an unmistakable, though diplomatic, rebuke to the Court, the Report says,

> the Court establishes the legal concept that the imaginary line between percolating groundwater and appropriable subflow is a geographic line, rather than a geologic line, by rejecting the younger alluvium test. In the Court's own words, subflow is water that is 'more closely associated with the stream than with the surrounding alluvium.' DWR can only interpret this to mean that subflow is the physical presence of water in a certain geographic location at a particular moment in time....Developing a set of criteria based on these guidelines negates the need to use the aquifer parameters of transmissivity and storage coefficient because these are only useful in determinations that calculate a specific volume of water depleted from the stream after a certain period of time, a specific rate of depletion after a certain period of time, or the location of the boundary between older and younger alluvium.[236]

Following the ADWR Report, the case returned to the trial court for a revised decision consistent with the Supreme Court's opinion. Obliged to draw a geographic rather than a geologic line (to find which wells are "more closely associated with the stream than with the surrounding alluvium"), the trial judge fashioned, and the Supreme Court has now validated, a geographic definition of subflow that probably includes most of the wells that have the greatest impact on the stream. While abjuring any direct measure of impact (such as the rejected 50%/90 day test), it

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[235] See Technical Assessment, *supra* note 220, at 36: "In other states that have a unified water law system, in which both groundwater and surface water are appropriable, there is still a need to establish streamflow interference thresholds for the conjunctive management of groundwater and surface water rights. States such as Colorado and New Mexico recognize that wells located some distance from the stream have an effect. Those states use a time based maximum interference test to identify which wells need to be actively administered in the prior appropriation system. Oregon uses a distance based approach, declaring wells within specified proximity to the stream to be within the law of appropriation. Whether Arizona has a bifurcated or unified system of water law, there is still the need to establish a test for identifying wells which significantly effect [sic] streamflow. That test must of necessity incorporate some type of arbitrary factor within its criteria."

[236] Preliminary Report, *supra* note 220, at 4 (citations omitted).

defines subflow as the "saturated floodplain Holocene [younger] alluvium."[237] To this the Court added several other criteria to provide "more certainty and reliability."[238] It noted that the geologic unit must be saturated because of the need for a hydraulic connection between the stream and the subflow. The water which makes up the saturation must flow substantially in the same direction as the stream, and the effect of any side discharge from tributary aquifers and basin fill is overcome or is negligible. In addition:[239]

1. the water level elevation of the subflow zone must be relatively the same as the stream flow's elevation.
2. the gradient of these elevations for any reach must be comparable with that of the levels of the stream flow.
3. there must be no significant difference in chemical composition that cannot be explained by some local pollution source which has a limited effect.
4. where there are connecting tributary aquifers or floodplain alluvium of ephemeral streams, the boundary of the subflow zone must be at least 200 feet inside of that connecting zone so that the hydrostatic pressure effect of the side recharge of this tributary aquifer is negligible and the dominant direction of flow is the stream direction.
5. where there is a basin-fill connection between saturated zones of the floodplain Holocene alluvium and a saturated zone of basin fill, the boundary of the subflow zone must be 100 feet inside of the connecting zone so that the hydrostatic pressure effect of the basin-fill's side discharge is overcome and the predominant direction of flow of all of the subflow zone is the same as the stream's directional flow.

The irony of the Arizona situation is that its Supreme Court in 1921, often condemned for backwardness, basically understood the importance of managing water functionally, while the same Court 72 years later – in a misplaced effort to defer to earlier precedent – turned the clock back to the formalism of an earlier time. The functional approach described by the ADWR reports was

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[237] Holocene is a period of time covering the most recent 10,000 years. It should be noted that the Technical Advisory Committee appointed by the Board to assist the author of this Report concludes that "anything in the Arizona [Report] that discusses this younger alluvium...[is] probably not applicable to the general case in California." The reason is that "In California, many river systems are constructional – that is the river deposits have built-up on top of previous sediments. Good examples of this are the areas in California where levees are required to control higher flows in the streams, because the streams are very close to surrounding surface elevations." Memorandum, Dr. Steven Bachman, to Joseph Sax, August 15, 2001, at 1 (on file with Joseph Sax).

[238] Gila River IV, 198 Ariz., at 337-38 (quoting trial court).

[239] *Ibid*.

long ago understood by the California Supreme Court, as evidenced by decisions like *Katz v. Walkinshaw*[240] and *Los Angeles v. Hunter*.[241] And, as an earlier section of this Report indicates, there is good reason to conclude that the California legislature knew it as well, and intended to legislate it in 1913.

2. Other Western States

How do other western states deal with the groundwater/surface water intersection, and what have any of them done that might be of interest to California, either in modifying its administration of the law as it currently stands, or in considering changes in the legal test it now employs?[242] While categorization of groundwater as either percolating water, or as subterranean stream water, was once common in many western states, it has been rejected as a scientific anachronism almost everywhere for many years. To take just a few examples, Utah got rid of it in 1935,[243] Kansas did so in 1945,[244] and North Dakota in 1955.[245] It remains as a legally significant category only in Arizona and California.

In general, western states may be categorized as falling in one of four categories:[246]

1. At one extreme is Oklahoma, which rigidly separates surface water and groundwater, and treats as groundwater any water under the surface of the earth outside the cut bank of a definite stream. Though prior appropriation governs both surface water and groundwater, the two sources are managed separately without integration. Texas – which still follows an absolute ownership rule for

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[240] 141 Cal. 116, 74 P. 766 (1903).

[241] 156 Cal. 603, 105 P. 755 (1909).

[242] Several excellent, modern articles are available dealing with the very questions posed in this study – essentially the problems and opportunities for integrating groundwater and surface water management – and the following draws significantly upon them, with thanks. Among those upon which I especially relied are: Glennon & Maddock (1994), *supra* note 214; Glennon & Maddock (1997), *supra* note 214; Grant, *supra* note 214.

[243] See Robert W. Swenson, A Primer of Utah Water Law: Part II, 6 Energy L.& Pol'y. 1, 25 (1985).

[244] Kans. Laws 1945, ch. 390, § 25.

[245] See *Baeth v. Hoisveen*, 157 N.W.2d 728, 730 (N.D. 1968).

[246] Where not otherwise cited, references to state statutes and cases cited can be found in Glennon & Maddock (1997), *supra* note 214.

groundwater – also provides no integrated management of groundwater and surface water (though it has been under strong pressure, because of an Endangered Species Act problem in the Edwards Aquifer, to do so).[247]

2. At the other extreme are those states that have a fully integrated system, under which all water is within the appropriation system, and seniority and juniority is recognized without regard to whether one is using groundwater or surface water.[248] Nebraska has moved somewhat toward integration, giving local districts authority (but not an obligation) to designate groundwater management areas and to develop plans for integrated use of groundwater and surface water.

3. Oregon and Colorado treat groundwater and surface water as separate systems (though appropriation applies to both), but have a specific method for integrating uses, founded on whether there is impact by a user of one source on a user from the other source. These methods are usually called "bright-line rules."

4. California and Arizona separate groundwater and surface water, drawing a line between them by a statutory category.[249] The statutory characterizations are almost certainly meant to be the same, though the phrasing of the laws differ somewhat.

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[247] For a review of the Texas situation generally, see *Sipriano v. Great Spring Waters of Am., Inc*., 1 S.W.3d 75 (Tex. 1999).

[248] E.g., Washington, Kansas, New Mexico, Nevada, North Dakota, Utah, Wyoming, Idaho.

[249] This seems to be the case in Texas as well, though the statutory situation in Texas is rather confused. Tex. Water Code Ann. §§ 52.001(4) (repealed in 1995), defined underground water as "water percolating below the surface of the earth...but does not include defined subterranean streams or the underflow of rivers." That definition still appears in Tex. Water Code Ann. § 64.003(12), which deals with import authorities, but a new statute dealing with groundwater conservation says only "'Groundwater' means water percolating below the surface of the earth," without qualification, Tex. Water Code Ann. § 36.001(5). In any event, the Texas courts thus far have rigorously applied the Kinney Treatise of 1912 as authority: "[f]or...water to qualify as surface water, the subterranean water course must have all the characteristics of surface water courses, such as beds, banks forming a channel, and a current of water," citing as authority, Kinney, §1155, at 2099, *A.H. Denis, III v. Kickapoo Land Company*, 771 S.W.2d 235, 236 (Ct. App. Texas, 1989), writ of error denied Oct. 25, 1989. Moreover, a designation of the Edwards Aquifer as a subterranean watercourse was found void by a state district court, and declared not an underground river in legislation in 1993, though litigation in a suit attempting to adjudicate water rights in the Edwards Aquifer on the theory that it is an underground river is still pending at this time. These issues were discussed by Douglas G. Caroom in an April 8, 1999 presentation at a Local Government Seminar, available at http://www.bickerstaff.com/articles/groundwater.htm.

> While California's law defines the jurisdiction of its administrative permitting agency, the Arizona law is utilized to determine whether or not the water in question is subject to appropriation, or is governed by the groundwater reasonable use system.

It would lengthen this Report unduly to describe in detail all the variants, intricacies and implementation issues encountered in each of the states mentioned above. The states on the two extremes – those that do not integrate administration at all, and those that totally integrate – have little if anything to offer California under its current law.

3. Nebraska

Nebraska's approach will doubtless be of interest to water interests in California. Until quite recently, surface streams and aquifers had been dealt with under separate legal regimes, and there was no law governing groundwater withdrawals that affect surface water rights. However, in 1996 a law was enacted stating that where groundwater and surface water are physically interrelated, they should be managed as one source,[250] but the question who was to govern was controversial for reasons that would be entirely familiar to Californians. The new law gives to local natural resource districts (NRDs) authority to resolve surface/groundwater conflicts by designating groundwater management areas and developing management plans for conjunctive use in what are called integrated management areas.[251] The State DWR (which like the Board here has surface water jurisdiction) was given only very limited authority to act where the NRDs fail to act (where interstate compacts are involved). The incentive for the new law was a particular problem, pumping in Nebraska that affected its ability to meet its compact obligations under the Republican River Compact.

Inquiries in Nebraska reveal that at least one NRD has initiated an integrated management plan (North Platte NRD, for Pumpkin Creek) to control groundwater impacts on stream flows. A moratorium was instituted on new well drilling, while existing wells are measured for pumping rates over the next few years to determine use. No limits on existing uses have been imposed at this time. Groundwater users have sued to challenge the NRD Management Plan, while surface water users have filed suit against the State seeking damages for its alleged failure to regulate

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[250] See Stephen D. Mossman, Whiskey is for Drinkin' But Water is for Fightin' About: A First-Hand Account of Nebraska's Integrated Management of Ground and Surface Water Debate and the Passage of L.B. 108, 30 Creighton L. Rev. 67 (1996).

[251] The NRDs are given authority to limit the total amount of groundwater withdrawn, institute a system of rotating groundwater use, requiring well spacing, and requiring a reduction in the number of irrigated acres.

groundwater use. The details of the plan can be accessed on the North Platte NRD website.[252] Another plan is said to be in the offing for Lodgepole Creek in the South Platte NRD. Then there is the Platte River Cooperative Agreement, which involves three-state negotiations, a Supreme Court interstate water case, and the Endangered Species Act, which presents a sort of ultimate legal, economic, and political test of a state's capacity to integrate management of hydrologically connected ground and surface water.[253]

4. Oregon

Oregon and Colorado have also employed techniques that might be of interest here: efforts to implement so-called "bright line" tests for determining when pumping impacts on surface streams should no longer be taken into account because they are too remote. Oregon regulates groundwater appropriation in order to prevent "substantial interference with surface water supplies"[254] (which includes both appropriators and instream flow rights). This is somewhat the same as the impact test proposed by the trial court in Arizona, discussed above. The Oregon administrative standard is the following:

1. Is the aquifer hydraulically connected to the surface water source?[255] If yes, then a well producing water from that aquifer is presumed to be a cause of substantial interference, if any of the following conditions exists:

    a. The well is less than .25 mile from the surface water source; or

    b. The rate of appropriation is greater than 5 c.f.s. and the well is less than 1 mile from the surface water source; or

    c. The rate of appropriation is greater than 1% of the minimum perennial

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[252] http://www.npnrd.org

[253] See J. David Aiken, Balancing Endangered Species Protection and Irrigation Water Rights: The Platte River Cooperative Agreement, 3 Great Plains Nat. Res. J. 119 (1999).

[254] Or. Admin. R. § 690-09-040. Washington State does not require a substantial impact. It regulates pumping that "affects, even if minutely, the river's flow...," *Hubbard v. Washington Dept. of Ecology*, 86 Wash.App. 119, 124, 936 P.2d 27, 29 (Wash. Ct. App. 1997).

[255] Or. Admin. R. § 690-09-040(1). While Oregon does not define hydraulic connection, there is a definition in a recent Washington State Pollution Control Board decision: "[i]f the evidence demonstrates that any of the water extracted from the ground at the place, and depth, in question would otherwise have contributed to a particular surface water, then hydraulic continuity between that groundwater and that surface water is established." *In re Appeals from Water Rights Decisions of the Department of Ecology*, at 1996 WL 514630, at 12.

streamflow or instream water right with a senior priority date, or greater than 1% of the discharge that is equaled or exceeded 80% of the time, and the well is less than 1 mile from the surface water source; or

d. The well pumping would result, after a continuous 30 day period, in depleting the stream by more than 25% of the rate of appropriation, and the well is less than 1 mile from the surface water source.

