Public Comment
Napa River Sediment TMDL
Deadline: 8/19/10 by 12 noon

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August 18, 2010

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AUG 19 2010
SWRCB EXECUTIVE

Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Re: Comment Letter - Napa River Sediment TMDL

Dear Ms Townsend:

This office represents Living Rivers Council ("LRC"), a non-profit association, with respect to the proposed Basin Plan Amendment for the Napa River Sediment Total Maximum Daily Load ("TMDL"). I am writing to submit comments regarding the proposed TMDL on LRC's behalf. LRC objects to the State Water Resources Control Board's ("State Board") adoption of the proposed TMDL on grounds that the proposed TMDL does not yet comply with California Environmental Quality Act ("CEQA"), the Clean Water Act or the Porter-Cologne Water Quality Act.

This letter incorporates by reference the comment letter from Dennis Jackson dated August 5, 2010 attached hereto as Exhibit 1 and the comment letter from Patrick Higgins dated August 17, 2010 attached hereto as Exhibit 2.

LRC previously submitted the following comments to the State Board or the San Francisco Bay Regional Water Quality Control Board ("Regional Board") regarding this proposed TMDL:

1. July 6, 2009 comment letter from my office to the Regional Board, including:
    a. Comment letter dated July 5, 2009 from Dennis Jackson;
    b. Comment letter dated July 2, 2009 from Dennis Jackson;
    c. Comment letter dated July 2, 2009 from Patrick Higgins;
2. October 20, 2008 comment letter from my office to the Regional Board, including:
    a. Comment letter dated October 19, 2008 from Dr. Robert Curry;
    b. Comment letter dated October 17, 2008 from Dennis Jackson;
3. May 7, 2008 comment letter from my office to the State Board, including:

a. Comment letter dated April 24, 2008 from Dennis Jackson regarding the Napa River Sediment TMDL;

b. Comment letter dated May 7, 2008 from Patrick Higgins regarding the Napa River Sediment TMDL;

c. Comment letter dated May 7, 2008 from Dr. Robert Curry regarding the Napa River Sediment TMDL attached hereto as Exhibit 6.

4. August 15, 2006 comment letter from my office to the Regional Board, including:

a. Comment letter dated August 11, 2006 from Dr. Robert Curry;

b. Comment letter dated August 11, 2006 from Dennis Jackson;

c. Comment letter dated August 12, 2006 from Patrick Higgins

These previous comments will not be repeated, except as points of departure for additional comments. Nevertheless, they are still applicable and LRC requests that the State Board consider them before deciding whether to adopt this proposed TMDL.

This letter, consistent with the direction provided in the July 2, 2010 notice of opportunity for public comment, focuses on the adequacy of the Regional Board's September 9, 2009 Responses to Comments (hereinafter "RTC").

The current TMDL proposal reflects a number of changes that Regional Board staff have made in response to comments submitted by LRC. LRC appreciates the fact that the proposal is much improved as a result of this process. Nevertheless, the proposal still has a number of scientific, regulatory and legal flaws that LRC believes should be remedied before this Board approves the proposal.

. The TMDL adopts, as a performance standard for controlling surface erosion from vineyards, Napa County's enforcement of its Conservation Regulations on new vineyard conversions. (TMDL, Table 4.1.) LRC has commented extensively that this County program has caused unintended adverse effects by increasing storm runoff, thereby entraining sediment from the bed and banks of upland streams, which is then deposited in shallow gradient downstream stream or river reaches.

The Regional Board has agreed with LRC that land use changes, particularly from new vineyard conversions, "may have a significant impact on sensitive communities [i.e., listed fish species] that may experience significant impacts from Basin Plan compliance actions." (RTC, p. 58.) The Regional Board has also agreed with LRC that some vineyard conversions approved by Napa County have "excessively" relied on "engineered drainage to control surface erosion on-site" and thereby "inadvertently caused or contributed to off-site gully erosion at or near the points of discharge from the vineyards." (RTC, p. 58.)

Despite these admissions, the Regional Board continues to reject LRC's request that it conduct an EIR-level analysis of the County's program to assess this mechanism of environmental impact of the TMDL's performance standards. Instead, the Board continues to use a checklist that is akin to a Negative Declaration, in violation of CEQA.

As a result of LRC's comments, the TMDL now includes, as a mitigation measure for this potentially significant impact, a performance standard stating: "Effectively attenuate significant increases in storm runoff." (TMDL, Table 4.1.) Yet the TMDL provides no criteria or "thresholds of significance" for determining when increases in runoff are significant. Thus, the environmental document violates CEQA for three reasons: (1) without this essential information, the project description is incomplete; (2) because the project description is incomplete, the project's environmental review has been segmented; (3) the Board has illegally deferred the identification of specific feasible mitigation measures to reduce significant impacts. On this last point, where impacts are found to be significant, CEQA may allow the use of a general performance standard in place of specific mitigation measures, but only where it is shown that developing specific mitigation measures is infeasible or impracticable. No such showing has been made here.

The Regional Board has acknowledged that it is preparing a "waiver policy" that will establish standards for exempting projects from direct, site specific regulation under the TMDL. LRC has extensively commented that deferring a description of this portion of the project description renders the environmental document inadequate because the project description is incomplete and project's environmental review has been segmented, in violation of CEQA.

A. NEITHER THE REGIONAL BOARD NOR THE STATE BOARD HAS COMPLIED WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT ("CEQA")

1. An EIR-Level Analysis of the Impacts of Using the Napa County Conservation Regulations as a Performance Standard is Required.

For many years environmental groups in Napa County have been involved in critiquing the Napa County Planning Department's approval of Erosion Control Plans ("ECP's") for new vineyards. I was originally retained by the Sierra Club and then later by Earth Defense for the Environment to coordinate this work. I retained three primary consultants to assist me - Dr. Robert Curry, Dennis Jackson and Pat Higgins. LRC's previous comments on this TMDL, including thirteen ECP's approved by Napa County, demonstrate that Napa County's program is not protecting water quality and is actually causing significant environmental harm.

The primary problem is that the focus of the ECP's approved under this program is to reduce surface erosion - and the methods that are used to do that - cross slope ditches; drop inlets and underground pipes, concentrate and rout rainfall off the property as quickly as possible before it can erode the surface.

The result is to increase runoff and peak discharge. The effect of this on the environment is devastating. Historical increases in runoff are deeply incising the stream and river channels because increased runoff picks up sediment from stream beds and the river bed. This destabilizes stream banks, which collapse and add more sediment to the system, which causes flooding by reducing channel capacity. It lowers the stream and river beds, which separates the channels from their natural flood plain, which has many adverse and well documented effects on the riparian environment. As a result, the Napa River is seriously out of hydrologic balance.

Indeed, both Dr. Curry and Mr. Jackson have consistently found that the Erosion Control Plans and facilities approved for new vineyards by Napa County pursuant to its Conservation Regulations do not accurately evaluate or adequately mitigate potentially significant impacts associated with increases in runoff from projects approved pursuant to the Conservation Regulations. *See e.g.*, Exhibits 7 through 16 and 30 through 32 to my comment letter dated August 15, 2006 to the San Francisco Bay Regional Water Quality Control Board regarding this TMDL. As Dr. Curry explained in his overview critique of the Conservation Regulations in 2000:

> The approach of the Napa County ordinances is fundamentally incorrect and cannot protect either public health and safety or long-term land productivity. The existing ordinances seem to assume that by attempting to capture sediments from upland vineyard conversion areas, downstream cumulative effects are reduced to insignificance. This is not correct. Increased upland sediment yields, while important, are less hazardous to Napa Valley than are the changes in runoff timing, volumes, and rates. Increased runoff does have cumulative downstream effects through changes in rates of runoff and frequency of runoff events of a given magnitude. These changes are likely to be a significant factor in changing sediment loads in the main Napa River through changes in stability of its side tributaries.

(Exhibit 7 to Lippe Comment Letter dated August 15, 2006, p. 1.)

The cumulative contribution to increased runoff from the installation of engineered drainage facilities designed to bring new vineyards into compliance with the Napa County Conservation Regulations is cumulatively significant. As explained by Dr. Curry:

> The recommended structural drainage facilities such as culverts, lined ditches, and drainage channels as applied over large areas of Napa Valley will reduce sediment input from uplands but will exacerbate off-site channel and stream-bed erosion through increased yield of runoff. The public and the fish in the Napa River are directly impacted by the cumulative downstream impacts of increased frequency and duration of flood flows in the main river and its primary tributaries. The sediment addressed by the TMDL is also important but cumulative effects analyses must also include the changed flow characteristics. Exhibit 6 attached hereto, p. 3.

Finally, the Regional Board's September 9, 2009 Staff Report does not acknowledge the following crucial facts. The conditions that have caused basin-wide increases in peak runoff which, in turn, have caused so much environmental damage in the Napa River watershed, are still in place and will continue to be place for the foreseeable future. Therefore, the nature and degree of environmental damage that has occurred and continues to occur will continue into the foreseeable future unless peak runoff is decreased basin-wide. Thus, continuing the peak-runoff status quo will have continuing significant effects on the environment and any increases in peak runoff will cause new significant effects on the environment. Therefore, to devise a performance standard that speaks in terms of attenuating "significant increases" in peak flow is to lose the battle before it starts.

The State Board is required to comply with CEQA in approving the TMDL. Where impacts of TMDL implementation may be significant, this means preparing a document that is equivalent to an Environmental Impact Report ("EIR"). *City of Arcadia v. State Water Resources Control Bd.* (2006) 135 Cal.App.4th 1392, 1422-1423. Here, the TMDL environmental document fails to assess the impact of increases in peak flow as a result of the TMDL's adoption of Napa County's program of requiring the installation of these engineered drainage facilities.

The TMDL as proposed in May of 2009 included "compliance" with Napa County's enforcement of its Conservation Regulations as a performance standard for controlling surface erosion. LRC opposed this on several grounds, including that the TMDL's substitute environmental document did not assess the environmental impact of using this performance standard. In response, the Regional Board revised this performance standard by deleting the word "comply," but added language stating: "Napa County Conservation Regulations (County Code Chapter 18.108) are effective in the control of excessive rates of sediment deliver resulting from vineyard surface erosion."

This semantic change is superficially appealing, but substantively meaningless, for two reasons. First, by making a factual finding that compliance with Napa County's enforcement of its Conservation Regulations is effective for controlling surface erosion, such compliance is effectively adopted as part of the <u>surface erosion</u> performance standard. But the issue presented by LRC in past comments and here is not whether Napa County's enforcement of its Conservation Regulations is effective for controlling <u>surface erosion</u>. The issue is what other unintended effects this enforcement program has on the environment. LRC's previous comments extensively detailed the fact that the County's program has caused unintended adverse effects by increasing storm runoff, thereby entraining sediment from the bed and banks of upland streams, which is then deposited in shallow gradient downstream stream or river reaches. The resulting imbalance between sediment discharge and runoff is discussed further in Dennis Jackson's August 5, 2010 letter (Exhibit 1). This dynamic has devastating effects on the environment.

Second, LRC has previously and extensively commented that the environmental document must assess these effects, with an EIR-level analysis because implementation of the standard is likely to cause significant runoff impacts. Instead, the RTC pretends that the Basin Plan amendment merely "acknowledges" the existence of the Napa County program and presents an environmental checklist that is functionally equivalent to a Negative Declaration. The RTC argues that the County's Conservation regulations do not specify any particular "means of compliance." (RTC, p. 55.) But the fact that the County's Conservation Regulations "do not specify means of compliance" is immaterial. At this point, the "means of compliance" are a matter of readily available historical record. Since the Conservation Regulations took effect in 1991, an entire consulting industry has arisen to enable vineyard owners to comply, and the consultants who populate this industry have standard, indeed routine, methods of trying to achieve compliance. All of this material is public record and available for the Board to review and evaluate, and much of this material has been submitted in connection with LRC's previous comments on this TMDL.

The RTC also makes a legal argument that relies primarily on the Board's certified regulatory program status under CEQA. (RTC, p. 14.) But this argument ignores the case I cited in my previous comments, *City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1422-1423. The import of this case is that the Board's certified regulatory program does not exempt it from preparing an EIR-level analysis of potentially significant project impacts.

The RTC also argues that the environmental documents is not required to evaluate the impacts of specific future projects. (RTC, p. 56.) This is true, but since the TMDL incorporates the County's program wholesale, it should conduct a wholesale review of its environmental impact.

The RTC's observations that Board staff are personally familiar with many new vineyards approved by the County under this program (RTC, p. 57) cannot substitute for public disclosure of a fact-based assessment of the environmental impact of this performance standard.

2. The TMDL Environmental Document Violates CEQA Because the Project Description is Incomplete and Segmented.

The Implementation Measures for Sediment Discharges Associated with Vineyards set forth in Table 4.1 of the TMDL specify the following "Actions" for achieving the identified performance standards:

> "Submit a Report of Waste Discharge[2] (RoWD) to the Water Board that provides, at a minimum, the following: a description of the vineyard; identification of site-specific erosion control measures needed to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.
> Or
> Implement farm plan certified under Fish Friendly Farming Environmental Certification Program or other farm plan certification program, as approved as part of a WDR waiver policy. All dischargers applying for coverage under a WDRs waiver policy also will be required to file a notice of intent (NOI) for coverage, and to comply with all conditions of the WDR waiver policy.[4]

Thus, for purposes of both ensuring that the TMDL achieves Basin Plan water quality standards and avoiding significant adverse impacts from implementation of the TMDL, the Regional

Board is essentially saying "Trust Us" based on the fact that future projects will either undergo project specific review through issuance of Waste Discharge Requirements ("WDRs"), or will have to meet conditions specified in a future WDR waiver policy to avoid project specific review through issuance of WDRs.

As LRC has previously pointed out, the problem here is that the Board has not published the future WDR waiver policy. Without the waiver policy, the public cannot evaluate whether the conditions that project applicants will be required to meet to avoid project specific review through issuance of WDRs will be stringent enough to ensure that only projects not needing additional analysis or mitigation measures are allowed within the WDR waiver.

Deferring development of the WDR waiver policy violates CEQA because it segments the environmental assessment of the current TMDL, its performance standards, and the measures necessary to meet these performance standards. All of these components constitute one project. Therefore, at this point, the project description is incomplete.

This is especially true regarding increases in runoff. The TMDL's performance standard for runoff is to "attenuate significant increases" in runoff. But critical information is not provided. No detail is provided as to what criteria or thresholds will be used to identify significant vs less-than-significant increases. No information is provided regarding how baseline runoff will be determined. How the TMDL will control increases in runoff is a black box that is entirely dependent on the WDR waiver policy, including the criteria for obtaining a waiver and the degree of enforcement that is brought to bear to ensure that people apply for waivers. As a result, the public cannot evaluate the effectiveness of the TMDL and is excluded from any reasonable participation in the process.

The RTC admits that the TMDL does not include (1) any definition of or threshold of significance for the term "significant" in the runoff performance standard (i.e., "Effectively attenuate significant increases in storm runoff." (RTC p. 12.); or (2) a description of the WDR waiver policy that will determine which projects are subject to or exempt from direct regulation under the TMDL (RTC, p. 11).

CEQA does not allow a lead agency to defer a description of an essential component of the project to a date after approval. Otherwise, segmented environmental review would be the norm, rather than illegal. For example, in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, the California Supreme Court held that a lead agency under CEQA cannot simply defer the identification of a project's source of water supply to a later date and thereby avoid its obligation to evaluate the environmental impacts of using the source of the project's water supply. The court held that even where there is uncertainty, the agency must make a good faith effort to describe the whole of the project, and make a good faith effort to assess the environmental impact of the entire project.

Here, the Regional Board has made no effort to specify what the word "significant" means in this performance standard or to disclose the waiver policy standards that will allow project developers to avoid direct regulation under the TMDL. With respect to the performance standard the RTC states that "we have not reached a decision yet on numeric expression of the vineyard storm runoff performance standard. (RTC, p. 12.)

It appears from the RTC that the Regional Board has misconceived the scope of its legal authority, stating: "The Water Board does not have the authority to regulate land use, only to condition discharges from those land uses as needed, to achieve water quality standards." This is a misconception because this Basin Plan amendment establishes the Board's authority to require a WDR permit for any change in land use that will result in the discharge of sediment to the Napa River regardless of source, whether from surface erosion or from entrainment of stream bed and bank sediments from increased runoff. Further, no project proponent has a ministerial right to a WDR in these circumstances. Thus, where a project requiring a WDR will cause increases in runoff that are "cumulatively considerable," the Board has the authority to require compliance with standards that will mitigate this impact.

With respect to the waiver policy the RTC makes a legal argument that the Water Board's decision to defer the waiver policy is within its "regulatory prerogative." (RTC, p. 11.) The RTC provides no fact-based reasons for why the waiver policy is severable from the remainder of the TMDL for purposes of CEQA compliance. Instead it offers up an inapposite analogy, arguing that "when the Water Board adopts a water quality objective through a Basin Plan amendment, it does not and need not simultaneously adopt permits to achieve the new standard." (RTC, p. 11.) This is non-responsive to LRC's comment, which is directed at the waiver policy, which is a rulemaking for a general class of projects, not a permit decision on an individual WDR permit application.

The RTC also contends that the environmental document "analyzes and discloses what it reasonably can." (RTC, p. 14.) This conclusion is flawed because it is based on the Regional Board's previous decision to exclude from the TMDL these essential project components.

Instead of providing a description of the WDR waiver policy, the RTC gives a few tidbits of it. For example, the RTC states: "Please note that as a condition of the WDR waivers, staff will propose that the Water Board require compliance with all water rights laws in order to obtain coverage." (RTC, p. 64.) In another example, the RTC states: "as a condition of the WDR waiver program for vineyards, we will propose BMP effectiveness monitoring to evaluate vineyard development and management on storm runoff peak and volume ..." (RTC, p. 65.) As mitigation measures, these "intentions to propose" are ineffective because they are not enforceable. As a description of the WDR waiver policy, it is incomplete.

3. The TMDL Environmental Document Violates CEQA Because the Project Description is Uncertain Regarding the Geographic Scope of the Project.

The geographic scope of the Project, i.e., whether it will be applied to areas upstream of municipal reservoirs, is uncertain. The RTC states that "we will consider these and other resource protection issues in determining the geographic scope and requirements for the WDR waiver programs ..." (RTC, p. 61.)

4. An EIR-Level Analysis of the Impacts of Incorporating the Division of Water Rights' Appropriative Permit Program is Required.

The TMDL implementation program also incorporates the Division of Water Rights' appropriative permit program and its *Policy for Maintaining Instream Flows in Northern California Coastal Streams*. (See Table 5.2, Resolution R2-2007-0011. Exhibit A, p. 1768.) As described by Dennis Jackson, the Division of Water Rights' appropriative permit program causes significant adverse impacts to the beneficial uses of water in the Napa River watershed (see Jackson letters dated July 2 and July 5, 2009 and as shown by Patrick Higgins (see Higgins letter dated July 2, 2009), this state of affairs is expected to continue into the foreseeable future. For this reason, an EIR level analysis of this mechanism of impact is required.

B. THE TMDL WILL NOT ACHIEVE WATER QUALITY STANDARDS OR PROTECT BENEFICIAL USES.

The TMDL will not achieve the goal of achieving water quality standards and protecting beneficial uses for a number of reasons, specifically including: (1) it does not effectively regulate increases in storm runoff resulting from changes in land uses (see comment letter from Dennis Jackson dated August 5, 2010); and (2) it does not regulate groundwater extractions or surface water diversions that contribute to "widespread decline in baseflow persistence and magnitude in the Napa River and the lower reaches of its tributaries." (RTC, p. 20.)

LRC has extensively commented on these issues in its comment letters listed above. It is worth noting that at the September 9, 2009 Regional Board hearing on this TMDL, Mr. Napolitano conceded that the TMDL may not conserve the salmonid fisheries in the Napa River drainage. This is a striking admission considering that the listed salmonid species in the Napa River are a principal beneficial use that the TMDL is intended to protect. This does not sound much like the "margin of error" the TMDL is required to include to ensure its success.

In addition, Dennis Jackson's July 2, 2009 and July 5, 2009 letters discuss the facts that (1) the TMDL does not include in its analysis existing impoundments and reservoirs, including illegal ones, that function as impervious surfaces and therefore contribute to runoff, when full; and (2) the TMDL does not factor in groundwater withdrawals that reduce base stream flows.

The RTC argues that the Basin Plan cannot include any standards relating to groundwater use because the Board has limited authority to require permits for groundwater extraction. (RTC, p. 20.) This is non-responsive and misses the crucial point. While LRC recognizes that the Board cannot require a permit for groundwater extraction except in ceratin limited circumstances, this Basin Plan amendment establishes the Board's authority to require a WDR permit for any change in land use that will result in the discharge of sediment to the Napa River. No project proponent has a ministerial right to a WDR in these circumstances. Thus, where a project requiring a WDR includes groundwater extraction and such extraction will cause or exacerbate sediment impacts on the Napa River, the Board has the authority require compliance with standards that will mitigate such groundwater extraction impacts. In short, the RTC is incorrect regarding the scope of the Board's regulatory authority over groundwater extraction in the context of this TMDL.