The above criteria, if met, create a presumption of interference. The administrative agency is also permitted to demonstrate substantial interference by evidence, and apparently one way of making that showing is by demonstrating a potential for "a cumulative adverse impact" on surface flows.[256] If a similar approach were to be utilized in California, the Board, by utilizing a version of such bright-line rules, might establish a presumption of the presence of a subterranean stream, and thus of jurisdiction. It would alternatively have the opportunity to establish jurisdiction analytically, that is, by site-specific evidence of the impact presumed to exist under the various bright-line tests.

An alternative approach would be to adopt a simplified version of the Oregon standard. One might, for example, create a presumption that pumping from any well within a fixed distance and pumping above a specified minimum, is pumping a statutory "subterranean stream." The question, when such methods are used, is both (1) how much sophistication one is willing to forego, e.g., in terms of actual impact on the stream in making a jurisdictional decision; and (2) how justifiable any such presumption is, in terms of the facts it purports presumptively to demonstrate. Notably, three of the four Oregon presumptions include no accounting for the actual hydrological relationship between the well and the stream. Only standard (d.) requires that factor to be determined analytically.

The Oregon system is also hydrologically incomplete in its use of specified distances such as .25 mile or 1 mile, which necessarily fail to account for impacts that will be felt over longer periods of time,[257] though some standard to account for attenuation of impact is inevitable in any system, a point that the California Supreme Court has expressly acknowledged.[258]

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[256] Or. Admin. R. § 690-09-040(5).

[257] Both Colorado and Idaho have statutes that require accounting for future loss: Colo. Rev. Stat. § 37-92-502(2) ("is causing or will cause material injury"); Idaho Code § 42-237a(g) (would adversely affect "the present or future use of any prior surface or ground water right").

[258] *City of San Bernardino v. City of Riverside*, 186 Cal. 7, 14, 198 P. 784 (1921): There "may be a point of distance from the stream at which a diversion of...underground water will have so little effect on the stream that it will not be actionable."

5. Colorado

Like Oregon, Colorado has also adopted a "bright line" approach that sets a standard for inclusion and exclusion from the regulatory system. That standard is whether "the withdrawal... will... within one hundred years, deplete the flow of a natural [surface] stream...at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal."[259] While 100 years seems an extraordinarily long time, and .001 a very small quantum, used as managerial standards, the attractiveness of some sort of time-sensitive standard is that it bases jurisdiction on the hydraulic realities of the specific case, rather than building in simplifying assumptions.[260] It also acknowledges the significance of long-term impacts on the water supply in the system.[261] Its weakness is that it is unlikely to take account of other variables that might intervene to diminish the need for the water, such as a run of unusually wet years.[262]

It should be noted again that any standard based on impact (that is, on the degree of hydrologic relationship between the groundwater use and surface water resources) – whatever the legal regime may be – necessarily calls for a policy judgment about the point at which impacts should no longer be accounted for, either because they are too slight, too difficult to ascertain, or too expensive to manage. Notably this problem arises as much in a state with a fully integral system for groundwater and surface water administration as it does in a state with a system like California's.[263]

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[259] Colo. Rev. Stat. § 37-90-103(10.5).

[260] "In the Scott River adjudication [in California], the ...Board staff report applied a time factor in deciding to include...only pumping which affected the surface flow of the Scott River within a single irrigation season." Anne J. Schneider, Are Our Ground Water Laws Adequate?, in Proceedings of the 19th Biennial Ground Water Conference, JJ DeVries, J. Woled, eds., Water Resources Center Report No. 84, Univ. of Cal., Davis (1994), at 50.

[261] Fashioning an appropriate remedy to account for impacts that won't be felt for many years is a challenging task. In theory, it is simply a discounting problem, like providing enough money today to assure an individual she will have $1,000 in 25 or 40 years based on an assumed rate of interest. In practice, with water supply, the problem is a good deal trickier. New Mexico's approach is discussed in Glennon & Maddock, *supra*, note 214, at 22-41 – 22-42. Colorado's augmentation plan system is discussed in Lawrence J. MacDonnell, Colorado's Law of "Underground Water"; A Look at the South Platte Basin and Beyond," 59 U. Colo. L.Rev. 579, 589 (1988).

[262] Possible practical approaches to this problem are discussed in Grant, *supra* note 214, at 75-77.

[263] An interesting dispute over the question how little is too little arose recently in

(continued...)

PART V:

MANAGEMENT OF GROUNDWATER OUTSIDE WATER CODE § 1200

In considering the limitations on Board jurisdiction imposed by Water Code § 1200, it is useful to keep in mind two matters: (1) Even if the definition of a subterranean stream were very expansively interpreted, the Board's permitting jurisdiction would still not embrace uses of that water on overlying land; and (2) There are other potentially available sources of Board authority over the use of subsurface water, outside of Water Code § 1200's permitting jurisdiction.

1. Overlying Uses of Groundwater

Land overlying a subterranean stream is considered riparian to that stream,[264] and the Board's understanding is that "[a] riparian is entitled to pump and use water on a parcel which overlies a subterranean stream" just like a riparian on a surface stream, without seeking a permit from the Board.[265]

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[263](...continued)
Washington State, which has an integrated system. See *Hubbard v. Washington Dept. of Ecology*, 86 Wash.App. 119, 936 P.2d 27 (1997). The court found that the Department of Ecology had not abused its discretion in restricting pumping when river flows fell below a specified minimum even though there was evidence that the impact of pumping could have accounted for as little as a .004 percent reduction in streamflow during low flows. See Jeffrie Minier, Conjunctive Management of Stream-Aquifer Water Rights: The *Hubbard* Decision, 38 Nat. Res. J. 651 (1998); Douglas L. Grant, *supra* note 214.

[264] "An overlying right, [is] analogous to that of the riparian owner in a surface stream," *City of Barstow v. Mojave Water Agency*, 23 Cal.4th 1224, 1240, 5 P.3d 853, 863, 99 Cal.Rptr. 294, 304 (2000). See also *Prather v. Hoberg*, 24 Cal.2d 549, 50 P.2d 405 (1944); Wells A. Hutchins, The California Law of Water Rights (1956), at 421. All the usual limits on riparian diversion and use presumably apply to subterranean stream riparians as to those riparian to a surface stream – use is limited to natural flows, must be within the watershed, and no seasonal storage is permitted. As to the extent of overlying rights, it is "the owner's right to take water from the ground underneath for use on his land within the basin or watershed." *City of Barstow, supra.*

[265] See D. 1632 (1995), at 35, 1995 WL 464946. Riparian pumpers of percolating groundwater don't even have to file the statements of diversion and use to which surface riparians (continued...)

While there is no authoritative source of data as to how much groundwater is used on overlying riparian land, and how much being applied to non-overlying land, there is little doubt that a considerable percentage of groundwater is being used on riparian overlying land, and thus would be outside the Board's permitting jurisdiction, no matter how expansively the statutory category of "subterranean streams flowing through known and definite channels" was applied. Some rough sense of the scope of the issue may be gleaned from the following estimates provided by the Association of California Water Agencies (ACWA) in response to an inquiry by the author of this Report:[266]

> For example, in Ventura County, the total groundwater pumping is about 70% agricultural and 30% municipal and industrial (M&I). It can be assumed that essentially all the M&I usage is not overlying....Assuming that some of the agricultural pumping is not overlying, then the total non-overlying usage could rise to at least 50%....Of course, this will vary considerably by county. It's likely that a county in the northern Sacramento Valley could have the highest percentage of overlying use whereas urban counties such as Los Angeles or Orange could have the lowest percentage. Again, this is all very theoretical and conditions could dramatically vary for each and every country in California.

Whatever the actual numbers, it is significant that concerns about non-regulation of groundwater use are not attributable solely to restrictions imposed under interpretations of Water Code § 1200, and that expanded interpretation of that statutory provision would primarily affect M&I users of groundwater, rather than agricultural pumpers.

2. Other Sources of Authority Over Use of Groundwater

a. Constitution Article X, § 2, Water Code § 100, The Public Trust, and Water Code § 275

While Water Code § 1200 limits the Board's permitting jurisdiction over groundwater, it does not limit other sources of authority that may be available to the Board to regulate uses of groundwater. A lively current question is whether, and to what extent, the Board may restrict pumping of percolating groundwater that is adversely affecting surface instream benefits, such as fish populations and riparian values. The Board's attorneys are of the view that the Board has authority to control such uses where they either (1) violate the prohibition of the Constitution and the Water Code on waste and on unreasonable use and methods of use; or (2) violate the public trust.

Both jurisdictional and substantive issues questions are presented. In terms of jurisdiction, there

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[265](...continued)
are subject under Water Code § 5101. See the definition of diversion in Water Code § 5100(b).

[266] Letter from Stephen K. Hall, Executive Dir., ACWA to Joseph Sax, October 31, 2001, at 1 (on file with Joseph Sax).

are two distinct issues: (1) Does the Board have authority to take jurisdiction itself, and to issue remedial orders against users water users over whom it has no permitting authority?[267] (2) May the Board go to court and seek judicial relief? Substantively, the questions are (1) What constitutes waste and unreasonable use, in the context of groundwater use that affects surface stream values? (2) Does the public trust extend to groundwater uses at all?[268] Since this Report deals only with the Board's permitting jurisdiction, the following discussion is limited to that issue, not with the questions what constitutes waste and unreasonable use, or what constitutes a violation of the public trust.[269]

Assuming that a substantive violation exists, there is no doubt[270] that the Board, through the Attorney General,[271] can institute litigation to control groundwater use that (1) constitutes waste or unreasonable use or method of use within the meaning of Article X, § 2 of the California Constitution, and Water Code § 100;[272] or (2) that violates the public trust.[273] There may still be

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[267] While the question here relates to users of percolating groundwater, a parallel question arises as to riparian surface water users, and pre-1914 appropriators.

[268] Cf. *In the Matter of the Water Use Permit Applications* (Waiahole Ditch case), 94 Haw. 97, 9 P.3d 409 (2000) (public trust extends to groundwater). An unresolved question in California is whether pumping of tributary groundwater that affects public trust values in navigable waters would be treated like tributary surface water under *National Audubon Society v. Superior Court*, 33 Cal.3d 419, 189 Cal.Rptr. 346, 658 P.2d 709 (1983).

[269] The scope of the Board's public trust authority is currently a subject of considerable dispute. See, e.g., David R.E. Aladjem, Is Water Ripe for the Taking? The SWRCB's Lower Yuba River Decision and the Public Trust Doctrine, 11 California Water Law & Policy 261 (July 2001), criticizing D. 1644 (2001) (Lower Yuba River) (petitions for reconsideration and petitions for writ of administrative mandamus pending). See generally Gregory S. Weber, Articulating the Public Trust: Text, Near-Text and Context, 27 Ariz.St.L.J. 1155, 1173 (1995).

[270] See *Environmental Defense Fund v. East Bay MUD*, 26 Cal.3d 183, 200, 605 P.2d 1, 10, 161 Cal.Rptr. 466, 475 (1980) (*EDF II*) and *People ex rel. State Water Resources Control Board v. Forni*, 54 Cal.App.3d 743, 126 Cal.Rptr. 851 (1st Dist. Ct. App. 1976). Courts may require the parties to accept a physical solution to resolve a waste problem. *City of Lodi v. East Bay MUD*, 7 Cal.2d 316, 341, 60 P.2d 439 (1936).

[271] Water Code § 275. Also the Attorney General can bring an action for equitable relief "for the protection of the natural resources of the state from pollution, impairment, or destruction." Cal. Govt. Code § 12607 (West 1980). For definition of "natural resources" see Cal. Govt. Code § 12605.

[272] *People ex rel. SWRCB v. Forni*, 54 Cal.App.3d 743, 753, 126 Cal.Rptr. 851 (1st Dist.

(continued...)

some question whether the Board can assert its own jurisdiction to adjudicate and remedy complaints about these matters where it otherwise has no jurisdiction over the respondent,[274] though the California Supreme Court has said that claims of unreasonable uses of water or of harm to the public trust "may be brought in the courts or before the Board."[275]

Board jurisdiction in such situations is said to be founded primarily on Water Code § 275,[276]

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[272](...continued)
Ct. App. 1976) (Board sues under Water Code § 275 to enjoin riparian uses as unreasonable). The prohibition on unreasonable and non-beneficial use applies to groundwater as well as surface water use. *Peabody v. Vallejo*, 2 Cal.2d 351, 372, 40 P.2d 486, 494 (1935); *Joslin v. Marin Mun. Water Dist.*, 67 Cal.2d 132, 138, 429 P.2d 889, 893, 60 Cal.Rptr. 377, 381 (1967).

[273] Under *Marks v. Whitney*, 6 Cal.3d 251, 261, 98 Cal.Rptr. 790, 491 P.2d 374 (1971) "members of the public" have standing to bring an action to restrain violations of the public trust. See also *In re Waters of Hallett Creek*, 44 Cal.3d 448, 472, 243 Cal.Rptr. 887, 749 P.2d 324, 338 n.16 (1988), cert. denied 488 U.S. 824 (1988). The State acting through the Board has a continuing responsibility and authority under the public trust doctrine to consider the effect of water diversions upon public trust resources and to avoid or minimize harm to those resources to the extent feasible. *National Audubon Society v. Superior Court*, 33 Cal.3d 419, 427, 189 Cal.Rptr. 346, 365, 658 P.2d 709 (1983) (a duty of continuing supervision). Preservation and enhancement of fish and wildlife resources, and recreation, as well as the public interest in water, are statutory responsibilities of the Board. Water Code §§ 1243, 1253.