Thank you for your attention to these comments.

Very truly yours,

Tom Lippe

Thomas N. Lippe

List of Exhibits

1. Comment letter from Dennis Jackson dated August 5, 2010.

2. Comment letter from Patrick Higgins dated August 17, 2010.

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EXHIBIT 1

Dennis Jackson - Hydrologist

2096 Redwood Drive
Santa Cruz, CA 95060
(831) 295-4413
dennisjack01@att.net

August 5, 2010

Thomas N. Lippe
329 Bryant Street, Suite 3D
San Francisco, CA 94107

re: Napa River Sediment TMDL

Dear Mr. Lippe:

You have asked me to review and comment on the proposed Napa River Sediment TMDL. I have reviewed the Response to Comments dated September 2009.

The goal of the TMDL is to reduce the sediment load of the Napa River to 125% of the natural load. In addition to reducing the sediment load to 125% of the natural background sediment load the TMDL and Basin Plan Amendment (BPA) should require that the stormwater discharge regime of the Napa River be brought into alignment with the natural hydrograph that would transport no more than 125% of the background sediment load.

I first discuss the geographic scope of the TMDL and Basin Plan Amendment (BPA). Next, I review my July 2, 2009 comments on the BPA and then discuss why the Regional Board Staff's September 2009 Response to Comments do not adequately address my concerns.

Geographic Scope

The TMDL and BPA do not have a clear statement of their geographic scope. The TMDL and BPA have gone through several versions. Initially, the lands upstream of the municipal water supply reservoirs were excluded from compliance with the performance standards and reporting requirements. Currently, it appears that the all lands within the Napa River watershed are subject to the performance standards and reporting requirements. It appears that currently only the stream channels downstream of the municipal reservoirs are subject to the numeric targets presented in Table 1 of the BPA. Clearly stating the geographic scope of the TMDL and BPA will avoid any confusion for landowners.

My July 2, 2009 letter states

> **Natural Hydrograph**
>
> The TMDL and Basin Plan Amendment (BPA) estimate that the current sediment load of the Napa River is 185% of the natural background sediment load. Leopold, Wolman, Miller, Emmett and many other researchers have established that a river constructs and maintains its channel. The water discharge delivered to the channel supplies the energy necessary to shape the channel. Merely reducing the sediment load supplied to the channel network is not sufficient to reduce the sediment transport capacity of the water flowing down the channel.
>
> While it is important to reduce the sediment load delivered to the Napa River it is also important to reduce the peak stormwater discharge in the Napa River and its tributaries. Many of the land use changes that have resulted in an increase in sediment load in the Napa River system have also

> caused an increase in stormwater discharge. Reducing the sediment discharge from the altered land surface without simultaneously reducing the stormwater discharge will not achieve the objective of the TMDL and BPA but will only result in erosion of the channel network.
>
> The TMDL and BPA do recognize that channel incision (progressive lowering of the streambed) is a significant source of the sediment load in the river. Instead of taking action to reduce the stormwater discharge in the Napa River system the TMDL and BPA seek to encourage voluntary projects to physically alter the shape of the channel. Projects to change the shape of the Napa River may be beneficial but they do not affect the channel elsewhere in the watershed. However, systematically reducing the stormwater discharge associated with human land use will reduce the magnitude of stormwater runoff throughout the watershed.

Significant sediment transport only occurs during the higher water discharges associated with storm runoff. A rough rule-of-thumb is that coarse sediment begins to move at about 80% of the bankfull discharge. Increasing the water discharge increases the sediment discharge, if there is sediment available for transport. It is always the case that increasing the water discharge increases the sediment transport capacity of the river. If the sediment transport capacity of the river exceeds the available supply of sediment from the watershed, the bed and banks of the river will be subjected to a greater erosive force. Erosion of the bed and banks will occur if the bed and banks are composed of materials of sufficiently low resistance to erosion. This is the basic process that drives channel incision.

The Napa River will remain out of balance if the sediment load in the Napa River is reduced to 125% of the natural sediment load but the discharge regime remains significantly above the discharge that transports 125% of the natural sediment load. Reducing the discharge until it is in conformance with the target sediment load of 125% of the natural load will ensure that the sediment load will remain within the target range over an extended time period.

The amplified storm discharge in the Napa River is the result of several processes and is an excellent example of a cumulative impact. That is, individual changes in land use may have resulted in small changes to storm discharge but when all changes to land use are considered a significant change to discharge has occurred. Stormwater runoff can be generated from Hortonian overland flow (rainfall intensity exceeds infiltration rate), subsurface stormflow and saturation overland flow. Runoff from an impervious surface is an example of Hortonian overland flow. Subsurface stormflow can be a significant component of the storm hydrograph in areas with steep slopes and thin soils or soils with a layer of decreased permeability. Subsurface stormflow can occur in soil pipes. Soil pipes are not uncommon in the mountainous areas of northern coast range of California. Saturation overland flow typically occurs in swales and near the foot of hillslopes adjacent to a stream channel.

Many types of land use practices can increase storm runoff. A given land use practice can affect more than one of the processes that generate runoff mentioned above. For example, consider a road on a hillside. The surface of a hillside road may be impervious and so would generate Hortonian overland flow. The cuts in the hill-slope to create the road bed may intersect subsurface flow paths which would then flow into the roadside ditch and be quickly directed to the stream channel. So the hillside road would change the permeability of the ground surface and could shorten the travel time of subsurface flow that previously traversed the hill-slope. Land use practices can also change the subsurface properties of the soil. For example, disking and ripping can result in layer of decreased soil permeability known as plowpan (Dunne and Leopold, 1978). Installation of French drains can quickly route subsurface flow to the stream channel.

Conversion of a forest to another type of land use typically results in more storm runoff. The hydrologic processes that are changed by a forest conversion include, but are not limited to: loss of interception storage in the forest canopy; loss of storage in the surface organic layer; reduction in the evapotranspiration of the vegetation; and surface compaction. Conversion of a forest to another land use can generate either increased surface runoff or increased subsurface runoff or both.

The increase in storm runoff in the Napa River watershed is the cumulative result of many different land use changes and varied land use practices. To bring the storm hydrograph of the Napa River into alignment with a hydrograph that transports 125% of the natural sediment load requires a reduction in the storm discharge from roads, vineyards, grazing land, urban areas, rural residential areas and other land uses.

BPA Table 4.1 requires that vineyards comply with the following discharge performance standard

> Effectively attenuate significant increases in storm runoff. Runoff from vineyards shall not cause or contribute to downstream increases in rates of bank or bed erosion.

This performance standard is not enforceable as written. The proposed discharge performance standard does not provide a measure for significance in the phrase "Effectively attenuate significant increases in storm runoff." Nor, does the discharge performance standard define a time reference for "effectively attenuate significant increases in storm runoff." We know that the 1994-2004 base period for the TMDL sediment budget estimated a sediment load that was 185% of the natural background load. Clearly, the 1994-2004 timeframe can *not* be used as a reference for increases in storm runoff since excessive sediment loads were already occurring.

The discharge performance standard does not provide a measure for significance in the phrase "…shall not cause or contribute to downstream increases in rates of bank or bed erosion." Nor, does the discharge performance standard define a time reference for increase in rates of bed or bank erosion. Does this mean that if *any* bank or bed erosion occurs then *all* of the upstream vineyard owners failed to comply with the discharge performance standard?

The vagueness of the proposed discharge performance standard makes it impossible for the Regional Board or a vineyard owner to know if he/she has "Effectively attenuated significant increases in storm runoff." The vagueness of the discharge performance also makes it impossible for the Regional Board or a vineyard owner to know if she/he has contributed to downstream increases in the rates of bed or bank erosion.

The goal of the TMDL and BPA is to reduce the sediment load to 125% of the natural background load. Merely reducing the sediment load will not correct the imbalance between the sediment transport capacity and the sediment load. Reducing the sediment load to 125% of background in the Napa River and its tributaries requires reducing the discharge in a manner that will transport no more than 125% of the natural sediment load. This suggests an approach that could provide the precision required to have an enforceable discharge standard.

Approach to Determine Numeric Discharge Performance Standard

A possible approach to this problem is to consider that the discharge observed during the 1994-2004 base period carried 185% of the natural sediment load. It is possible to estimate what discharge characteristics would have been required to transport 125% of the natural sediment load during the 1994-2004 period. Then, the discharge regime that transports no more than 125% of the natural load could be compared to the discharge regime for the 1994-2004 timeframe. The amount the observed discharge would have to be reduced could then be determined for the 1994-2004 discharge regime.

It is common practice to estimate the sediment load of a river using a power function of water discharge as in Equation 1.

$$L = aQ^b \qquad \text{Eq. 1}$$

Where L is the sediment load, Q is the water discharge and "a" and "b" are empirical constants. The literature contains range for the exponent b in Equation 1. Leopold (Page 180, *A View of the River*, 1994) notes that the range of b is typically 2 to 2.5. Others have suggested that the exponent b can range from 1.5 to 2.5.

Equation 1 can be used with the known total sediment load of 272,000 metric tons (185% of natural background) for the 1994-2003 period together with the measured water discharge for that period, at the Napa River near Napa stream gauge, to characterize how the constants a and b vary such that the resulting sediment load equation produces the total known sediment load of 272,000 metric tons for the target timeframe. The resulting family of sediment load functions can then used to estimate the reduction in water discharge required to carry a total sediment load of 125% of natural background (183,784 metric tons).

I have done this analysis using a range of exponent b from 1.5 to 2.5. I also adjusted the discharge record of the Napa River near Napa stream gauge (drainage area = 218 sq-mi) to represent the discharge of the Napa River at Soda Creek (drainage area = 225.5 sq-mi) using the factor 1.034 (= 225.5 sq-mi/218 sq-mi).

Figure 1, at the end of this letter, shows the resulting sediment load function for three values of the exponent b (Case A, b = 2.5, Case B, b = 2.0 and Case C b = 1.5) in Equation 1. The three values of the exponent b were used to fit the power function of Equation 1 to the estimated water discharge of the Napa River at Soda Creek to find the coefficient, "a" in Equation 1, required to produce a sediment load of 272,000 metric tons.