A recently filed case in Arizona asserts that the State water agency has an affirmative duty to use the public trust to protect the state's watercourses from adverse affects of groundwater pumping. Center for Biological Diversity v. Joseph C. Smith, Dir., Arizona Dept. of Water Resources, No. CV2002-000171, Superior Court, Maricopa County, filed Jan. 7, 2002.

[274] It may be important to distinguish the Board's ability to go to court from its ability to assert jurisdiction itself, and to issue orders restraining groundwater use. Sometimes the term "jurisdiction" seems to be used without making this distinction explicit. See, e.g., Barton H. Thompson, Jr., Legal Disconnections Between Surface Water and Ground Water, in Making the Connections: Proceedings of the Twentieth Biennial Conference on Ground Water, University of California, Water Resources Center Report No. 88, June 1996, at 21.

[275] *In re Waters of Hallett Creek, supra* note 273, at 749 P.2d 324, 338 n.16.

[276] "The department and board shall take all appropriate proceedings or actions before executive, legislative, or judicial agencies to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state."

secondarily on Water Code § 174,[277] and perhaps on substantive provisions Article X, § 2 of the Constitution which is self-executing, and on its statutory parallel, Water Code § 100. There is one court decision, in a district court of appeal case, directly on point, though it did not involve groundwater.

In *Imperial Irrigation District v. State Water Resources Control Board* (*IID II*),[278] the issue was whether the Board could take jurisdiction over pre-1914 surface water appropriations in order to determine whether the water was being unreasonably used in violation of Article X, § 2 of the Constitution, or whether a complainant would have to go to court to raise and adjudicate such a claim. The argument was that the Board had no pre-existing jurisdiction over IID's pre-1914 appropriations; and that the statutory provision upon which the Board relied was not a grant of jurisdiction to it, but simply an authorization to the Board to go to court to seek relief. The provision in question was Water Code § 275. IID claimed that this provision was a restriction on the Board – directing it to petition other agencies to grant relief for violations – rather than a grant of jurisdiction to act on its own. (Even if such a claim were to prevail, however, courts have broad authority to refer any and all issues to the Board).[279]

The court expressly rejected that claim, and said it saw no distinction between the *IID* case and an earlier case in the California Supreme Court (known as *EDF I*)[280] which sustained Board jurisdiction over a claim of waste and unreasonable use under Water Code § 275. However in that case, the Board already had jurisdiction over the water user, which was one of its permittees;[281]

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[277] "The [l]egislature hereby finds and declares that in order to provide for the orderly and efficient administration of the water resources of the state it is necessary to establish a control board which shall exercise the adjudicatory and regulatory functions of the state in the field of water resources." See also Water Code §§ 104, 105.

[278] 225 Cal.App.3d 548, 275 Cal.Rptr. 250 (4th Dist. Ct. App. 1990).

[279] "...in any lawsuit for a determination of rights to water, 'the court may order a reference to the Board, as referee, of any or all issues' (Wat. Code, § 2000), or, alternatively, 'may refer the suit to the board for investigation or and report upon any or all of the physical facts involved.' (Wat. Code, § 2001.)." *In re Waters of Hallett Creek*, *supra* note 273, at 749 P.2d 324, 338 n.16.

[280] *Environmental Defense Fund v. East Bay MUD*, 20 Cal.3d 327, 572 P.2d 1128, 142 Cal.Rptr. 904 (1977) (*EDF I)*. See also *EDF II*, *supra*, note 270.

[281] The *EDF v. EBMUD* case, where the court held that the Board has jurisdiction to determine whether a water user's failure to reclaim water violated the Water Reclamation Law, dealt not only with the use of water held under a Board permit, but with a statute that expressly granted the Board jurisdiction to regulate reclamation and use of waste water. Such cases

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similarly, in the *National Audubon* (Mono Lake)[282] case (which began in a court) Los Angeles was already within the Board's jurisdiction before the public trust claim arose.

The *IID I* decision says: "[n]o case has construed section 275 as a limitation on the Board's adjudicatory power. In fact, *EDF I*, which holds the Board had *exclusive* adjudicatory jurisdiction...cites section 275 in support of its conclusion the Board's 'powers extend to regulation of water quality and prevention of waste.'"[283] The court in *IID I* also relied on the so-called Racanelli decision,[284] which also cited § 275 as authority for the proposition that the Board has "the separate and additional power to take whatever steps are necessary to prevent unreasonable use or methods of diversion."[285] The court in *IID I* concluded that "section 275 is not to be construed as a limitation on the Board's adjudicatory authority, but rather as a statute granting separate, additional power to the Board."[286]

Though the Supreme Court has not yet expressly addressed the question whether Water Code § 275 provides an independent source of jurisdiction over pumpers of percolating groundwater, the holding of the *IID* case, along with the language of *EDF I*, and the Racanelli decision, are significant authority in favor of the claim that the Board can assert jurisdiction over percolating groundwater pumping to adjudicate and remedy claims that come within the scope of waste and unreasonable use covered by Water Code § 275. Such jurisdiction could be a powerful tool to deal with pumping that impairs instream flows needed to protect fish and riparian values, one of the major issues underlying complaints urging the Board to take a broadened view of its jurisdiction

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[281](...continued)
essentially raise primary jurisdiction, or concurrent jurisdiction, issues, rather than dealing with the question whether there is Board jurisdiction at all. The Board and the courts have concurrent jurisdiction. *EDF II*, *supra* note 270.

[282] *National Audubon Society v. Superior Court*, 33 Cal.3d 419, 189 Cal.Rptr. 346, 658 P.2d 709 (1983); D. 1635 (1996), at ¶ 4.1, 1996 WL 904701 at 12.

[283] 186 Cal.App.3d 1160, 1169 (4th Dist. Ct. App. 1986).

[284] *United States v. State Water Resources Control Board*, 182 Cal.App.3d 82, 142, 129-30, 227 Cal.Rptr. 161, 195-96, 187 (1st Dist. Ct. App. 1986). While there is language in the Racanelli decision that is very broad – the court says the Board has independent jurisdiction to implement the Constitutional provision against unreasonable use – this statement was made in the context of a party holding a Board permit, and the Board was only amending the permit terms. It did not seek to use an unreasonable use claim to create jurisdiction where it did not otherwise exist.

[285] 186 Cal.App.3d., at 1170, quoting 182 Cal.App. 3d at 142.

[286] *Id*, at 1170.

under Water Code §1200.[287]

Of course *IID* is a District Court of Appeals case, not a Supreme Court decision, and it deals with surface water. It remains to be seen if the Supreme Court's language in *EDF I* will be applied to cases like groundwater, where there is no pre-existing Board jurisdiction. No doubt the claim will be made that percolating groundwater is a special case, and that the legislature has taken special pains to restrict Board jurisdiction over groundwater, specifying those (few) instances in which it believes such jurisdiction may be exercised.[288] In anticipation of any such claim, however, it should be recalled that back in 1912 and 1913 the only expressed objection to jurisdiction over groundwater was to a discretionary permitting system that might deny a landowner appropriation of water despite an adequate supply. It was acknowledged even then that when groundwater pumping adversely affected other water rights it was amenable to regulation and restriction.

The question of the scope of Board jurisdiction over groundwater to protect instream values is currently pending in the *North Gualala Water Company* case.[289] In that matter the Board had jurisdiction over a surface appropriation, which was conditioned by a bypass flow provision. The permittee then sought a permit (out of an abundance of caution?) to change the point of diversion to a well, while simultaneously asserting that the well did not pump subterranean stream water, and that it was not being recharged by the stream anyway. The Board nonetheless insisted on maintaining the bypass flow condition on the well, while declining to adjudicate the subterranean stream question, saying that issue was not properly before it.

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[287] It should be noted that the Board's limited ability to gather information or perform monitoring, or to require diverters to report and monitor, significantly constrains its practical capacity to implement Water Code § 275 and the public trust. Broad substantive authority may be undermined by ability to obtain sufficient evidence to sustain a claim. Improving the Board's information-gathering capacity is certainly an issue that deserves to be on the legislative agenda.

[288] See text at notes 132 et seq., *supra*, citing various Water Code provisions.

[289] *North Gualala Water Company v. State Water Resources Control Board*, No. SCUK CVG 01 86 109, Superior Court, Mendocino County, filed July 19, 2001. The case has a complicated history. See SWRCB Orders WR 2001-14, WR 99-011, and WR 99-09-DWR. On June 21, 2001, the Board issued an Order Denying Reconsideration, in the *North Gualala Water Company* case, Order WR 2001-14. The Order deals with the procedural failings of the petition for reconsideration. But the Order notes that the Company claims its pumping is not affecting the surface flow, as well as that it is not pumping from a subterranean stream. If there is no hydraulic connection between the pumping and the surface flows, then the case would become moot (there would be no need to apply streamflow maintenance standards to these wells). If, however, there is a connection, and if it is determined that the Company is not pumping from a subterranean stream – an issue that the June 21 Order leaves open for later consideration – the question remains whether, and how, the Board would seek to control the pumping in order to protect instream flows.

The Board has, however, made clear its understanding that it has jurisdiction whether or not the well in question is pumping subterranean stream water.[290] As noted above, the applicant has now filed suit in Superior Court seeking a determination that it is not pumping subterranean stream water and that the Board has no jurisdiction over its well. The case potentially presents this issue: If the facts showed that the new point of diversion, the well, was pumping tributary groundwater with virtually the same impact on instream values as the previous surface diversion, but that legally the well is pumping percolating groundwater, has the Board now lost jurisdiction over the diversion? If so, can it take jurisdiction anew under Water Code § 275? This case, or one like it, will doubtless eventually work its way through the courts and clarify the scope of the Board's asserted independent authority over percolating groundwater that threatens surface stream values in violation of the values protected under Water Code § 275.

b. Remedies for Impairment of Water Rights

While California does not have an integrated permit system for administering surface and groundwater use, the Courts have protected surface stream rights against groundwater pumping, and *vice versa*, at the behest of the injured party, for nearly a century.[291] For example, in a 1904

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[290] The Board's Order says the following: "...Under Article X, Section 2 of the California Constitution and Water Code Section 100, all diversion and use of water in California is subject to reasonable use restrictions and a prohibition on unreasonable diversion or method of diversion. Adverse impacts to fish and wildlife are among the factors that provide a basis for determining that a water diversion may be unreasonable. (*United States v. State Water Resources Control Board* (1986) 182 Cal.App.3d 82, 129-130 [227 Cal.Rptr. 161, 187]; SWRCB Order WR 95-4, p. 17). Water Code Section 275 directs the SWRCB to take all appropriate actions to prevent waste or unreasonable use and unreasonable methods of diversion. The SWRCB's authority to regulate water use to comply with the reasonable use and diversion requirements of the California Constitution and Water Code extends to water use under all types of rights. *[Imperial Irrigation District v. State Water Resources Control Board*, 225 Cal.App.3d 548, 275 Cal.Rptr. 250 (4th Dist. Ct. App. 1990).] Thus, the SWRCB's authority to require the operator of a well to prepare a water supply contingency plan to avoid or reduce impacts on public trust resources is not limited to situations where the well is deemed to be under the SWRCB's permitting authority." Order WR-99-011, at 7-8, n.3. Elsewhere in the Order, the Board, citing *National Audubon* (note 273, *supra)*, says the Board "has the continuing responsibility and authority under the public trust doctrine to consider the effect of water diversions upon public trust resources and to avoid or minimize harm to those resources to the extent feasible." *Id.*, at 5. It should be noted, incidentally, that since salmon in the river were listed under the federal Endangered Species Act, the pumpers might have been liable for a "take" under that law (16 U.S.C. § 1538(a)(1)(B)) whether or not the Board had jurisdiction over them.

[291] *Eckel v. Springfield Tunnel & Dev. Co.*, 87 Cal.App. 617, 262 P. 425 (3d Dist. Ct. App. 1927); *McClintock v. Hudson*, 141 Cal. 275, 281, 74 P. 849 (1903); *Miller v. Bay Cities Water*

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case, *Cohen v. La Canada Land & Water Company*,[292] the Court protected a prior appropriator from a surface stream against a subsequent appropriator of tributary percolating groundwater. Similarly in *City of Lodi v. East Bay M.U.D.*,[293] the Court protected a prior appropriator of percolating groundwater against a subsequent appropriator of surface stream water.

In a 1903 decision, a riparian surface stream user was protected against an appropriator of percolating groundwater.[294] Similarly, the Court protected Los Angeles' paramount pueblo rights in the Los Angeles River against diminution by pumping of tributary percolating groundwater.[295] Still another early case applied the correlative rights doctrine as between a riparian user of a surface stream and an overlying user of tributary groundwater.[296]

The effective result of all these cases has been to implement integrated management of water rights in hydraulically connected groundwater and surface stream water, through the medium of private litigation.[297] Indeed, it may be that the determination of the California Supreme Court to

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[291](...continued)
Co., 157 Cal. 256, 107 P. 115 (1910) (mandated injunctive relief no longer the law, cited in *City of Lodi v. East Bay M.U.D.*, 7 Cal.2d 316, 338, 60 P.2d 439 (1936)).

[292]142 Cal. 437, 76 P. 47 (1904). The Court's legal posture in this case is not entirely clear, as it does not describe the defendant (pumper of percolating groundwater used off the overlying land) as simply an appropriator, junior to the plaintiff (surface steam appropriator), but says that a use other than on the pumper's own land is "not for a reasonable use" (142 Cal. at 439).

[293] 7 Cal.2d 316, 60 P.2d 439 (1936).

[294] *McClintock v. Hudson*, 141 Cal. 275, 281, 74 P. 849 (1903).

[295] *Los Angeles v. Hunter*, 156 Cal. 603, 608, 105 P. 755 (1909).

[296] *Hudson v. Dailey*, 156 Cal. 617, 105 P. 748 (1909). The Court made clear that correlative rights would apply whether the groundwater was percolating or was a subterranean stream (156 Cal. at 628). Followed in *Eckel v. Springfield Tunnel & Dev. Co.*, 87 Cal.App. 617, 623, 262 P. 425 (3d Dist. Ct. App. 1927).

[297] See *United States v. Fallbrook Public Utility Dist.*, 165 F.Supp. 806, 847 (S.D. Cal. 1958), citing numerous California cases to the effect that: "...a percolating groundwater supply, although not part of the flow of a stream, may nevertheless be hydrologically connected with it, with the result that the extraction of water from either source diminishes the amount of water in the other....In such a situation, the percolating groundwater and the stream are regarded as one common water supply...and in considering the respective rights of those who secure water from
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integrate groundwater and surface water rights in litigation explains at least in part how California law has been able to endure the "non-administration" of groundwater under Water Code § 1200 for so many decades.

Nor need all such cases be remitted to private litigation. The Board clearly has authority to protect groundwater uses when it has jurisdiction over permit applications to appropriate surface water,[298] and it does so. Groundwater users dependent on recharge from surface streams are protected by a determination whether surface water is available for appropriation.[299] The Board also has authority to condition surface stream appropriation permits so as to protect groundwater rights.[300] The courts, of course, can also afford such protection in private litigation.[301]

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[297](...continued)
the two interconnected sources, it is 'immaterial whether the (underground) waters...were or were not part of an underground stream, provided the fact be established that this exaction from the ground diminished to that extent, or to some substantial extent, the water flowing in the stream.'" Needless to say, the courts also integratively manage surface water rights with subterranean stream water uses, for example, protecting a senior surface appropriator against a junior pumper. *Larsen v. Apollonio*, 5 Cal.2d 440, 55 P.2d 196 (1936); *Barton Land & Water Co. v. Crafton Water Co.*, 171 Cal. 89, 152 P. 48 (1915).

[298] Water Code §§ 1253, 1255, 1257.

[299] E.g., the permits for the Solano Project (Putah Creek), Order WR 81-11 (1981), 1981 WL 40368, and Cachuma Project (Santa Ynez River), D. 1486 (1978), 1978 WL 21156, among others, have permit conditions designed to protect prior rights to divert from percolating groundwater (in both cases Condition 11). In a decision involving a stream tributary to Pismo Creek in San Luis Obispo County, the Board said: "In order to issue a permit, the Board must find that unappropriated water is available to supply the applicant....Unappropriated water includes water that has not been either previously appropriated or diverted for riparian use....The owner of land overlying a groundwater basin, which is fed by percolation from a surface watercourse, possesses rights analogous to a riparian owner (Peabody v. Vallejo (1935) 2 Cal.2d 351, 372, 40 P.2d 486. Consequently, water is not available for appropriation from a watercourse which feeds a groundwater basin if the appropriation would materially damage the rights of the overlying landowners (see Id. at 374; Lodi v. East Bay Municipal Utility Dist. (1936) 7 Cal.2d 316, 339, 60 P.2d 439)." D. 1627 (1990), at 3.

[300] E.g., *City of Lodi v. East Bay M.U.D.*, 7 Cal.2d 316, 323, 60 P.2d 439 (1936): "In the permits of the District...it was specifically provided that the District was under the responsibility of not injuring the underground water users, downstream from the dam."

[301] E.g., *Miller v. Bay Cities Water Co.*, 157 Cal. 256, 107 P. 115 (1910) (the court prohibited an appropriation of surface waters where the appropriation would have reduced
(continued...)

PART VI:

SHOULD THE LEGAL TEST BE CHANGED?

Should the legal test for determining what subsurface waters are subject to the SWRCB's permitting authority be changed? If so, what legal test would be appropriate?

To answer these questions, one must first decide what is really being asked? If the question is whether Water Code § 1200 is suited to resolve California's 21st Century water problems, or is a law that would or should be enacted today, the answer is certainly "no".[302]

If, however, the question is whether proposing legislation to expand the Board's permitting jurisdiction over subsurface waters is the most promising approach to today problems for California, the answer – in this observer's opinion – is also "no." The reasons are many, and they are more practical than theoretical:

> A great deal of subsurface water has been pumped for a long time, and any comprehensive permitting system would have to address existing uses. To do so presents complex problems of fairness to those dependent on existing uses, and perplexing questions of implementation. Illustratively, would a pumper of tributary groundwater since 1980 be integrated as of that date with appropriators from the stream, or be treated as a new appropriator, as

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[301](...continued)
groundwater recharge necessary to support the use of an overlying user of percolating groundwater).

[302] Every authority agrees that the "right" system is one that integrates management of hydrologically connected ground and surface waters. "Where...the stream and the groundwater are so closely connected that the use of one affects the other, the same law must be applied to both sources," Frank J. Trelease, Conjunctive Use of Groundwater and Surface Water, 27 Rocky Mtn. Min. L. Inst. 1853, 1856 (1982), quoted in John D. Leshy & James Belanger, Arizona Law Where Ground and Surface Water Meet, 20 Ariz. St. L.J. 657, 658-59 (1988). See also National Water Commission, Water Policies for the Future 233, Recommendation 7-1 (1973): "State laws should recognize and take account of the substantial interrelation of surface water and ground water. Rights in both sources of supply should be integrated, and uses should be administered and managed conjunctively. There should not be separate codifications of surface water law and ground water law; the law of waters should be a single, integrated body of jurisprudence."

of the date of a newly required permit application?[303] What if 1980 surface stream appropriators are subject to bypass flow limits in their permits? Would such limits be newly imposed on pumpers of tributary water? Or should there be recognition of longstanding existing uses through some form of "grandfathered rights" (an approach that presents its own fairness problems)?

Numerous such questions would arise under new legislation if it extended Board jurisdiction over existing uses, such as the application of permit requirements to situations such as adjudicated groundwater rights, and to established groundwater banking programs.

As noted above, a considerable percentage of pumped groundwater is used on overlying land and is thus riparian. It would therefore be outside any revised permitting system, unless riparian groundwater use was to be treated differently from riparian surface water use. Excluding overlying uses would at best be an incomplete form of regulatory management.

Experience shows the reluctance of the legislature to provide for comprehensive regulation of groundwater, even in the context of local control, as illustrated by the limitations in recent groundwater management legislation.[304] The prospects for comprehensive legislative reform are therefore unpromising. (I do, however, wish to reiterate the observation made above[305] that legislation improving the Board's information-gathering capacity, so that it can effectively fulfill responsibilities it already has under the Article X, § 2 of the Constitution, and Water Code § 275, should unquestionably be on the legislative agenda).

The issues described in the preceding paragraphs are only some of those that legislative rewriting of Water Code § 1200 at this late stage would generate. In acknowledgment of such practical concerns, and in light of the history of proposed legislative groundwater reform in California, I

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[303] While priority is ordinarily based on the date of filing of a permit application (Water Code §§ 1225, 1450, 1455), the Board has authority to adjust the priorities of water right applicants, *United States v. SWRCB,* 182 Cal.App.3d 82, 132, 227 Cal. Rptr. 161, 189 (1st Dist. Ct. App. 1986), and it has adjusted priorities in the public interest where junior applicants had longstanding claims and uses within the groundwater basin (e.g., D. 1632 (1995), *supra* note 265 at 35, 41-45; Order WR 95-10, *supra* note 189 at 38-39). Nonetheless, settling priorities would be a deeply troublesome issue. See note 212, *supra.*

[304] E.g., Water Code §§ 10753.8(b); 10750.4.

[305] In note 287, *supra.*

suggest an alternate approach, a three-point strategy for dealing with the problem of groundwater/surface water management in California:

(1) Adoption by the Board of clear criteria to implement the existing statutory purpose, by taking jurisdiction henceforth over groundwater uses that diminish appreciably and directly the flow of a surface stream; and

(2) Proactive use by the Board of its authority under Water Code § 275 and any other sources of jurisdiction it has, to implement the constitutional prohibitions on waste, unreasonable use, and unreasonable methods of use; to protect the public trust; and to safeguard established rights in surface stream flows; and

(3) Where serious basin-wide problems are presented, comprehensive basin management (as with the most successful adjudicated/managed Southern California basins)[306] is the most promising tool to achieve genuine integration of surface water and groundwater administration in California. This suggestion is made in full recognition of the cost, duration and complexity usually associated with settling rights generally within a basin.[307] Nonetheless, that approach seems the most promising way for this state to position itself to address contemporary issues. Unlike proposals for expanding regulatory jurisdiction, basin management offers the possibility of employing the full range of needed management tools, such as professional administration, pumping assessments, importation of new supplies, replenishment programs, achievement of sustainable use, allocation of groundwater storage capacity, quality control, and conjunctive use.

-end of report-

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[306] See generally William Blomquist, Dividing the Waters: Governing Groundwater in Southern California (1992).

[307] A task that has not been made easier by the recent decision in *City of Barstow v. Mojave Water Agency*, 23 Cal.4th 1224, 1240, 5 P.3d 853, 863, 99 Cal.Rptr. 294, 304 (2000).

Appendix A:
Draft of the Proposed Water Commission Bill

Appendix B1:

Assembly Bill No. 642 (1913) (as introduced Jan. 23, 1913)

Appendix B2:

Assembly Bill No. 642 (1913) (as amended in Senate May 10, 1913)

Appendix C:
Water Commission Act of 1913

Appendix D:
Transcripts of Hearings on Proposed Water Commission Bill

Appendix E:
Memos from Technical Advisory Committee Members

-end of appendices-

STATE WATER RESOURCES CONTROL BOARD
REGULATION

Text of Regulation

Amendment to Division 3 of Title 23 of the California Code of Regulations

Add the following section:

§ 862 Russian River, Special.

Budding grape vines and certain other crops in the Russian River watershed may be severely damaged by spring frosts. Frost protection of crops is a beneficial use of water under section 671 of this chapter. During a frost, however, the high instantaneous demand for water for frost protection by numerous vineyardists and other water users may contribute to a rapid decrease in stream stage that results in the mortality of salmonids due to stranding. Stranding mortality can be avoided by coordinating or otherwise managing diversions to reduce instantaneous demand. Because a reasonable alternative to current practices exists, the Board has determined these diversions must be conducted in accordance with this section.

(a) After March 14, 2012, except for diversion upstream of Warm Springs Dam in Sonoma County or Coyote Dam in Mendocino County, any diversion of water from the Russian River stream system, including the pumping of hydraulically connected groundwater, for purposes of frost protection from March 15 through May 15, shall be diverted in accordance with a board approved water demand management program (WDMP). For purposes of this section, groundwater pumped within the Russian River watershed is considered hydraulically connected to the Russian River stream system if that pumping contributes to a reduction in stream stage to any surface stream in the Russian River watershed during any single frost event.

(b) The purpose of the WDMP is to assess the extent to which diversions for frost protection affect stream stage and manage diversions to prevent cumulative diversions for frost protection from causing a reduction in stream stage that causes stranding mortality. The WDMP, and any revisions thereto, shall be administered by an individual or governing body (governing body) capable of ensuring that the requirements of the program are met. Any WDMP developed pursuant to this section shall be submitted to the board by February 1 prior to the frost season.

(c) At a minimum, the WDMP shall include (1) an inventory of the frost diversion systems within the area subject to the WDMP, (2) a stream stage monitoring program, (3) an assessment of the potential risk of stranding mortality due to frost diversions, (4) the identification and timelines for implementation of any corrective actions necessary to prevent stranding mortality caused by frost diversions, and (5) annual reporting of program data, activities, and results. In addition, the WDMP shall identify the diverters participating in the program and any known diverters within the area subject to the WDMP who declined to participate. The WDMP also shall include a schedule for conducting the frost inventory, developing and implementing the stream stage monitoring program, and conducting the risk assessment.

(1) Inventory of frost diversion systems: The governing body shall establish an inventory of all frost diversions included in the WDMP. The inventory, except for diversion data, shall be completed within three months after board approval of a WDMP. The inventory shall be updated annually with any changes to the inventory and with frost diversion data. The inventory shall include for each frost diversion:

(A) Name of the diverter;

(B) Source of water used and location of diversion;

(C) A description of the diversion system and its capacity;

(D) Acreage frost protected and acres frost protected by means other than water diverted from the Russian River stream system; and

(E) The rate of diversion, hours of operation, and volume of water diverted during each frost event for the year.