Equation 1 calculates sediment discharge as a power function of discharge ($L = aQ^b$) The relationship between the coefficient "a" in Equation 1 is fixed when the sediment load is constrained to a value of 272,000 metric tons for the period 1994 to 2003, see Figure 2. Since the sediment load is fixed and the water discharge is fixed for the 1994-2003 period then, selecting a value of exponent b determines the value of coefficient "a".

Equation 1 says that sediment load can be described as a function of water discharge ($L = aQ^b$). Using the values of the exponent b in Case A, Case B and Case C the value of the coefficient "a" was determined (see Figure 2) that produced a sediment load of 272,000 metric tons (185% of natural load) during the 1994-2003 period for the Napa River at Soda Creek. The reduction in water discharge was then calculated that would produce a sediment load of 125% of natural (183,784 metric tons), see Figure 3. The required reduction in water discharge varies as a function of the exponent b in Equation 1. Table 1 gives the required reduction in water discharge for each of the three values of the exponent evaluated. Figure 3 gives and equation that allows the required reduction in water discharge to be calculated for any value of the exponent b in Equation 1.

Table 1. The reduction in water discharge during the 1994 to 2003 period required to reduce the sediment load to 125% of the natural load.

	Exponent	Required Reduction in Discharge
Case A	2.5	14.51%
Case B	2	17.80%
Case C	1.5	23.00%

I have not analyzed the sediment load data collected by the USGS, or others, for the Napa River. Fitting the existing sediment data for the Napa River to Equation 1 will determine what value of the exponent b in Equation 1 is most realistic for the Napa River. Focusing on the range of values of exponent b suggested by Leopold, that is b in the range of 2.0 to 2.5, Table 1 suggests that the required reduction in discharge in the Napa River at Soda Creek is in the range of 15% to 18%, a small range.

The above analysis should be applied to produce a numerically quantified discharge performance standard.

Apply Discharge Performance Standard to All Land Uses

An increase in the peak (instantaneous maximum) storm discharge may not be the sole cause of the increased sediment transport of the 1994-2004 period, the amount of time that the discharge remains above the discharge that initiates transport of coarse sediment may also have increased. In other words it is important to consider not only increases in peak discharge but increases in duration of discharges large enough to transport sediment.

Applying a discharge performance standard only to vineyards ignores the fact that other land uses in the Napa watershed have significantly contributed to the increased storm runoff. To effectively reduce storm runoff, a storm discharge performance standard should be required for all land uses that generate excess sediment.

In my July 2, 2009 letter, quoted below, I proposed that all land uses mentioned in Tables 4.1 through 4.4 of the BPA be subjected to a discharge performance standard to "Effectively attenuate significant increases in storm runoff". Vineyards (Table 4.1) are the only land use subject to a discharge performance standard. The BPA does not require that Grazing (Table 4.2), Rural Lands (Table 4.3) and Parks and Open Space, and/or Municipal Public Works (Table 4.4) comply with a discharge performance standard.

> Therefore, I propose that the following performance standard be applied to all four land use categories listed in BPA Tables 4.1 through 4.4.
>
> - Effectively attenuate significant increases in storm runoff. Runoff from all land uses listed in Tables 4.1 through 4.4 shall not cause or contribute to downstream increases in rates of bank or bed erosion relative to the discharge regime that carries 125% of the natural sediment load.

I want to point out that the above discharge performance standard that I proposed in July 2009 is also too vague and needs to be modified to be enforceable.

The Regional Board Staff's response to my comment that all land uses in Tables 4.1 through 4.4 should be subject to the performance standard to "Effectively attenuate significant increases in runoff" is inadequate (see response to Comment 4.DJ1 and Comment 4.DJ4). The response to Comment 4.DJ4 refers back to the response to Comment 4.DJ1. The portion of Staff's response to Comment 4.DJ1 that addresses this issue is quoted below.

> With regard to other potential sources of increases in storm runoff (i.e., developed areas, roads, and grazing), please note:
>
> - Using USGS land cover data for the Napa River watershed, and applying typical values for impervious surface coefficients, we calculate that total impervious area in the watershed is less than 3 percent (Napolitano, 2009). Effective impervious area, or that fraction of the total impervious area, that is directly connected to the drainage network, is lower. **Absent other significant land cover changes**, this magnitude of impervious cover (< 3 percent) would not be expected to cause channel incision (see Booth et al., 2002). We also note that more than 90 percent of the total impervious surface area within the watershed is located within the municipalities of Napa, American Canyon, and Vallejo, all of which drain into the Napa River estuary, approximately at sea level. As such, these developed areas do not significantly influence incision documented in the freshwater reaches of the Napa River. (*Emphasis Added*)
> - The 102,000 acre estimate the commenter provides for grazing is much too high. In 2004, we estimated that 14,000 acres (approximately 5 percent of watershed area) were grazed, and that stocking rates were very low at almost all sites. Since that time, the number of active commercial livestock operations has declined further, including cessation of grazing on the ranch that was the largest operator in 2004 (the Kirkland Cattle Company). Although storm runoff rates in grazing areas are likely elevated above natural background, the magnitude of such increases, even a decade after intensive grazing ceased, would be modest compared to runoff increases resulting from impervious cover. Furthermore, our performance standards for grazing require that operators "attain or exceed minimal residual dry matter values" so that soils compacted by intensive historical grazing can recover.

Staff's response focuses on the amount and distribution of impervious area in the watershed. Staff argues that 90% of the impervious surface in the watershed is in the urban areas of City of Napa, American Canyon, Vallejo and other urban areas that drain directly into the estuary and are outside and downstream of the area of the TMDL (upstream of Soda Creek).

As I have stated above, conversion of land cover to an impervious surface is not the only way to increase storm runoff. There have been "significant land cover changes" in the Napa watershed since 1940. The net cumulative effect of these land cover changes has been an increase in both sediment load and stormwater runoff. Impervious land cover plays a role in the elevated discharge in the Napa River but it is clearly not the major source of the increased discharge in the Napa River. The cumulative impact of the numerous land use changes in the Napa watershed is responsible for the increased storm runoff in the Napa River and its tributaries. The TMDL and BPA should include performance standards to reduce the storm runoff from all land uses.

Staff's comment also discusses the impact of grazing on discharge by noting that the increased runoff from their estimate of 14,000 acres of grazed land would be modest compared to impervious cover. (Note that the 2009 Napa County Crop Report states that there is 95,000 acres of range and pastureland in the county). Comparison of the storm runoff from a land use to the runoff from an impervious covering the same land area is not a useful to determine the significance of the increased storm runoff. If the land use is contributing excess storm runoff, in relation to the discharge regime that transports 125% of the natural sediment load, then steps should be taken to reduce the storm runoff to the target levels.

I support the performance standard for grazing to require that operators "attain or exceed minimal residual dry matter values" so that soils compacted by intensive historical grazing can recover. However, grazing operations can involve impacts from roads, stock ponds and other miscellaneous management actions that have the potential to increase storm discharge. Therefore, it is necessary to require that storm water runoff from grazing land effectively attenuate increases in storm runoff such that there is no bed or bank erosion downstream.

Staff's response to Comment 4.DJ1 does not address increased discharge from Rural Lands (BPA Table 4.3). Footnote 3 in BPA Table 4.3 provides the following definition of Rural Lands.

> [3] Rural lands, per Napa County definition include: non-farmed and non-grazing portions of parcels >10-ac that contain one or more residences and/or a winery; vacant residential parcels >10-acres; and/or portions of 10-acre or larger parcels with secondary vineyard, orchard, and/or grazing.

This definition of Rural Lands is troubling. There is no definition of, "…secondary vineyard, orchard and/or grazing." These "secondary" activities can occur on parcels that are 10 acres or greater. Therefore, these activities could involve more than 10 acres and still meet this definition. Why should a sizeable "secondary" vineyard not be subject to the same regulations as a vineyard regulated under BPA Table 4.1? I propose that any vineyard, orchard or grazing, on Rural Lands, that exceed 1.0 acres be subject to the requirements set forth in BPA Tables 4.1 and 4.2.

Rural Lands are larger parcels that provide for a variety of land uses including rural residential. The land use activities of Rural Lands can generate increased runoff and elevated sediment loads. The following performance standards from BPA Table 4.3 apply to Rural Lands.

> **Roads**: Road-related sediment delivery to channels ≤ 500 cubic yards per mile per 20-year period.
>
> **Gullies and/or shallow landslides:** Accelerate natural recovery and prevent human-caused increases in sediment delivery from unstable areas.

The literature is filled with studies that document the fact that roads increase storm discharge. The amount of the increase in runoff and the road density required for a measurable increase in runoff to be detected varies with geology and precipitation regime. Since roads generate both additional sediment and discharge, it is necessary to set performance standards for both sediment production from roads and for the generation of increased storm discharge from roads.

In addition, other activities on Rural Lands can generate increases in storm runoff. Therefore, I propose that an enforceable discharge performance standard also be applied to Rural Lands.

BPA Table 4.4 sets the same performance standards for Open Space and/or Municipal Public Works that Table 4.3 sets for Rural Lands. Since roads and other management practices can generate increases in sediment and storm runoff, it is necessary to require a discharge performance standard in addition to the road and gully performance standards required for Open Space and/or Municipal Public Works.

The Regional Board Staff appears to disagree with my view that the long-term successful reduction in sediment also requires bringing the storm water discharge into alignment with the target sediment load of 125% of natural background load. In their response to my July 2, 2009 comment labeled Comment 4.DJ5 (Evidence of groundwater level declines) Staff states that;

> Based on the results of our sediment budget study (Water Board, 2009), we conclude that water quality objectives for sediment can be achieved solely by regulating sediment discharges.

Staff reports that the 1994-2004 sediment load was 185% of the natural background load. This implies that the storm water discharge had the transport capacity to move 48% more sediment than the target load of 125% of the natural background load. Thus the target sediment load of 125% of the natural background load will be out of balance with the transport capacity of the river. The TMDL and BPA may initially reduce the sediment load of the Napa River but since the storm water discharge is not actively being reduced and given that future land use changes will cumulatively increase storm water discharge the Napa River, it is likely that the Napa River system will adjust its sediment load to match the transport capacity of the Napa River. Long-term success of the TMDL and BPA to reduce the sediment load of the Napa River requires that the storm water discharge be brought into balance with the target load of 125% of the natural background load.

In their response to my July 2, 2009 letter, Staff agrees that storm discharge has increased and they agree that the transport capacity has to be brought into alignment with the coarse sediment supply to reduce bed and bank erosion.