(2) Stream stage monitoring program: The governing body shall develop a stream stage monitoring program in consultation with National Marine Fisheries Service (NMFS) and California Department of Fish and Game (DFG). For the purposes of this section, consultation involves an open exchange of information for the purposes of obtaining recommendations. The governing body is authorized to include its own expert scientists and engineers in the consultation, and request board staff to participate, when desired. The stream stage monitoring program shall include the following:

(A) A determination of the number, type, and location of stream gages necessary for the WDMP to monitor and assess the extent to which frost diversions may affect stream stage and cause stranding mortality;

(B) A determination of the stream stage that should be maintained at each gage to prevent stranding mortality;

(C) Provisions for the installation and ongoing calibration and maintenance of stream gages; and

(D) Monitoring and recording of stream stage at intervals not to exceed 15 minutes.

(3) Risk assessment: Based on the inventory and stream stage information described above, and information regarding the presence of habitat for salmonids, the governing body shall conduct a risk assessment that evaluates the potential for

frost diversions to cause stranding mortality. The risk assessment shall be conducted in consultation with NMFS and DFG. The governing body is authorized to include its own expert scientists and engineers in the consultation, and request board staff to participate, when desired. The risk assessment shall be evaluated and updated annually.

(4) Corrective Actions: If the governing body determines that diversions for purposes of frost protection have the potential to cause stranding mortality, the governing body shall notify the diverter(s) of the potential risk. The governing body, in consultation with the diverters, shall develop a corrective action plan that will prevent stranding mortality. Corrective actions may include alternative methods for frost protection, best management practices, better coordination of diversions, construction of offstream storage facilities, real-time stream gage and diversion monitoring, or other alternative methods of diversion. Corrective actions also may include revisions to the number, location and type of stream stage monitoring gages, or to the stream stages considered necessary to prevent stranding mortality. In developing the corrective action plan the governing body shall consider the relative water right priorities of the diverters and any time delay between groundwater diversions and a reduction in stream stage. The corrective action plan shall include a schedule of implementation. To the extent feasible, the corrective action plan shall include interim corrective actions if long-term corrective actions are anticipated to take over three years to fully implement. The diverters shall implement corrective actions in accordance with the corrective action plan, or cease diverting water for frost protection.

(5) Annual Reporting: The governing body shall submit a publically available annual report of program operations, risk assessment, and corrective actions by September

1 following the frost season that is the subject of the report. The report shall include:

(A) The frost inventory, including diversion data.

(B) Stream stage monitoring data.

(C) The risk assessment and its results, identification of the need for any additional data or analysis, and a schedule for obtaining the data or completing the analysis.

(D) A description of any corrective action plan that has been developed, any corrective actions implemented to date, and a schedule for implementing any additional corrective actions.

(E) Any instances of noncompliance with the WDMP or with a corrective action plan, including the failure to implement identified corrective actions.

The report shall document consultations with DFG and NMFS regarding the stream stage monitoring program and risk assessment and shall explain any deviations from recommendations made by DFG or NMFS during the consultation process. In addition, the annual report shall evaluate the effectiveness of the WDMP and recommend any necessary changes to the WDMP, including any proposed additions or subtractions of program participants. Any recommendations for revisions to the WDMP shall include a program implementation plan and schedule. The board may require changes to the WDMP, including but not limited to the risk assessment, corrective action plan, and schedule of implementation, at any time.

(d) The governing body may develop and submit for the Deputy Director for Water Rights' approval, criteria, applicable to any participant in its WDMP, for identifying groundwater diversions that are not hydraulically connected to the Russian River stream

system. The governing body may submit to the Deputy Director a list of groundwater diverters that appear to meet these criteria and could be exempted from this section. The Deputy Director is authorized to exempt the listed groundwater diverters, or identify the reason for not exempting the listed groundwater diverters. Beginning three years from the effective date of this section, if an individual groundwater diverter can independently demonstrate to the satisfaction of the Deputy Director that the diversion is not hydraulically connected to the Russian River stream system, the Deputy Director is authorized to exempt the groundwater diverter from this section.

(e) Compliance with this section shall constitute a condition of all water right permits and licenses that authorize the diversion of water from the Russian River stream system for purposes of frost protection. The diversion of water in violation of this section, including the failure to implement the corrective actions included in any corrective action plan developed by the governing body, is an unreasonable method of diversion and use and a violation of Water Code section 100, and shall be subject to enforcement by the board. The board has continuing authority to revise terms and conditions of all permits and licenses that authorize the diversion of water for purposes of frost protection should future conditions warrant.

NOTE: Authority cited: Section 1058, Water Code.
Reference: Section 2, Article X, California Constitution; and Sections 100, 275 and 1051.5, Water Code.

Watershed Systems
Hydrology - Geology - Soil Science

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April 7, 2013

Thomas Lippe
Lippe Gaffney Wagner LLP
329 Bryant Street, Suite 3D
San Francisco, CA 94107

RE: Northern California Instream Flows

Dear Mr. Lippe,

You have asked me to review the technical reports prepared by Stetson Engineers on *Methodology and sources of information: Delineation of subterranean streams and potential streamflow depletion areas* dated May 16, 2008 and their prior discussion report of February 28, 2008 titled: *Approach to delineate subterranean streams and determine potential streamflow depletion areas*. These were prepared for the California State Water Resources Control Board's adoption of their *Policy for Maintaining Instream Flows in Northern California Coastal Streams.*

You have also requested that I review the issues of trade-offs between water diversions resulting from groundwater pumping in streamside aquifers as a substitute for flow reductions that could result from direct pumping of surface water.

These are interrelated issues that I have focused on throughout my professional geologic and hydrologic career. Beginning in 1980 with my University of California graduate students, I have had long-duration involvement in research on the Carmel River that has led to the Water Board decision classing parts of that alluvial valley as a known and definite underground channel. After retiring from the University of California Santa Cruz, I founded and mentored the Watershed Institute at California State University Monterey Bay where my students and I directly monitored and helped to define conditions to permit the Water Board to evaluate and define subterranean stream flow in the alluvial channel at Garrapata Creek. I have worked throughout western United States as a fluvial geomorphologist, including an appointment with the U.S. Geological Survey Water Resources Division in the 1960's as a Research Hydrologist. I have conducted field work in a large proportion of the northwestern California stream channels that are the subjects of the current instream flow studies and proposed regulation. This has included field investigations in the Gualala watershed.

The Stetson subterranean stream mapping effort

In my professional opinion the effort and reports provided by Stetson Engineers to the California Water Board on the delineation of subterranean streams and potential streamflow depletion areas are scientifically sound and carefully executed and documented. A single exception is a common mistake in the first full paragraph on page 11765 of the Administrative Record that confuses "small scale" maps with greater detail. This semantic mistake it does not affect any conclusions, findings, or recommendations.

Stetson Engineers had a significant challenge to try to base delineation of subterranean streams on widely differing geologic maps. Geologic mapping is not a precise science. A map is an interpretation of field geologic conditions that cannot be directly observed on or under the ground surface. Geologists must use all available information to derive clues about the subsurface. Soils and plant cover characteristics may be more diagnostic than bedrock or other geologic substrates. Topography can be used to infer the origin of a surface feature seen on the ground, on a topographic map, or on an aerial photo. The extent of experience that the mapping geologist brings to his draft map and the purpose of the final map will influence the degree of care and detail that are represented on the map.

California's geologic maps and map products have been created by persons with widely differing experiences and interests. Stetson had to try to interpret and utilize widely different source maps that were produced for very different purposes such as water supply studies or mineral investigations. Stetson had to derive surficial geomorphic and geologic information from maps produced to display general bedrock and for specialized purposes such as seismic hazards.

The way they chose to accomplish their task was to create a category that represents uncertain shallow subsurface fluvial geomorphic conditions where further work is necessary to determine shallow groundwater hydrology. This leads to a three-part mapping classification with reasonably certain known and definite subterranean stream courses, potential stream depletion areas if wells are placed in the water-bearing subsurface zones, and mapped active stream deposits within those potential stream depletion areas. Connectivity between a surface stream and its alluvial bed and banks had to be inferred based on sound groundwater conditions (hydrogeology).

Without pump tests for wells in various local substrates, permeability and connectivity of geologic substrates had to be inferred by Stetson from geologic, topographic, soil, and vegetation information. I follow a rule-of-thumb guide that compares permeability of adjacent substrates to determine if groundwater in the pores of relatively impermeable substrates such as shale or mudstone will be a source of groundwater from a pumped well or if the water will preferentially be derived from more porous and permeable substrates such as stream alluvial sand and gravel. Of course groundwater can be derived from most geologic substrates, and water will seep from any region of higher concentration and static head into a region of lower concentration. But for practical purposes, if a well in porous geologic substrates is pumping intermittently and recharges from a porous substrate, the geologically-adjacent material will not significantly contribute from adjacent less porous substrate if the porosities of the two adjacent geologic units differ by 2 orders of magnitude or more (100 times). This is just a rule-of-thumb that I use in helping locate water supply wells. Of course, an overdrawn well will slowly recharge from large bedrock substrates nearby, but that recharge is geologically older than that from the adjacent alluvium – several years or more, and recharges only

very slowly. My work[1] is based on California coastal streams and springs that were affected by the 1989 Loma Prieta Earthquake but corroborates the reasoning presented by the State Water Board in 2003[2].

Stetson's work is carefully qualified. Because the map database that they had to use was inadequate, incomplete, and contradictory on some adjacent map quadrangles, they had to document all judgments made. All geologic mapping is a matter of judgment. Stetson primarily explained their judgment in their May 16, 2008, Technical Memorandum where each source of map information was reviewed and all decisions based on that source were listed and qualified. Where information was inadequate or contradictory, Stetson classed areas that met minimum criteria for possible influence of subterranean streams as "Potential Stream Depletion Areas" or PSDA's. These areas are generally in close proximity to a surface stream, in a geologic substrate that was mapped or can be inferred from its location and geomorphic form as a stream deposit, and are close enough to that watercourse to be readily recharged or drained by it. These are a limited special class of what we call hyporheic exchange zones (http://www.hyporheic.net). Such zones are characterized by saturated alluvial deposits adjacent to streams where water can pass both into and out of the streambank and streambed and where that water supports streamflow and aquatic organisms.

Where geologic mapping was not adequate to delimit the legally-defined "subterranean streams" as perceived using that nineteenth century language, Stetson had to make inferences based upon best available contemporary information and understanding of fluvial geomorphology and stratigraphy. In my professional opinion, Stetson's work, caveats, and principles are fully defensible in light of modern geologic knowledge.

Stetson acknowledges that in particular locations, more site-specific work may be appropriate or required to fully characterize whether a given geologic substrate is hydraulically connected to a nearby stream. I agree with this observation.

Are the potential reductions of surface flows from increased groundwater pumping "unlikely"?

The California Water Board makes a case that a policy-induced switch from surface water diversions to groundwater pumping *could* result in reduced surface flows but that such reductions are *unlikely*. The discussion and documentation are included in the:

Revised sections 6.2, 6.9, and 7 and Supplement to Appendix D of the Substitute Environmental Document prepared for the **Policy for maintaining instream flows in Northern California coastal streams** dated February, 2013.

[1] Curry, R.R., Brett A. Emery and Tom G. Kidwell, 1994, Sources and Magnitudes of Increased Streamflow in the Santa Cruz Mountains for the 1990 water year after the Earthquake. U.S. Geological Survey Professional Paper 1551-E, The Loma-Prieta, California, Earthquake of October 17, 1989 - Hydrologic Disturbances, p. 31-50, Wash. D.C.

[2] See North Gualala Court Order, p. 16, Order WRO 2003 – 0004*: Order determining legal classification of groundwater*.

The hydrological and geological bases for the Board's opinions are not supported. The discussion in Appendix D is "tortured" and contradictory. The tradeoffs between direct stream diversion and groundwater withdrawal in lieu of surface water diversion are complex and vary by the particular local annual precipitation deficit or excess. For given water year, less withdrawal of already-limited stream flow volumes and compensatory increases in groundwater withdrawals may be potentially less damaging to instream fishery resources. But under multi-year streamflow deficits, decreasing the volumes of interstitial water in the hyporheos or streamside exchange zone simply increases the losses of streamflow to the alluvial stream channel environment. You cannot have it both ways. Instream flow volumes are not separate from saturated water in the streambanks and streambeds. Lower water tables in the stream alluvium are instantly reflected in the instream flow conditions. You cannot take water out of the deep end of a swimming pool to increase the area available for non-swimming children.

Section 7.2 of Appendix D acknowledges that impacts are possible but unlikely. We are told that "*The State Water Board's assessment of future groundwater demand (section 6.2), which conservatively included all diversion points for pending water right applications, found that increased groundwater pumping could drop production rates of nearby wells and could cause a significant reduction in surface water flow, although this impact is speculative and unlikely to occur."* The Board's conclusions seem to be based on the assumption that groundwater is less reliable for domestic uses than is stream diversion flow or that groundwater is not directly connected to the stream: ".. *the potential switch from surface water diversions to groundwater pumping is likely to reduce the impacts of surface water diversions on surface water flows because in many cases groundwater pumping will not deplete surface water flows on a one-to-one basis, and in some cases the groundwater and surface water may not be hydraulically connected at all* (p. 94 – revised SED Section 7).