> Second, the commenter asserts that coarse sediment deposition in tributary reservoirs is a significant contributing factor to ongoing incision. Although we agree on this point, considering the results of the sediment budget analysis we completed, we do not think that this factor must be addressed in order to control and reverse incision. We refer the commenter to a previous response to comment, where we present our rationale (Response to Comment 14.1, January 2007 Response to Comments document):
>
> > "While we agree it is likely that tributary dam construction has contributed to the current episode of bed and bank cutting in the Napa River, other management actions also appear to be significant including:
> >
> > > a) Land cover changes that have ***increased peak flows in the river*** (e.g., vineyards, rural residences, commercial buildings, and roads); and
> > >
> > > b) A suite of direct alterations to the river channel and/or its floodplain (e.g., levee building, channel straightening, filling of side channels, removal of debris jams, historical gravel mining, and dredging).
>
> ***We also agree that bed and bank erosion rates in the Napa River will not be substantially decreased until the imbalance between coarse sediment supply (e.g., cobbles and gravel) and transport capacity is rectified***. We differ however in our diagnosis of the relative significance of various contributing factors (e.g., dams, direct alterations to the channels, and land cover changes) and in our conclusions regarding feasibility of various management measures to address this issue. ***Instead of introducing large quantities of coarse sediment to the channel,*** which would be extremely expensive and present important questions regarding technical feasibility and potential to substantially increase flood risk, we conclude that it is possible to solve this problem by focusing primarily on the other contributing factors: the direct alterations to the channel and **increases in peak flow**. (***Emphasis Added***)
>
> The approach to restoration being emphasized in the Rutherford Reach (which we recognize as a key action in the plan to reduce fine sediment supply and enhance habitat conditions) involves setting back the river banks, increasing the sinuosity of the river (and hence reducing its slope), adding wood and large rock to force additional gravel bars to be deposited, and enhancing riparian vegetation to increase bank stability. We also call for design and management practices for new and replanted hillside vineyards to attenuate increases in peak runoff (see response to Comments 9.3 and 9.4). We think these approaches will prove effective in the reduction of bed and bank erosion rates along the Napa River.

I agree that modifying the channel, as is being done along a significant reach of the mainstem, will create a depositional reach and reduce bed and bank erosion. However, modifying the mainstem will not reduce the sediment load in the tributaries or in the mainstem above the channel enhancement projects.

In the above quoted comment, Staff also agrees that the tributary reservoirs (private and municipal) are a significant contributing factor in creating the imbalance between the sediment load and transport capacity of the Napa River that lead to the channel incision. Staff rejects the idea of depositing coarse sediment in the stream channels downstream of the reservoirs (private and municipal) to attempt to bring the sediment load into balance with the transport capacity. I agree with Staff on this point, it is ill-advised to place coarse sediment into the tributary channels below reservoirs. However, I strongly favor reducing the excess storm discharge that the multitude of land use changes has generated. Reducing the storm water discharge reduces the transport capacity of the tributaries and the Napa River.

Reducing the excess storm discharge, from all land uses, will help bring the discharge regime into alignment with the target sediment load of 125% of the natural background load. In addition, reducing the excess storm discharge will help alleviate flooding problems along the Napa River. Citizens of Napa County believe that flooding has increased along the Napa River. In March 1998, the voters of Napa County passed Measure A, the *Flood Protection and Watershed Improvement Ordinance.* Significant money has been spent on routing flood waters through the City of Napa. But these projects do not decrease the risk of flooding elsewhere. Reducing the excess storm discharge, by way of discharge performance standards, will contribute to a reduced risk of flooding along the Napa River and its tributaries.

Environmental Impact of TMDL and BPA

The proposed TMDL and BPA have the potential to create adverse environmental impacts if implemented in their current form. The TMDL and the BPA will reduce the sediment load of the Napa River and its tributaries but only seek to reduce excess storm discharge from vineyards. No evidence has been presented that demonstrates that reducing storm discharge on vineyards is sufficient to bring the storm discharge regime into alignment with the target sediment load of 125% of natural load. From 1994-2004 the storm discharge transported 185% of the natural sediment load. No estimate has been made of the expected total reduction in storm discharge from controlling runoff from only vineyards.

Controlling excess storm runoff from all vineyards will reduce the excess storm water discharge in the Napa River but it is likely that the sediment transport capacity of the Napa River will continue to be greater than that necessary to transport 125% of the natural sediment load. Excess storm discharge will not be controlled on roads, grazing lands, rural residential, urban or other non-vineyard land uses. Additional non-vineyard land use changes will increase the storm discharge excess from non-vineyard land. Until the excess storm discharge is reduced from all land uses it is unlikely that the storm discharge will come into alignment with the target sediment load of 125% of the natural load.

As long as the transport capacity of the Napa River exceeds the target sediment load of 125% of the natural background load there is a significant risk of continued erosion of the banks and/or the bed of the Napa River or its tributaries. The environmental impacts from the continued future imbalance between sediment load and sediment transport capacity of the Napa River and its tributaries has not been analyzed.

Low Base Flow

In my July 2, 2009 comments, I submitted an analysis of readily available reports and groundwater data demonstrating that it is likely that widespread groundwater pumping is diminishing the magnitude and persistence of dry season baseflow. Staff's response to my evidence that widespread groundwater pumping is decreasing dry season baseflow is quoted below.

> **Comment 4.DJ5** (Evidence of groundwater level declines): The analysis, included herein, suggests groundwater pumping is diminishing dry season baseflow magnitude and persistence. The actions identified in the Basin Plan amendment are not adequate to counter the adverse impacts of groundwater pumping on baseflow.
>
> Considering the information provided, we agree it is reasonable to hypothesize that groundwater pumping (or a decline in recharge[38]) may contribute to widespread decline in baseflow persistence and magnitude in the Napa River and the lower reaches of its tributaries. Given the potential significance of groundwater pumping with regard to fisheries conservation, we strongly support review of all available information and follow-up studies to provide a basis for confirming or rejecting this hypothesis. The information provided also reinforces our interest in review and comment on the comprehensive groundwater resources study that Napa County has commissioned to guide its future data gathering, monitoring, and policy for groundwater management. The first report in this effort is expected in January of 2010.
>
> Note that the State and Regional Water Boards have limited authority to regulate groundwater pumping. Local government has the primary regulatory authority in California. Although the State Board has authority to regulate two categories of groundwater pumping – under flow of a surface stream, and defined underground streams – and a Water Board may propose a baseflow objective when required to achieve a water quality objective, these are the limits of our authorities. Based on the results of our sediment budget study (Water Board, 2009), we conclude that water quality objectives for sediment can be achieved solely by regulating sediment discharges. Therefore, we do not have a basis for proposing a baseflow objective to achieve water quality objectives for sediment.
>
> Considering local government's primary authority over groundwater pumping, and the provided information, we believe that data gathering, monitoring, and policy related to groundwater resources should be incorporated into the *plan for joint resolution of water supply reliability and fisheries conservation concerns* that we call for in Table 5.2 of the Basin Plan amendment (Action 2.1), as management of groundwater resources certainly is relevant to protection of municipal water supply, fish, and wildlife.
>
> [38] For example, increases in volume of surface water diversion upstream of this site, combined with associated evaporation in reservoirs, might also be a primary or secondary control on the observed downward trend in groundwater levels through time).

Staff's response to my July 2009 comments stated that the first of a series of reports on groundwater in Napa County was expected in January 2010.

According to Felix Riesenberg, Deputy Director of Napa County Flood Control and Water Resources, the consulting firm of Luhdorff & Scalmanini from Woodland, CA is preparing a Groundwater Monitoring Program. The Groundwater Monitoring Program is expected to be presented to the Board of Supervisors in September of this year. Once the Groundwater Monitoring Program is adopted at least five years of data collection are expected to be required before comprehensive groundwater study can be done.

The Regional Board Staff has acknowledged my concern. However, their response is to merely *suggest* that the lowering of the groundwater surface and decrease in dry season baseflow be discussed during agency meetings called for in Action 2.1 from Table 5.2 of the Basin Plan.

> Action 2.1. Local, State, and federal agencies to participate in a cooperative partnership to develop a plan for joint resolution of water supply reliability and fisheries conservation concerns.

Stronger action is required for this important topic. The State Board could take action to determine if any groundwater pumping is decreasing the underflow of the Napa River. The BPA and Table 5.2 could be amended to include statements that the affect of groundwater pumping on dry season flow in the Napa River shall be further studied and shall be discussed in the agency meetings called for in Action 2.1 from BPA Table 5.2.

The Napa River has a Watermaster to oversee diversions during the frost protection season. In their response to my concerns staff states that,

> Regulation of surface water diversions in the Napa River watershed is not the impetus of the proposed inter-agency cooperative for joint resolution of water supply reliability and fisheries conservation concerns (Action 2.1 in Table 5.2 of the Basin Plan amendment); which would include both Fish and Game and NOAA Fisheries.

I note that Action 2.1 of BPA Table 5.2, quoted above, is to, "…plan for a joint resolution of water supply reliability and fishery conservation concerns." In my opinion, the Watermaster has knowledge of the Napa River to contribute to such a discussion and information from other participants in these discussions could help the Watermaster be better informed about the status of fisheries in the Napa River and thereby avoid regulating frost diversions in a manner that harms the fisheries.

The Watermaster, Kevin Taylor, of the California Department of Water Resources (888-226-8268, email at ktaylor@water.ca.gov) should be included in the agency meetings called for in Action 2.1 of BPA Table 5.2 and he should be involved in the water rights compliance survey called for in Action 2.4 of BPA Table 5.2. Staff's response to my previous comments regarding involvement of the Watermaster has not explained why he should be excluded.

Summary

In addition to reducing the sediment load to 125% of the natural background sediment load the TMDL and BPA should require that the stormwater discharge regime of the Napa River be brought into alignment with the natural hydrograph that transports no more than 125% of the background sediment load. An enforceable storm water discharge performance standard shall be applied to all four land use categories listed in BPA Tables 4.1 through 4.4. The storm water discharge performance standard should be applied to all lands in the Napa River watershed including upstream of the municipal water supply reservoirs.

Reducing the sediment load from 185% down to 125% of the natural sediment load without actively reducing excess storm discharge from all land uses in the Napa watershed will create an imbalance between the target sediment load of 125% of the natural load and the sediment transport capacity of the Napa River and its tributaries. Such an imbalance has the potential to result in erosion of the banks and/or bed of the Napa River and its tributaries. Therefore, implementing the current version TMDL and BPA, as written, has the potential of causing erosion of the banks and/or bed of the Napa River and its tributaries.

I have demonstrated a procedure to determine the amount the water discharge of the 1994-2003 period needs to be reduced so that the resulting sediment load is 125% of the natural load. The required reduction in water discharge appears to be in the range of 15% to 18%. The actual required reduction in the water discharge can be calculated by fitting existing sediment transport data to Equation 1. A numeric discharge performance standard can then be applied to all land uses in the Napa River watershed.

Valley-wide groundwater extraction rates are currently high enough to lower the groundwater table below the bed of the Napa River and change it into a losing stream. The loss of streamflow to the groundwater system can adversely affect the growth of salmonid juveniles. In some locations, the loss of river flow to the groundwater system may be sufficient to dry up portions of the riverbed. The goal of enhancing salmonid habitat in the Napa River will not be achieved if the lowering of the groundwater surface by valley-wide groundwater pumping is not accounted for.

Sincerely,

Dennis Jackson

Dennis Jackson
Hydrologist

References

Dunne, Thomas, Luna Leopold, 1978, *Water in Environmental Planning,* W.H. Freeman and Co, San Francisco.

Felix Riesenberg, Deputy Director of Napa County Flood Control and Water Resources, Personal Communication, August 5, 2010.

Leopold, Luna, 1994, *A View of the River*, Harvard University Press.

Napa County Agricultural Commissioner, 2009, Napa County Crop Report.

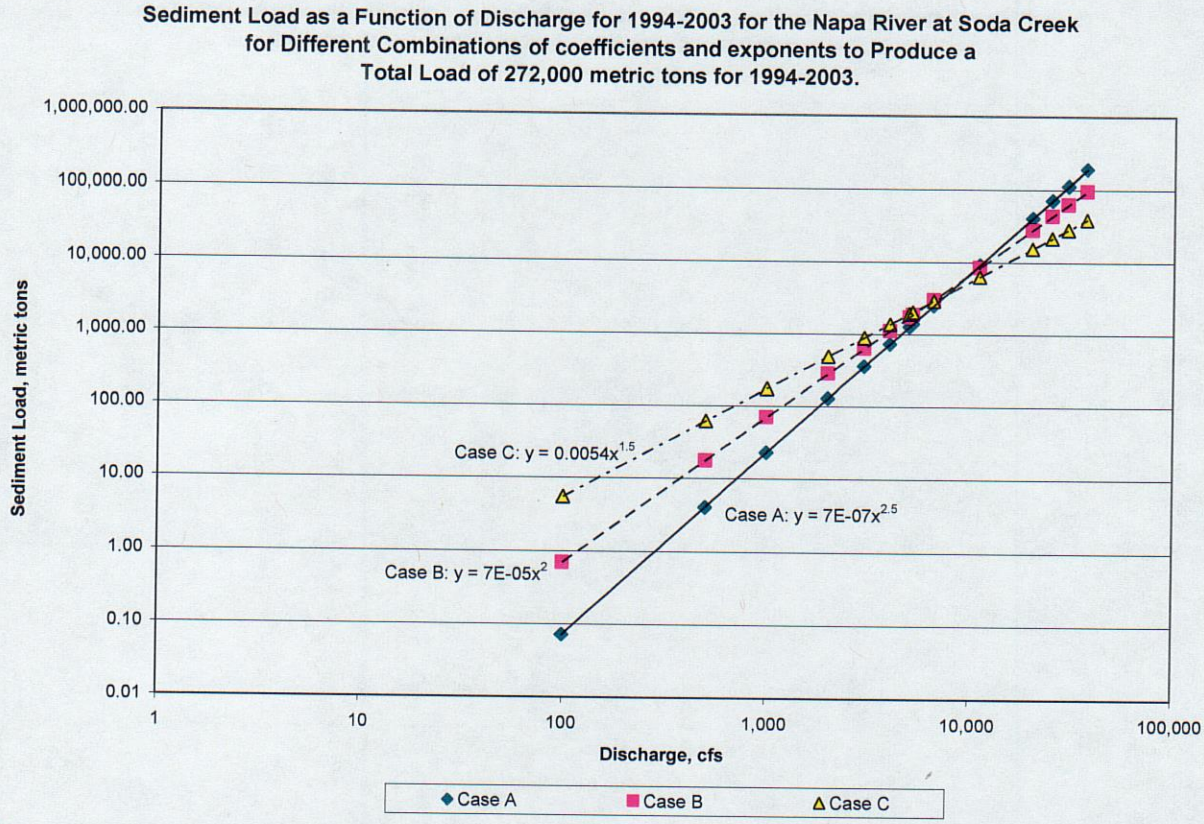

Figure 1. The Regional Board Staff has estimated that the total sediment load for the Napa River at Soda Creek, for the period 1994-2003, was 272,000 metric tons. Leopold (1994, A View of the River, p 180) says that the exponent in my Equation 1 ($L = aQ^b$) ranges between 2.0 and 2.5. Others give a range of 1.5 to 2.5. Three values of the exponent b were used to fit the power function of Equation 1 to the estimated water discharge of the Napa River at Soda Creek to find the coefficient, "a" in Equation 1, required to produce a sediment load of 272,000 metric tons. The three selected values of b are: b = 2.5 (Case A); b = 2.0 (Case B) and b = 1.5 (Case C).

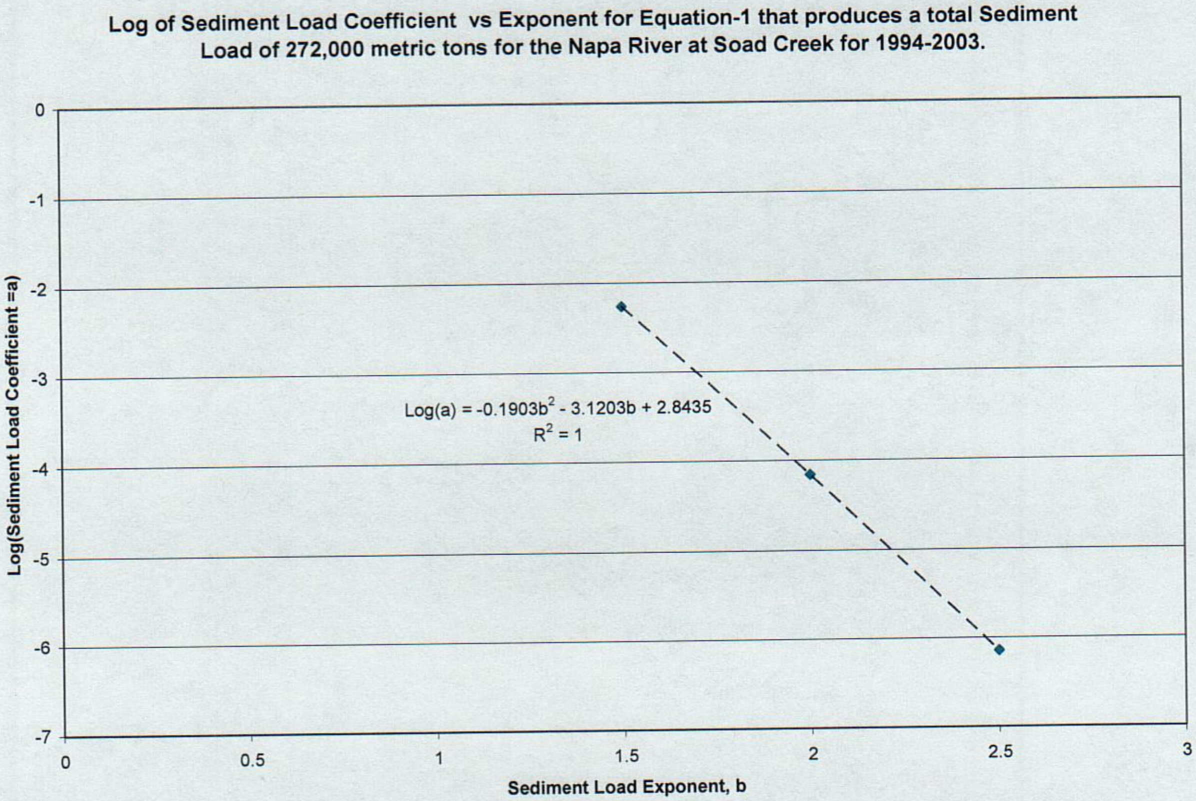

Figure 2. Equation 1 calculates sediment discharge as a power function of discharge ($L = aQ^b$) The relationship between the coefficient "a" in Equation 1 is fixed when the sediment load is constrained to a value of 272,000 metric tons for the period 1994 to 2003. Since the sediment load is fixed and the water discharge is fixed for the 1994-2003 period then, selecting a value of exponent b determines the value of coefficient "a".