From a hydrological and biological perspective, the water in the stream alluvium is part of the stream system. If it is possible to withdraw that water without any obvious decrease in the instream flow for a given water year, the deficit in the adjacent groundwater volume will still exist. The fundamental issue that the Water Board must address is the residence time of this hyporheric exchange water. This issue has been addressed in part by my academic colleague Professor Andrew Fisher. Fisher and his students and colleagues have been investigating residence times and flow patterns in alluvial valley systems in the Pajaro River, a coastal stream in Central California[3]. Their work uses heat as a tracer for stream water flowing in the bed and banks. Their study site differs from many in the Northern California area of California Water Board focus in that the Pajaro River flows in a wide channel with well vegetated gradual banks. They established downward seepage rates as great as 1.4 meters per day with greater seepage infiltration occurring in the lower-gradient stream reaches and in the low-flow summer and fall periods.

The Water Board proposes that even with active pumping, wells adjacent to streams may not respond to withdrawals rapidly, so that the Potential Stream Depletion Areas may not immediately affect instream flow. Clearly, the time lag between well pumping

[3] C. Ruehl, A.T. Fisher, C. Hatch, M. Los Huertos, G. Stemler, C. Shennan, 2006, Differential gauging and tracer tests resolve seepage fluxes in a strongly-losing stream, Journal of Hydrology, Volume 330, Pages 235-248,

Christine E. Hatch, Andrew T. Fisher, Chris R. Ruehl, Greg Stemler,2010, Spatial and temporal variations in streambed hydraulic conductivity quantified with time-series thermal methods, Journal of Hydrology, Volume 389, Pages 276-288

and stream response will be greater for wells farther from the stream, but for those areas outlined on the Stetson maps as PSDA's based on geologic substrate (alluvial origin related to the adjacent stream course) the streamflow response will vary from hours to days, not months to years. The proximity of the well to the surface water course has always been a factor in approval of well locations, but the locations mapped on the Stetson maps are all close enough to their source streams to have lag times of less than a month.

The static elevation of water in unpumped wells that draw water from stream alluvium may be higher or lower than that in the associated watercourse. Many well-drillers will justify wells in stream-side flood plains or stream terrace deposits as "not connected to the stream" by noting a clay or silt bed in the well log at a higher elevation than the well seal and/or pumping interval. Often these less-permeable stratigraphic barriers are not laterally extensive, even where the silt bed is of marine origin in a drowned coastal valley. The default condition should be as treated in the Stetson reports: – *assumed hydraulically connected unless proven otherwise.*

Stetson's methods include a conservative approach in which ambiguous or sparse data sources were interpreted so that any mapping of subterranean streams or PSDA erred on the side of "under-inclusion." An example of this approach can be found at AR 11651:

> "Delineating the mapped active stream deposits from this source was especially difficult because all of the non-Tertiary alluvium could technically be included in this designation, and the inclusion would resolve many discrepancies with the small scale sources at the edges, but using the same criteria on the other 1:24k maps from this set would have led to more ambiguous decisions on other quads. Considering the large scale of this source and the need for consistency, the decision was made to include only the geologic unit mapped as active stream (ac) from these sources in the delineation of Mapped Active Stream Deposits", rather than try to define "associated alluvial deposits" for these sources." (Stetson, AR 11651)

To avoid having this conservative approach exclude areas from the Board's jurisdiction were the Board to adopt the delineation maps, Stetson also included a disclaimer that would allow the Board to later add areas to the mapped subterranean streams based on more site-specific investigations:

> "The subterranean stream and PSDA delineations prepared in conjunction with this project will be based on the available geologic information at the time of delineation. Further refinement of the delineations could be made in the future if new information becomes available. Field inspection will not be conducted as part of the delineations. Therefore, the following statement will be included on all maps resulting from this project to insure that no alluvial deposits associated with a "natural channel" are excluded from the jurisdiction of the State Water Board.
>
> *Because the delineated areas on this map were based on information readily available at the time of its development, this map does not claim to represent all of the subterranean streams or potential stream depletion areas that exist in the area. Site specific investigations will be needed to verify the existence of subterranean streams or potential stream depletion areas.*" (Stetson, AR 11763.)

In summary, the qualifications added to the text in Section 7.2 of Appendix D as modified in February, 2013 that suggest that groundwater can be withdrawn from stream-side alluvial deposits without concomitant reductions in stream-flow are plausible in some

locations but in most locations are not probable from a geologic and hydrologic standpoint. Further, Stetson's delineations underestimate the extent of subterranean streams and potential stream depletion areas.

Robert R. Curry
Registered Geologist
and Hydrologist

California 3295

CURRICULUM VITA

Robert R. Curry

Research Professor, University of California Santa Cruz; Research Coordinator and Senior Scientist, California State University Monterey Bay, Watershed Institute and Adjunct Professor, Earth Systems Science and Policy, California State University. Principal: Watershed Systems, 600 Twin Lanes, Soquel, Calif. 95073 curry@ucsc.edu; 831 426-9604 (fax); 426-6131 (res.). 831 582-4098- Watershed Institute CSUMB. Fax 582-3691; Research Station 760 932-7700

Research Specialties:

Fluvial Geomorphology, Geologic Hazards, Wetlands and Stream Restoration, Wetland Delineation, Watershed Systems, Mined-land Reclamation, Environmental Geology, Soil Erosion and Formation, Climatology, Water Quality Protection, Pleistocene Geology, Water and Energy Policy, Arctic & Alpine Plant Ecology, Sierra Nevada Natural History, Water Resources Conservation

Web Pages:

Academic: http://watershed.csumb.edu (follow links to faculty)

1. EDUCATION

PhD: University of California, Berkeley, Department of Geology & Geophysics, 1967 in Geomorphology & Paleoclimatology

Dissertation Topics under Professor Clyde Wahrhaftig:

- Holocene Climatic History of the Sierra Nevada.
- Quaternary Glacial and Climatic History of the Sierra Nevada, California.
- Rates and Forms of Mass Wasting in the Sierra Nevada, California.

1.1. Pre-doctoral studies:

- University of Colorado Geology B.A., 1960 Boulder, Colorado
- University of Colorado Geology M.Sc., 1961 Boulder, Colorado
- University of Colorado Plant Ecology M.Sc., 1962

  Geobotanical correlations in the alpine and subalpine regions of the Tenmile Range, Summit County, Colorado, 122 pp. + 3 fold maps in pocket. M.Sc. Directed by: W.C. Bradley.

2. EXPERIENCE—RESEARCH AND TEACHING

1998-2002 Research Fellow, Packard Foundation at Watershed Institute, California State University, Monterey Bay

1997-1998 Guest Lecturer, Catholic University of Valpariso, Chile. Los Glacieres al Mar (Watershed and Water Supply Alternatives for the Aconcagua River)

1995-2007 : Adjunct Professor of Watershed Systems, Earth Systems Science, Calif. State Univ. Monterey; Senior Scientist and Research Coordinator, Watershed Institute

1994-ff : Research Professor, University of California Santa Cruz (July 1, 1994 ff)

1981-94 : Professor of Environmental Geology, University of California Santa Cruz

1979-1981: Provost, College Eight; and Chair, Environmental Studies Board, Univ. of California Santa Cruz

1976-1979: Co-Chairman, National Coal Policy Project, Georgetown University, Wash. D.C.

1979 : visiting professor, College of the Atlantic, Bar Harbor, Maine (January).

1974-1979: Professor of Environmental Geology, University of Montana

1973-1975: Director, Sierra Club Research, San Francisco, California

1971-1974: Associate Professor, University of Montana

1969-1971: Assistant Professor, University of Montana

1969 : research fellow, French National Academy, France

1969-ff : staff consultant, U.S. Senate Public Works Committee, Washington, D.C.

1969 : consultant, Office of the Science Advisor, Executive Office of the President, Washington, D.C.

1967-1969: Assistant Professor III, Univ. California, Santa Barbara

1967-1976: Research Hydrologist, U.S. Geological Survey

1964-1967: teaching and research assistant, U.C. Berkeley, Geology & Geophysics

1963 : visiting scholar: Universities of Göttengen, Berlin, Edinburgh, and Innsbruck

1962-1963: teaching associate, University of Alaska, Department of Geology, College

1962 : NSF research assistant, Santa Cruz, California

1962 : instructor, University of Colorado, Denver Extension Division

1960-1962: teaching assistant, University of Colorado, Boulder, Colorado

3. PROFESSIONAL -REGISTRATION

Registered Geologist

California

#3258

1994-ff : Consulting rubric: *Watershed Systems*, Soquel, California

4. MEMBERSHIP in educational and scholarly associations

(1) Geological Society of America (Fellow - 1977 ff)
- Geomorphology Division - panelest
- Engineering Geology Division
- Hydrogeology Division
- Archaeological Division

(2) Ecological Society of America
- Paleoecology Division

(3) Society for Ecological Restoration
- SERCAL - California Chapter President 1995-96

(4) American Geomorphological Field Group
(5) International Glaciological Society
(6) California Watershed Council
(7) American Geophysical Union
(8) Society for Soil and Water Conservation
(9) Scientists Committee for Public Information (Fellow)
(10) International Ecological Society (Committeeman for Soil Ecology Division)
(11) American Institute of Biological Sciences
(12) American Quaternary Association
(13) Sigma Xi (science honorary)
(14) Sigma Gamma Epsilon (earth sciences honorary)
(15) International Association for Quaternary Research (committee officer)
(16) Friends of the Pleistocene
(17) New Zealand Hydrological Society
(18) American Association for the Advancement of Science
(19) Sierra Club (research advisor)

5. MEMBERSHIP on advisory panels, commissions, etc.

5.1. -National

(1) Co-chairman, National Coal Policy Project, Georgetown University, Washington, D.C. -1976-1979

(2) U.S. Senate, Public Works & Environment Committee - panel member - 1969-ff
- subpanelest on Ocean Dumping
- subpanelest on Eutrophication
- subpanelest on Hazardous Wastes

(3) Member, Federal Utility Advisory panel, 1975-1978 National Science Foundation ERDA/NASA “ECAS” Utility Review Panel (Energy Conversion Alternatives Study)

(4) National Academy of Sciences & Engineering - 1975-1979 Risks Impacts Panel for Power Generation - panelest

(5) U.S. Department of Interior - review panel on Teton Dam Failure- invited consultant 1976-1977

(6) National Academy of Engineering and National Research Council, Committee on Criteria for Selection of National Coal Laboratories, 1978-1982.

(7) National Academy of Sciences / National Research Council, Committee on Reclamation and Economic Valuation of Soil, 1978-1980. -panel chairman

(8) American Association for the Advancement of Science (AAAS), Committee on Climate, 1984.

(9) National Oceanic and Atmospheric Administration and U.S. Geological Survey; Working Group on Climatic Change, 1986-ff.

(10) National Academy of Sciences, Mono Lake Review Committee, outside reviewer.

(11) Geological Society of America, Penrose Conference on Environmental Geology. Chair of panel on "Role of the Geologist in the 21st Century", 1986-87

(12) Geological Society of America, Penrose Conference. Co-chair for committee on geological education.

(13) National Academy of Science/National Research Council, 1990, review panelest, Role of Scientists in the Courts, Science Court proposal

(14) Chile - Foundation for Agronomic Innovation, 1997-98, Technology Exchange Fellow – Water Resource Development Options

5.2. -Regional

(1) Northern Cheyenne Tribal Government - advisor on hydrologic and pedologic problems of coal development
(2) Alberta Farm Organizations - advisor on agricultural problems and reclamation in coal land
(3) Wyoming Environmental Institute - coal development impacts advisor 1972-1974
(4) Rocky Mountain Center on Environment 1970-72, consultant on problems of open pit mining
(5) Trans-Alaska Pipeline - Scientific coordinator for public technical critique for the Center for Law & Social Policy, Wash. D.C., 1971-73
(6) Northern Tier Pipeline - impact assessment and technical stipulation specialist for state of Montana. 1978-1979.
(7) Redwood National Park, Outside Technical Review Committee, Watershed Rehabilitation Program, contracted through the Center for Natural Resource Studies, Berkeley, Calif., 1982-ff
(8) Coordinating Board, Water Resources Center (California), Chair of Research Review Committee, Berkeley, Calif. 1982-86; 1994-ff.

(9) State of California, Departments of Forestry and Water Resources, Resources Agency: Shrubland Watershed Vegetation Management Committee, 1982-84.
(10) State of California, Transportation Department, Consultant and advisor on geologic and hydrologic aspects of highway construction.
(11) State of California, University of California, School of Forestry, Wildlands Resources Institute, Advisory Board, 1987-1992
(12) State of California, California Watershed Management Conference, Coordinating Board, 1985-89
(13) University of California Watershed Management Conference, Steering Committee, UCB, Wildlands Resources Center, School of Forestry, 1986-89
(14) U.S. Forest Service, Academic Peer Review Panel, Cumulative Effects Analysis, U.S. F. S., Region V., California. (letter report of December, 1987), 1986-90
(15) California Dept. of Forestry, Hardwoods Task Force, 1990-92.
(16) University of California, Water Resources Research Review Board, reappointment, 1994-95.
(17) – 1996 & 1997 & 2001-- US EPA and Corps of Engineers - Hydrogeomorphic Wetland Function training (National Wetland Science Training Cooperative)

6. PRINCIPAL RESEARCH INTERESTS

(1) 1959-1961: Geobotanical correlations in the Tenmile Range of central Colorado. Geologic mapping in an area masked by tills using indicator plant species for bedrock mapping. M. Sc. thesis topic, Univ. Colo.
(2) 1962: Santa Cruz, California, marine terrace study. N.S.F.-sponsored study of the origin, deformation, and soil development on the marine terrace sequence of northern Monterey Bay. Wm.C. Bradley - principal investigator.
(3) 1963-1965: Santa Clara County, California landslide hazard mapping project. Co-principal investigator for active and potential slide mapping for land-use planning throughout entire County.
(4) 1965-present: Northern California watershed erosion research. A series of projects initiated through request of California State Assembly to assess stability of California watersheds and to assess the impacts of land use manipulations upon that stability. Subsumed under sponsorship of California Division of Forestry and Dept. of Water Resources in 1983.
(5) 1966-present: Sierra Nevada, California - chronology of glaciations. Ph.D. research topic on radiometric chronology of Tertiary and Quaternary glaciation in the Sierra Nevada, including detailed Holocene climatic history.
(6) 1968-present: Climatic trend analysis. Use of historical climatic data to predict future climatic perturbations based upon correlation of paleoclimatic indicators and use of time-series analyses. 1986-ff PACCLIM - Pacific Basin Climate Group - U.S. Geol. Survey.
(7) 1973-present: East Sierra fault and volcanic hazard evaluation. Planning and theoretical geologic studies of Mono County, California.
(8) 1972-1975: Director, public interest research organization. Establishment, funding, and direction of a conservation research organization - Sierra Club Research.
(9) 1973-present: Reclamation potential of arid western lands. N.S.F. and National Academy - supported work integrating paleo-climatic, time-series, and pedologic studies of nutrient status and hydrologic parameters of reclaimed and native areas of western North American coal lands.

(10) 1988-Present: Series of research projects on wetland definition theory and practice. Combine geochemical soil studies with botanical and hydrologic studies to develop geomorphically-based criteria for delineation and definition of wetlands in California. Work supported by Calif. Energy Commission, Water Resources Control Board, EPA, CoE, USF&W, and local governments.
(11) 1989-91: U.S. Geological Survey Sponsored (National Earthquake Hazards Reduction Program) studies of geochemistry of surface and groundwaters affected by the Loma Prieta earthquake of 1989. Work completed in 1991.
(12) 1986-ff: Demonstration building project of "earth-coupled" solar housing. Innovative design and construction of experimental housing unit that requires no fossil fuels at all for any phase of operation (heating, cooking, electricity, water, etc.) and is suitable for very cold climate regions with long periods of no solar input.
(13) 1976-1983: Natural Regions study: National Park Service supported assessment and selection of geologic and ecologic natural areas in the Sierra Nevada, Calif.
(14) 1977-1978: Director of small project to assess the hydrology and total available domestic water for Missoula County, Montana. E.P.A. funded.
(15) 1976-1978: Co-chairman, Mining Task Force, National Coal Policy Project: develop, through mediation and "Rule of Reason" process, a proposed national coal development policy that is acceptable to both industry and environmental Final report completed and published, 1978. Stage 2 begun 1979.
(16) 1978-1981: Chairman, National Academy of Sciences / National Research Council study on soil erosion as a function of land uses in the United States, and prospects for recovery.
(17) 1979-1984: Carmel River watershed channel stability studies. Contracted and thesis supervision research on causes and controls of bank and channel cross-section instability in the Carmel River Valley. For the Monterey Peninsula Water Management District; leading to work on the role of riparian vegetation in bank stability of rivers.
(18) 1982-present: Estuarine and freshwater stream restoration projects. Primary research with students on restoration of damaged estuarine ecosystems. Pescadero Marsh Management Plan study for California Dept. of Parks and Recreation. Schwan Lake restoration plan, 1991-95. San Lorenzo river restoration planning, 1986-96; Lahontan Regional Water Quality Control Board regional wetland restoration 1991-ff., 1998-ff San Mateo and Santa Barbara Counties with L.C. Lee & Assoc; 1999-2006 Napa and Salinas River Valley TMDL Sediment/Salmonid studies.

7. PUBLICATIONS

7.1. -Books and Monographs

(1) Curry, R.R., and Wahrhaftig, Clyde, 1967, Geologic Implications of Sediment Discharge from the Northern Coast Ranges, California: p. 35-60 in Goldman, C.R., (ed), Man's Effect on California Watersheds, Section 3; Inst. of Ecology, University of California, Davis, Calif. 434 p.
(2) Curry, R.R., 1962, Geobotanical Correlations in the Alpine and Subalpine Regions of the Tenmile Range, Summit Co., Colo. Univ. Colo. MSc thesis, 123 p. + maps, unpublished.

(3) Curry, R.R., 1968, Quaternary Climatic and Glacial History of the Sierra Nevada, California: Univ. Microfilms 68-13,896; Ann Arbor, Mich., 238 p. (PhD thesis, University of California, Dept. of Geology and Geophysics, 1968).
(4) Curry, R.R., 1969, Holocene Climatic and Glacial History of the Central Sierra Nevada, p. 1-47, Special Paper 123, Geol. Soc. America.
(5) Committee on Public Works, U. S. Senate, 1970, Toxicological and Environmental Implications on the use of Nitrilotriacetic Acid as a Detergent Builder: Staff Report, Dec. 1971, G.P.O., Washington, D.C. 52-354, 84 p.
(6) Curry, R.R., 1970, Eutrophication and the Role of Phosphates in Eutrophication. Special Staff Report, U.S. Senate Committee on Public Works, Scientific Advisory Panel, July 23, 10 p.
(7) Curry, R.R., 1971, Glacial and Pleistocene History of the Mammoth Lakes Sierra: Univ. Montana, Dept. Geology, Geol Series Publ. 2, 50 pp + map.
(8) Curry, R. R. (ed), 1972, Field Guide: Univ. Montana winter field, Idaho, Washington, Oregon, Feb. 1972, Dept. Geol. Univ. Montana, 81 p.
(9) Curry, R.R., 1972, Technical Comments on the Trans-Alaska Pipeline, vol. 1, tab b; Center for Law and Social Policy, Washington D.C., 107 p.
(10) Curry, R.R., Malde, H.E., Andrus, D.R., and Balzer, J.L., 1975, Reclamation of Mined Lands. The Reclamation Question. Rocky Mountain Center on Environment, Coal in the West Series - A Colorado Business Survey, Denver, Colo. 18 p.
(11) Curry, R.R., Lister, J.C., and Stoffel, Kieth, 1977, Glacial History of Flathead Valley and Lake Missoula Floods. Geol. Soc. America, Rocky Mountain Section, 30th annual meeting, Field Guide No. 4, p. 14-38. in Glacial Geology of the Flathead Valley and catastrophic drainage of Glacial Lake Missoula; Smith, D.G., et al, eds.
(12) Murray, F.X. (ed), 1978, Where We Agree - Report of the National Coal Policy Project: Georgetown University, Center for Strategic and International Studies; Westview Press, Boulder, Colo. vol. 2, Report of the Mining Task Force, 477 p.
(13) Committee on Criteria for Establishing Coal Research Laboratories in Universities, 1979, Criteria for Establishing University Coal Research Laboratories. National Academy of Sciences / National Research Council, Energy Engineering Board, NAS Press, Washington D.C., 20 p. (Committee member and coauthor)
(14) CONAES (Committee on Nuclear and Alternative Energy Systems), 1980, Energy and the Fate of Ecosystems. Supporting Paper 8, Report of Ecosystems Impacts Resource Group, John Harte, Chair. National Academy of Sciences/National Academy of Engineering, NAS Press, Wash. D.C., 399 p. (Member of Group, and author of Chapt. 5, “Land Reclamation in North America”, pp. 95-121)
(15) Committee on Soil as a Resource in Relation to Surface Mining for Coal, 1981, Surface Mining: Soil, Coal and Society. National Academy of Sciences, Commission on Natural Resources, National Research Council, NAS Press, Washington DC, 220 p. (co-author of report and primary author of Chapt. 5, pp. 73-105, “The Soil”).
(16) Kennett, Gregory A, and R.R. Curry, 1981, Investigations of high groundwater in Polson terminal moraine; Bozeman, Mont.: Montana Water Resources Research Center, Montana State University
(17) National Coal Policy Project, 1981, Final Report, Center for Strategic and International Studies, Georgetown University, Wash. D.C., 124 p. (project co-chair).
(18) Burke, Mary T., R. Curry, J. Major, and D. Taylor, 1982, Natural Landmarks of the Sierra Nevada. U.S. Dept. Interior, National Park Service, Conservation and Recreational Services Division. Landmark Survey of the Sierra Nevada, 529 p.
(19) Curry, R.R., (technical coordinator and writer), 1982, “Kampf und Wasser - Kalifornian wissen...” [”Fight for Water - California’s position between water excess

and water deficit]. Video Documentary produced by Hans G. Wiegand for West Deutsche Rundfunk, Science Dept., Koln, Germany, and first aired nationwide March, 1982. Audio version edited for radio first aired Sept 7, 1984. Seventy minute program exploring conflicts in water resource allocation in California. Videotape with German and English soundtracks.

(20) Kondolf, G.M., John Williams, and R. R. Curry, 1983, Channel Stability and Fish Habitat, Carmel River, California. Field Conference Guidebook for Symposium and Field Conference, Monterey Peninsula College, Monterey, Calif. June 16-18, Monterey Peninsula Water Management District, 76 p.

(21) Curry, R. R., 1985, Sedimentologic and Hydrologic Analysis of Pescadero Marsh and its Watershed. Report to State of California, Dept. of Parks and Recreation, 110 pp.

(22) Curry, R. R., and A. Beth Dyer (eds), 1992, The current status of Schwan Lagoon, Santa Cruz County, California and some management considerations. A compilation of technical reports. Univ. of California Santa Cruz, 96 p.

7.2. -Journal and web papers and book chapters

(1) Curry, R.R., 1966, Observations of Alpine Mudflows in the Ten-mile Range, central Colorado: Geol. Soc. America Bull., v. 77, p. 771-776.

(2) Curry, R.R., and Clyde Wahrhaftig, 1966, Geologic Implications of Sediment Discharge Records from the Northern Coast Ranges, California. Report to the California state Assembly Committee on Natural Resources, Planning, and Public Works; Sub-committee on Forest Practices and Watershed Management, August, Sacramento, Calif., 22 p.

(3) Curry, R.R., 1966, Glaciation -- 3,000,000 years ago in the Sierra Nevada, California: Science, v. 152, p. 155-156.

(4) Curry, R.R., 1967, Glacial History of the Central Alps between Sellrain and Otztal: (english summary of report by Helmut Heuberger): Wissenschaftliche Alpenvereins Hefte 20, 10 p.

(5) Curry, R.R., 1967, On the use of vegetation to date land surfaces: Revue de Geomorphologie Dynamique, v. 17, no. 4, p. 168-169.

(6) Curry R.R., 1967, Photography and Stereophotography: Revue de Geomorphologie Dynamique, v. 17, no. 4, p. 174-175.

(7) Curry, R.R., 1967, Repeated Photographs: Revue de Geomorphologie Dynamique, v. 17, no. 4, p. 175-176.

(8) Curry, R.R., 1968, California's Deadman Pass Glacial Till is also nearly 3,000,000 years old: Calif. Divn. Mines, Mineral Information Service, v. 21, no. 10, p. 143-145.

(9) Curry, R.R., 1969, Lake: in Styles, Ed. (ed), Jefferson Encyclopedia, World Book Publ. Co., Cleveland, Ohio.

(10) Curry, R.R., 1969, River: in Styles, Ed. (ed), Jefferson Encyclopedia, World Book Publ. Co., Cleveland, Ohio.

(11) Curry, R.R., 1969, Swamp: in Styles, Ed. (ed), Jefferson Encyclopedia, World Book Publ. Co., Cleveland, Ohio.

(12) Curry, R.R., 1969, Santa Barbara and Beyond: *in*: Olsen, R.A. and M. M. Wallace (eds), Geologic Hazards and Public Problems. Exec. Office of the President, Office of Emergency Preparedness, Reg. 7, Wash. D.C.

(13) Curry, R.R., 1969, Vertical movements of the Sangamon marine terrace around the Santa Barbara Channel, California. p. 300 *in*: Symposium de Nèotectonique du Pacific, Resumes de communications, VIIIe Congress INQUA, Paris, France.