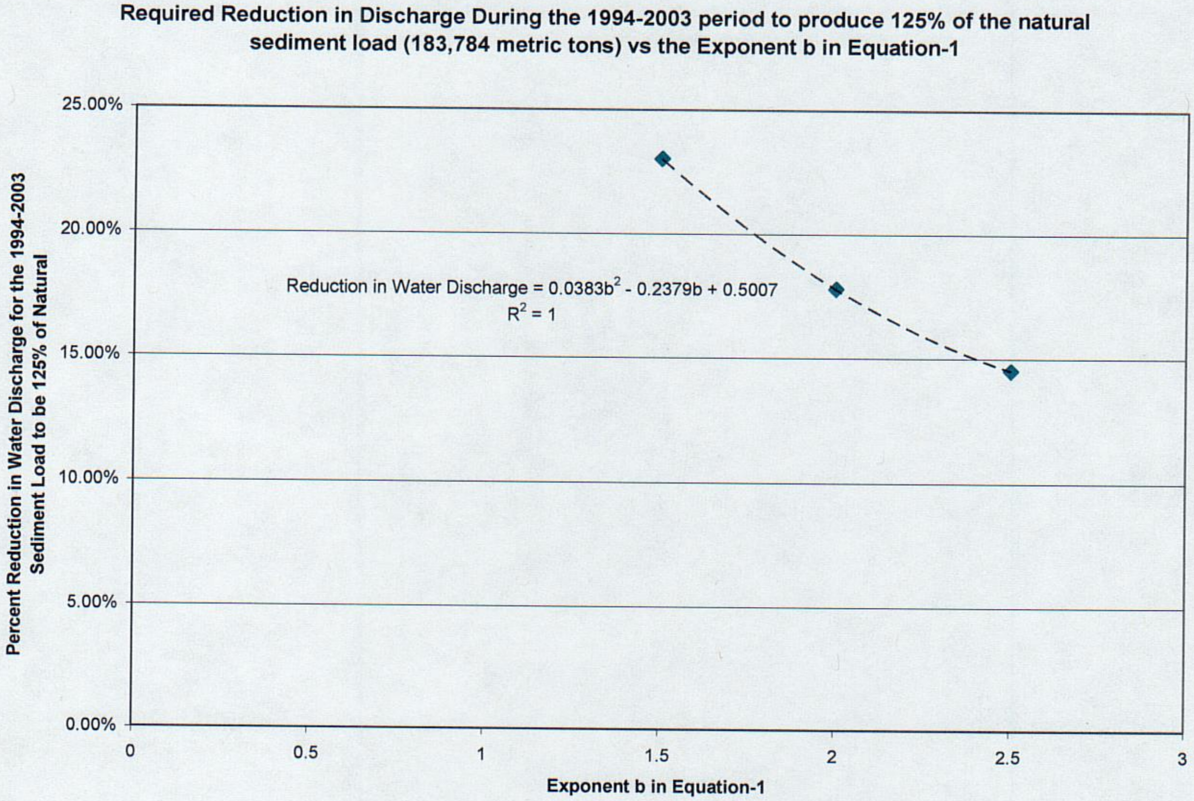

Figure 3. Sediment load can be described as a function of water discharge (Equation 1, $L = aQ^b$). Using the values of the exponent b in Case A, Case B and Case C the value of the coefficient "a" was determined (see Figure 2) that produced a sediment load of 272,000 metric tons (185% of natural load) for the 1994-2003 period for the Napa River at Soda Creek. The reduction in water discharge was then calculated that would produce a sediment load of 125% of natural (183,784 metric tons). The required reduction in water discharge varies as a function of the exponent b in Equation 1.

EXHIBIT 2

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August 17, 2010

Mr. Thomas Lippe
329 Bryant Street, Suite 3D
San Francisco, CA 94107

Re: Sufficiency of SFBRWQCB Staff *Napa River Sediment TMDL Appendix D: Responses to Comments*

Dear Mr. Lippe,

Comments below are once again prepared at your request and on behalf of your client the Living Rivers Council (LRC) and focus on the *Napa River Sediment TMDL Appendix D: Responses to Comments* (SFBRWQCB 2009b) by San Francisco Bay Regional Water Quality Control Board (Water Board) staff. I have now provided comments (Higgins 2006, 2007, 2008, 2009) for nearly four years on the draft and final *Napa River Watershed Sediment TMDL and Habitat Enhancement Plan: Staff Report* (Napolitano et al. 2009) (Napa TMDL), the related Basin Plan Amendment (SFBRWQCB 2009a) and previous Water Board staff response to comments. There is some progress with regard to cooperative efforts in the Napa River basin, such as installation and operation of the downstream migrant trap (NCRCD 2009) and good faith efforts by the Water Board staff to engage other agencies in resolving critical flow issues. I remain unconvinced; however, that best management practices (BMPs) embodied in Napa County conservation programs and Fish Friendly Farming can prevent excess sediment discharge and offset the cumulative effects of development in too wide an area of the watershed. In several cases I find Water Board staff response to my previous arguments, and those of Dennis Jackson (2009) offered on behalf of LRC, rhetorical rather than substantive. Main areas of clarification and disagreement are:

- Pacific salmon current and historic stock status,
- The need to apply TMDL measures in areas above reservoirs,
- Cumulative effects problems that are likely to confound successful TMDL implementation, and
- Sufficiency of monitoring and validity of using gravel permeability.

Pacific Salmon Stock Status and Trends

Water Board staff took issue with assertions in my previous comments with regard to Pacific salmon status and trends in the Napa River.

Coho salmon: Water Board staff asserts that coho salmon were lost from the Napa River in the 19th Century because of a dam on the mainstem at Trancas Road that was demolished in the 1930s. Figure 1 is a gradient map from Stillwater and Dietrich (2002) that has been modified to

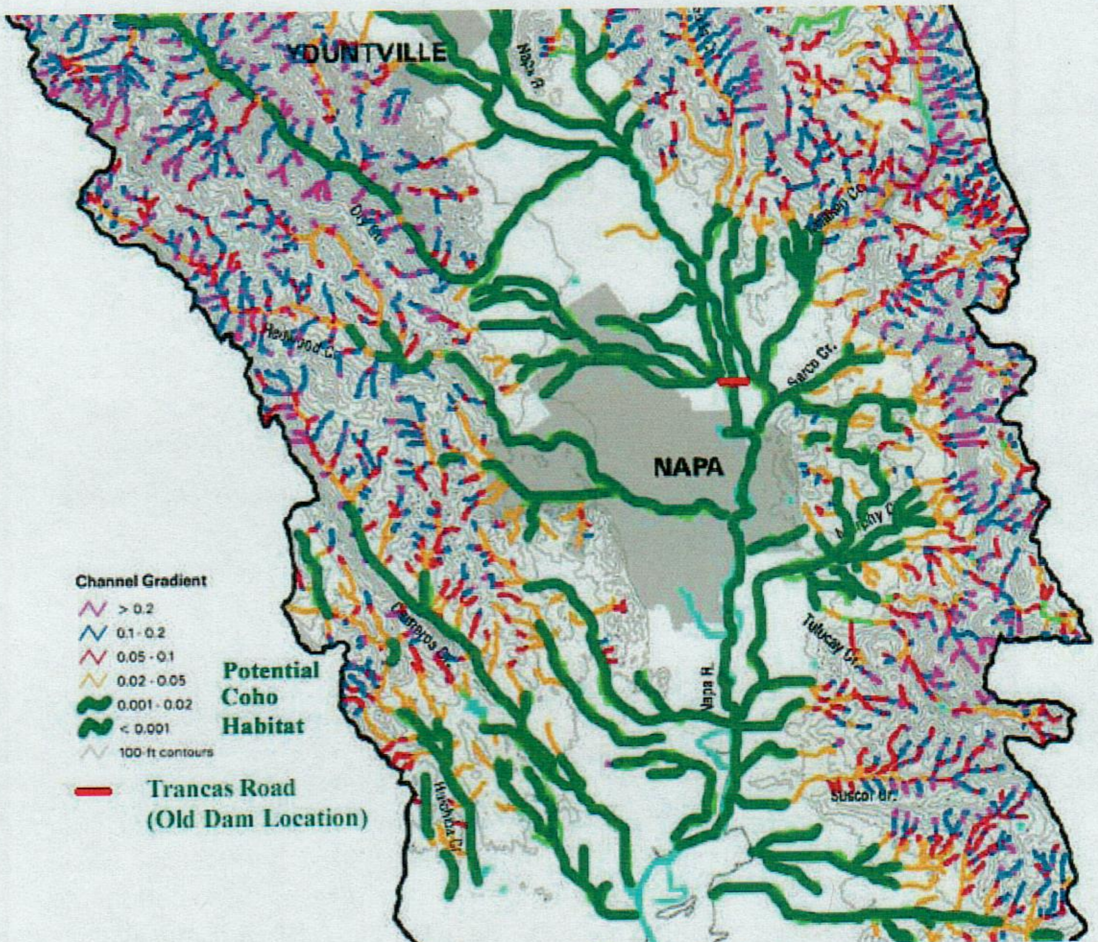

Figure 1. Map of stream gradient from Stillwater and Dietrich (2002)(Map 6) with an overlay of dark green on all reaches with gradient less than 2% (0.02) to show likely range of coho salmon prior to human disturbance and the approximate location of old dam at Trancas Road.

show optimal gradient for coho salmon (< 2%) and also includes the approximate location of the old dam. It is clear that many miles of optimal habitat below the dam in creeks like Redwood, Carneros, Huachica, Murphy, Tulucay and Sarco would have remained accessible and could have provided for sufficient spawning and rearing habitat to have maintained the Napa River coho salmon population into the 20th Century.

The Water Board staff also quibbled with my characterization of low gradient habitats on the Napa Valley floor as the center of former coho salmon production:

> "Finally, we do not agree with the commenter that the only or primary historical habitat for coho salmon was in the lower reaches of the tributaries, instead we hypothesize that coho salmon would have occupied tributary channel reaches with Coast redwood. Douglas fir forest cover including canyon reaches of Redwood and Dry Creeks in the Mount Veeder area, Sulphur, Mill, and Ritchie Creeks, and similar habitat along upper Conn Creek (several tens of miles of pool riffle habitat with perennial flow and closed canopy)."

I previously acknowledged that low gradient reaches in forested tributaries would have been ideal coho salmon, if there were no barriers downstream. The map in Figure 1 was submitted previously and shows suitable reaches on benches in forested tributaries, such as Redwood Creek. Spence et al. (2005) found the Napa River to have 466 kilometers (km) of high intrinsic potential (IP) coho salmon habitat and by far the largest extent of such habitat would have been on the valley floor. Side channels and beaver ponds cool with ample cool water due to hyporheic connections would have provided a huge amount of habitat prior to disturbance. Of all rivers in the Central California Coast Evolutionarily Significant Unit (ESU), only the Russian River and Gualala River have more extensive high IP coho salmon habitat (Spence et al. 2005). NMFS not choosing to include the Napa River in the CCC likely has more to do with politics or their professional opinion about the ability to recover coho salmon than potential historic productivity. Since all other populations of coho salmon in the San Francisco Bay have been extirpated and there are no other nearby source populations from which to draw gene resources, I agree that Napa River coho salmon are not likely recoverable.

Chinook salmon: The impacts to Chinook salmon from the historic dam at the approximate location of Trancas Road were likely greater than those to coho salmon because smaller tributaries below the dam would have been less suitable for spawning of the larger species. Therefore, the Water Board staff assertion that the dam may have eliminated native Chinook salmon runs has more merit. Erratic patterns of abundance, as reflected by Napa County Resource Conservation District (NCRCD 2009, 2010) downstream migrant trapping results (Figure 2 & 3), indicate that the population is not stable or secure. Only one Chinook salmon downstream migrant was trapped in 2009, but there were 1520 juveniles captured and counted in 2010. Very low flows in late 2008 and early 2009 may have lead to very low Chinook salmon spawning and the lack of downstream migrants trapped. The 2010 water year allowed greater potential for access and had higher counts. Water Board staff mention genetic studies to determine whether Napa River Chinook salmon are hatchery strays and results from such studies should be shared expeditiously when available.