(14) Curry, R.R., 1969, Chronologie Glaciare Absolue de la Sierra Nevada, Californie, pour les derniers 2,700,000 ans. p. 346 *in*: resumes des communications, VIIIe Congress INQUA, Paris, France.
(15) Curry, R.R., 1970, Wilderness as biota refugia. *In*: Luten, D.B. (ed), Wilderness, the Edge of Knowledge; Proc. of the 1969 Sierra Club Wilderness Conf., Sierra Club, San Francisco.
(16) Curry, R.R., 1970, Fluorine in the marine environment—a legislative proposal prepared for the Sub-committee on Ocean Dumping, U.S. Senate Public Works Committee, advisory panel, 9 p.
(17) Curry, R.R., 1970, Lodgepole Subclimax—its maintenance by insects and birds: Reports of the American Quaternary Association, 1st meeting, 1970, p. 26.
(18) Curry, R.R., 1970, Altithermal precipitation maximum: Reports of the American Quaternary Association, 1st meeting, p. 25.
(19) Curry, R.R., 1970, Report to the subpanel on Ocean Dumping, U.S. Senate Committee on Public Works; including a proposal for the establishment of national dumping sites; reports of the Senate Committee on Public Works, advisory panel, 12 p.
(20) Curry, R.R., 1970, A proposal for ecological refugia: Intecol Bulletin, v. 1, p. 3-7.
(21) Curry, R.R., 1971, How to deforest a continent: Not Man Apart, v.1, no. 9, p 25-27.
(22) Curry, R.R., 1971, Soil destruction associated with forest management and prospects for recovery in geologic time: Assoc. Southeastern Biologists Bull. v. 18, no. 3, p 117-128.
(23) Curry, R.R., 1972, Geology, the environmentalists foundation: Michigan Acad. of Science, Arts and Letters Bull., 10 p., East Lansing, Mich.
(24) Curry, R.R., 1972, Rivers—a geomorphic and chemical overview, p. 18-32 *in*: Oglesby, R.T., Carlson, C.A. and McCann, J.A. (eds), River Ecology and Man, Academic Press, New York, 465 p.
(25) Curry, R.R., 1972, Some questions on forest soils, p. 18-32 *in:* Western Montana Scientists' Committee for Public Information, lecture volume of May, 1972, WMSCPI, Missoula, Mt. 212 p.
(26) Curry, R.R., 1973, Geologic and hydrologic effects of even aged management on productivity of forest soils, particularly in the Douglas-fir region, 43 p. *in*: Hermann, R.K. (ed), Even-Aged Management, Oregon State Univ. Press, Corvallis.
(27) Curry, R.R., 1973, Reclamation of Arid Western Lands: Montana Outdoors, v. 4, no. 3, p 18.
(28) Curry, R.R., 1973, The great tree rip-off: Not Man Apart, Oct., 1973, p. 1-7.
(29) Curry, R.R., 1973, A scientific and policy review of the draft environmental impact statement: Crow Ceeded Area Coal Lease Westmorland Resources Mining Proposal; Inst. of Ecology, Applegate, Rick, et al, (eds), Denver, Colo. 69 p.
(30) Curry, R.R., 1974, Reviewers comment: p. 165-171 *in*: Rehabilitation Potential of Western Coal Lands; National Academy of Sciences, Ballanger Publ. Co., Cambridge, Mass., 198 p.
(31) Curry, R.R., 1975, Practices and problems of land reclamation in western North America: Biogeochemical limitations on western reclamation—the high Northern Great Plains example. p. 18-47 *in*: Wali, M.K. (ed), Practices and Problems of Land Reclamation in western North America, Univ. North Dakota Press, Grand Forks, 196 p.
(32) Curry, R.R., 1976, Downstream effects of runoff changes, p. 251-262 *in*: Sharma, Raj, D. Buffington, and J. McFadden (eds), Proceedings of the workshop on biological significance, Argonne National Laboratories. U.S. Nuclear Regulatory Comm., NR-CONF-002, Wash. D.C., 327 p.

(33) Shedd, Ben (Producer), R. Curry, 1976, The Renewable Tree (Vol 1). WGBH NOVA series video, 59 minute , WGBH Boston (rereleased by Time-Life Books).
(34) Curry, R.R., 1976, Practices and problems of reclamation in North America, p.23 *in*: Tixier, Stan (ed), Vegetative Rehabilitation and Equipment Workshop, annual report, 30th annual workshop report. U.S. Dept. Agriculture, Wash. D.C., 34 p
(35) Curry, R.R., 1976, Teton Dam Collapse. Geophysical Event Notification Report, Smithsonian Inst., Center for Short-lived Phenomena, Cambridge, Mass. Event 47-76, card 2450, 16 June, 1976.
(36) Strasser, Gabor, Curry, R.R., and others, 1976, Roles and responsibilities. p. 108-130 *in*: Advanced Power Systems for Utility Implementation; Proceedings of an ERDA Workshop of April, 1976 Mitre Corp. Report M76-49, 138+ p.
(37) Curry, R.R., 1977, Watershed form and process: The elegant balance. p. 14-21 in: CoEvolution Quarterly, winter 1976-77.
(38) Curry, R.R., 1977, Reinhabiting the Earth: Life support and the future primitive. p. 1-23 *in:* Carins, John, Dickson, K.L., and Herricks, E.E., (eds), Recovery of Damaged Ecosystems, University of Virginia Press, Charlottesville, 531 p.
(39) Curry, R.R., 1977, Natural Resources, p. 74 *in*: Nash, Hugh (ed), Progress as if Survival Mattered. Friends of the Earth, San Francisco, 319 p.
(40) Curry, R.R., 1977, Watershed Systems and Policy Planning, p. 47-61 in: Inst. for Policy Studies, Portland State University, Water for Oregon's Future, Inst. for Policy Studies, Portland, 144 p.
(41) Curry, R.R., 1977, Realities and problems of reclamation, p. 4-12 *in*: Coal Industry Reclamation Symposium, Proceedings Volume. The Coal Association of Canada, Calgary, 197 p.
(42) Koch, Roy, Robert Curry and Mark Weber, 1977, The effect of altered streamflow on the hydrology and geomorphology of the Yellowstone River Basin, Montana. Montana Dept. of Natural resources and Conservation, 163 p., Tech. Rept. No. 2; Yellowstone Impact Study.
(43) Curry, R.R., 1978, Collision Terracy, p. 34-37 *in*: Berg, Peter (ed), Reinhabiting a Separate Country: A bioregional anthology of northern California. Planet Drum Foundation, San Francisco, Calif. sponsored by the California Arts Council, 220 p.
(44) Curry, R.R., 1978, New Directions Needed for Agricultural Research, p. 122-137, Truck No. 18, Truck Press, St. Paul., Minn.
(45) Curry, R.R., 1978, Reinhabiting the Earth, p 17-42, Truck No. 18, Truck Press, St. Paul, Minn.
(46) Curry, R.R., 1979, Policy Development to Minimize Mining Impact: Report of the U.S. National Coal Policy Project, p. 127-136 *in* Ecology and Coal Resource Development (M. Wali, ed), V. 1, Pergamon Press, New York.
(47) Curry, R.R., and G. M. Kondolf, 1981, Strategy for Restoration of Channel Stability, Carmel River, Monterey County, Calif., p. 191-208 in "Watershed Rehabilitation in Redwood National Park and other Coastal Areas", Proc. of a Symp. held Aug. 24-28, R.N. Coats, (ed), National Park Service and Center for Natural Resource Studies of JMI, Berkeley, Calif.
(48) Curry, R. R., 1981, Watershed Form and Process: The Elegant Balance. Chapt 20 (p. 319-340) *in* Emery, F.E. (ed), "Systems Thinking", Vol. 2, Penguin Books, Middlesex, England, 474 p. Penguin Modern Management Readings, Education Series, published simultaneously by Penguin Books, New York; Victoria, Australia; Markham, Ontario, Canada; and Auckland, New Zealand.
(49) Curry, R.R., 1981, Watershed Form and Process, p. 36-52 *in* "Symposium on Watershed Rehabilitation in Redwood National Park and Other Coastal Areas",

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(51) Curry, R. R., with Peter Berg, 1984, Volcanoes Make Good Neighbors, p. 2-3, Raise the Stakes, No. 9, Planet Drum Foundation, San Francisco.

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(53) Kondolf, G. M., and R. R. Curry, 1984, Role of Riparian Vegetation in stream channel equilibrium: The Carmel River Example, Monterey County, California. pp. 124 - 133 *in* Warner, R.E. and K.M. Hendrix (eds), California Riparian Systems, Univ. Calif. Press, Los Angeles.

(54) Curry, R. R., 1984, Water Yield and Water Quality in Shrubland Watersheds, Chapt 5, p. 51-60, *in* J.J. deVries (ed), Shrublands in California: Literature Review and Research Needed for Management. Water Resources Center, Univ. of California, Davis, California, June, 1984.

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2. Curry, R.R., 1971, Specific recommendations on the Council on Environmental Quality's report on Ocean Dumping: To the U.S. Senate, Committee on Public Works, 3 p.
3. Curry, R.R., 1971, Interim progress report on Montana Power electric utility advertising: To the Montana state Legislature, 19 p.
4. Curry, R.R., 1971, Criteria for evaluating proposals for disposal of underground fluids—suggestions on groundwater pollution control legislation and evaluation of 102-statements: To the U.S. Senate Committee on Public Works, May 18, 7 p.
5. Curry, R.R., 1971, Critical review of the Environmental Impact Statement for the Trans-Alaska Pipeline: Cong. Record, Apr. 21, 1971, submitted by Ed Muskie, (D) Maine, S5298-S5300.
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7.4 – selected Hearings and Appeals Court citations

1. Santa Teresa Citizen Action Group v. City of San Jose, H024841 , COURT OF APPEAL OF CALIFORNIA, SIXTH APPELLATE DISTRICT , 114 Cal. App. 4th 689; 7 Cal. Rptr. 3d 868; 2003 Cal. App. LEXIS 1879; 2003 Cal. Daily Op. Service 10997; 2003 Daily Journal DAR 13864, December 18, 2003, Filed, Rehearing denied by Santa Teresa Citizen Action Group v. City of San Jose, 2004 Cal. App. LEXIS 70 (Cal. App. 6th Dist., Jan. 13, 2004)

2. Arreola v. County of Monterey, No. H021339. , COURT OF APPEAL OF CALIFORNIA, SIXTH APPELLATE DISTRICT , 99 Cal. App. 4th 722; 122 Cal. Rptr. 2d 38; 2002 Cal. App. LEXIS 4319; 2002 Cal. Daily Op. Service 5668; 2002 Daily Journal DAR 7131, June 25, 2002, Decided, June 25, 2002, Filed, Order Modifying Opinion and Denying Petition for Rehearing July 23, 2002, Reported at: 2002 Cal. App. LEXIS 4423. Review Denied September 18, 2002, Reported at: 2002 Cal. LEXIS 6194.

3. Sierra Club v. County of Sonoma, No. A054037, COURT OF APPEAL OF CALIFORNIA, FIRST APPELLATE DISTRICT, DIVISION ONE., 6 Cal. App. 4th 1307; 8 Cal. Rptr. 2d 473; 1992 Cal. App. LEXIS 672; 92 Cal. Daily Op. Service 4543; 92 Daily Journal DAR 7195, May 28, 1992, Decided, Rehearing Denied June 29, 1992, Reported at 1992 Cal. App. LEXIS 836. Review Denied August 27, 1992, Reported at 1992 Cal. LEXIS 4394. Panelli, J., and Arbian, J., are of the opinion the petition should be granted.

4. City of Carmel-by-the-Sea v. Board of Supervisors, Nos. H000282, H001125, Court of Appeal of California, Sixth Appellate District, 183 Cal. App. 3d 229; 227 Cal. Rptr. 899; 1986 Cal. App. LEXIS 1806, July 10, 1986, Petitions for a rehearing were denied July

25, 1986, and the petition of plaintiff and appellant for review by the Supreme Court was denied September 24, 1986.

5. Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova, C044653 , COURT OF APPEAL OF CALIFORNIA, THIRD APPELLATE DISTRICT , 127 Cal. App. 4th 490; 25 Cal. Rptr. 3d 596; 2005 Cal. App. LEXIS 349; 2005 Cal. Daily Op. Service 2170; 2005 Daily Journal DAR 2979; 35 ELR 20059, February 8, 2005, Filed, NOT CITABLE--SUPERSEDED BY GRANT OF REVIEW, The Publication Status of this Document has been Changed by the Court from Unpublished to Published March 10, 2005. Review granted, Depublished by Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova (Sunrise Douglas Property Owners Assn.), 29 Cal. Rptr. 3d 737, 2005 Cal. LEXIS 5956 (Cal., 2005) Later proceeding at Vineyard Area Citizens v. City of Rancho Cordova; Sunrise Douglas Property, 2005 Cal. LEXIS 7416 (Cal., June 28, 2005) Later proceeding at Vineyard Area Citizens v. City of Rancho Cordova (Sunrise Douglas Property), 2005 Cal. LEXIS 7489 (Cal., July 11, 2005) Application granted by Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova, 2005 Cal. LEXIS 9278 (Cal., Aug. 16, 2005)
6. Blasdel v. Montana Power Co., No. 80-208, Supreme Court of Montana, 196 Mont. 417; 640 P.2d 889; 1982 Mont. LEXIS 722, October 21, 1981, Submitted, February 2, 1982, Decided 889; 1982 Mont.
7. San Francisco Baykeeper v. Cargill Salt Div., No. C 96-2161 SI , UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA , 2003 U.S. Dist. LEXIS 8247, April 29, 2003, Decided, April 30, 2003, Filed, Motion denied by S.F. Baykeeper v. Cargill Salt Div., 2003 U.S. Dist. LEXIS 8246 (N.D. Cal., Apr. 29, 2003)
8. Tri-Valley Cares v. United States DOE, No. C 03-3926 SBA , UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA , 2004 U.S. Dist. LEXIS 18777, September 10, 2004, Decided
9. Sierra Club v. County of Napa, A101941 , COURT OF APPEAL OF CALIFORNIA, FIRST APPELLATE DISTRICT, DIVISION ONE , 121 Cal. App. 4th 1490; 19 Cal. Rptr. 3d 1; 2004 Cal. App. LEXIS 1467; 2004 Cal. Daily Op. Service 8146; 2004 Daily Journal DAR 10939, August 6, 2004, Filed, The Publication Status of this Document has been Changed by the Court from Unpublished to Published September 1, 2004. Review denied by, Request denied by Sierra Club v. County of Napa (Beringer Wine Estates), 2004 Cal.