Steelhead Trout: The NCRCD (2009) is doing a very professional job in operating a Nap River downstream migrant trap that will provide an excellent basis for developing population estimates of steelhead in the future. The first two years of results (Figure 2 & 3) show that steelhead production is relatively low and highly variable. The NCRCD (2009) captured 128 steelhead smolts and 910 young of the year in 2009, but total steelhead juveniles captured in 2010 was 388. The small number of fish marked and relocated upstream to calibrate trap efficiency and the low recapture rate do not allow for population estimation and greater effort in the future in this regard is needed.

The capture of only 388 juveniles in 2010 is likely indicative of low carrying capacity for older age juveniles during the 2009 water year when flows were very low. This is consistent with concerns raised in previous comments about carrying capacity for juvenile steelhead rearing in dry years. Dewberry (2001, 2003) organized dive counts of steelhead juveniles in many Napa River tributaries in 2001 and 2002 and found that only Dry Creek had consistently high juvenile steelhead standing crops (> 1 fish/meter^2 for >500 meters) in both years. Watersheds of secondary importance included Redwood, Pickle, Richie, Heath, Carneros, Bell and Huichica creeks. Dewberry's (FONR 2004) map of results is included with these comments as Appendix A. Even in watersheds where Dewberry (2001, 2003) found high concentrations of steelhead juveniles, there were many reaches in the same creeks with low or no steelhead present. Only 9% of reaches had high concentrations of steelhead in 2001, which was a severe drought year, but these highly productive reaches expanded to only 19% of habitat surveyed in 2002. This

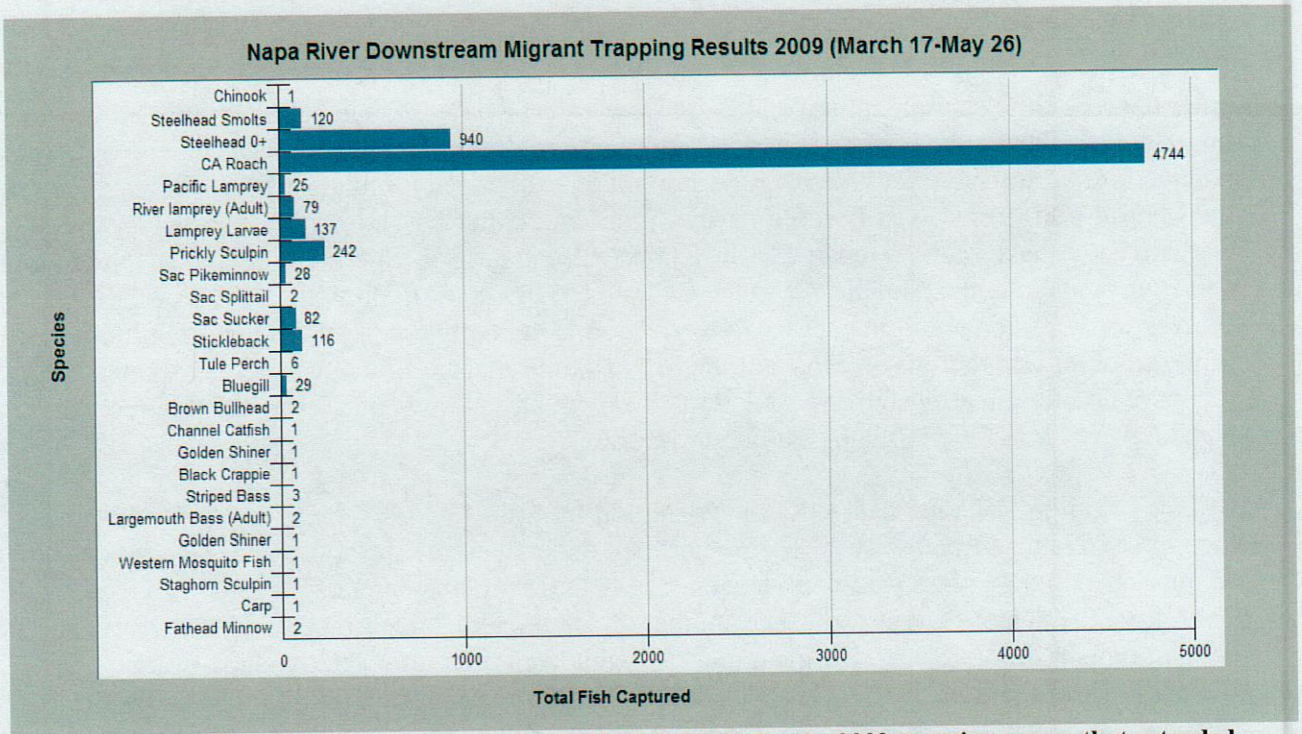

Figure 2. Downstream migrant trap results from NCRCD (2009) for the 2009 trapping season that extended from March 17 to May 26. There was only one Chinook juvenile captured but steelhead juveniles far outnumbered those in 2010.

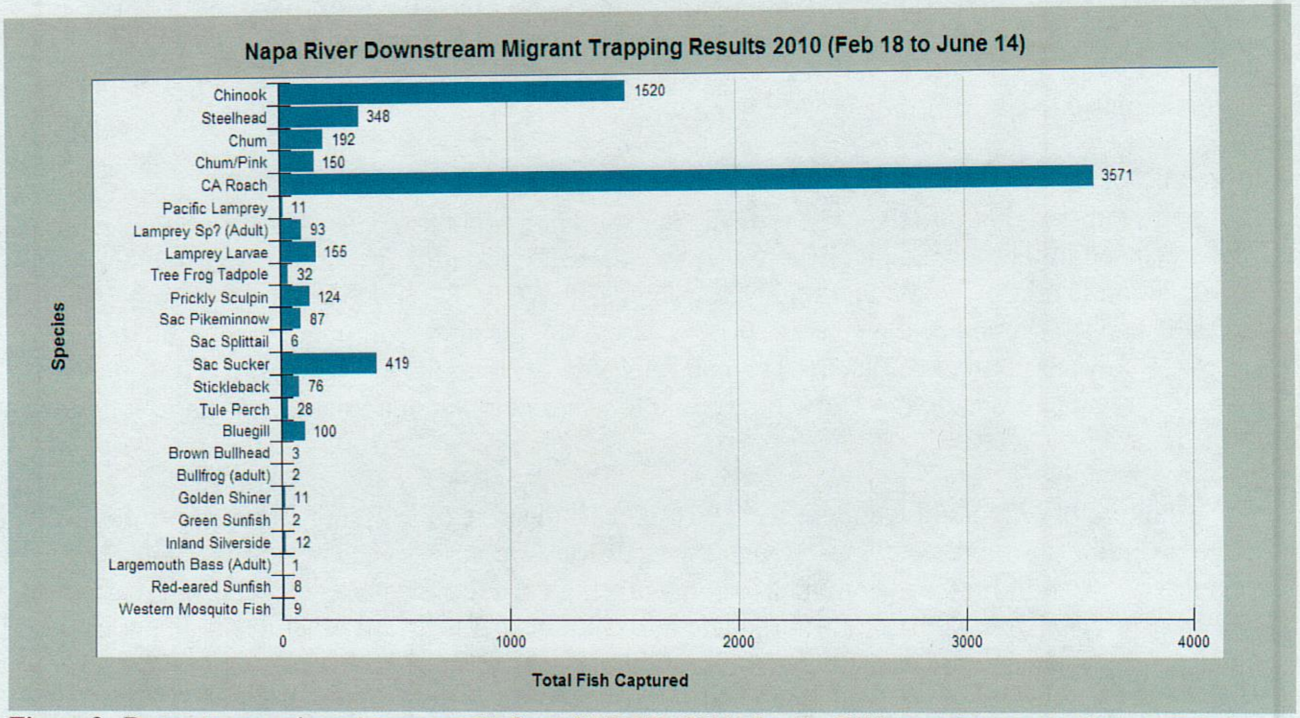

Figure 3. Downstream migrant trap results from NCRCD (2010) for the 2010 trapping season that extended from February 18 to June 14. More Chinook juveniles were captured than in 2009, but fewer steelhead.

indicates that even in good years that 80% of tributary habitat surveyed was marginally functional or non-functional. As mentioned in previous comments, the mainstem Napa River was formerly a very important nursery area for older age juvenile steelhead (Anderson 1969) that are most likely to survive to adulthood and that habitat is now completely non-functional for rearing. Therefore, all indications are that lack of older age steelhead rearing habitat is limiting the population and 2010 downstream migrant trap results show the influence of low water years in depressing smolt production.

Juvenile steelhead dive counts by the NCRCD (2010) in spring and fall of 2007 on York Creek show a pattern of substantial reduction in density except in pools, which indicates that flow depletion reduces seasonal and annual carrying capacity (Figure 4). This is likely a characteristic pattern throughout the basin and shows pervasive problems with over allocation of water. Although Water Board staff proposes a solutions to flow problems through cooperative efforts with other agencies, additional development of vineyards will be permitted under the TMDL if they comply with sediment mitigation measures embodied in Napa County ordinances and Fish Friendly Farming methods. Any additional vineyard development will increase water demand and further diminish steelhead habitat (see Cumulative Effects).

<u>Fish Community Structure</u>: The downstream migrant trap results show that warm water adapted species, such as the California roach are more numerous than salmonids, which is an indication of temperature impairment of the mainstem Napa River. Non-native fishes are numerous and diverse. Stillwater and Dietrich (2002) pointed out that the decreasing trend in salmonids in the Napa River has been accompanied by an increase in non-native warm water adapted species. That trend appears to be continuing. This is problematic because these fish not only compete for food and space with salmon and steelhead juveniles but also likely predate upon them. Occurrence of chum and possibly pink salmon juveniles in the 2010 downstream migrant trap catch indicates there may be a possible remnant population. Genetic work on these fish would be of interest in determining the origin of these fish.

Issue of Protection by TMDL of Areas Upstream of Reservoirs

Water Board staff reject Jackson's (2009) argument regarding the need to enforce TMDL standards above reservoirs to control increased peak flows stating that the reservoirs have the ability to capture flows and shave flood peaks. However, in other sections of the response to comments Water Board staff admits that the reservoirs are not operated for flood control and often pass flows through in late winter. Consequently, concerns about peak flow effects from lands upstream of reservoirs and bed incision of tributaries and the lower mainstem Napa River are valid and remain unresolved.

Water Board staff is incorrect in asserting that lack of steelhead passage above reservoirs means that there is no potential for steelhead production. Titus et al. (2006) found that non-anadromous resident rainbow trout high in southern and south central coastal California watersheds may exhibit an anadromous life history, if washed downstream to the ocean. Similarly, sea run

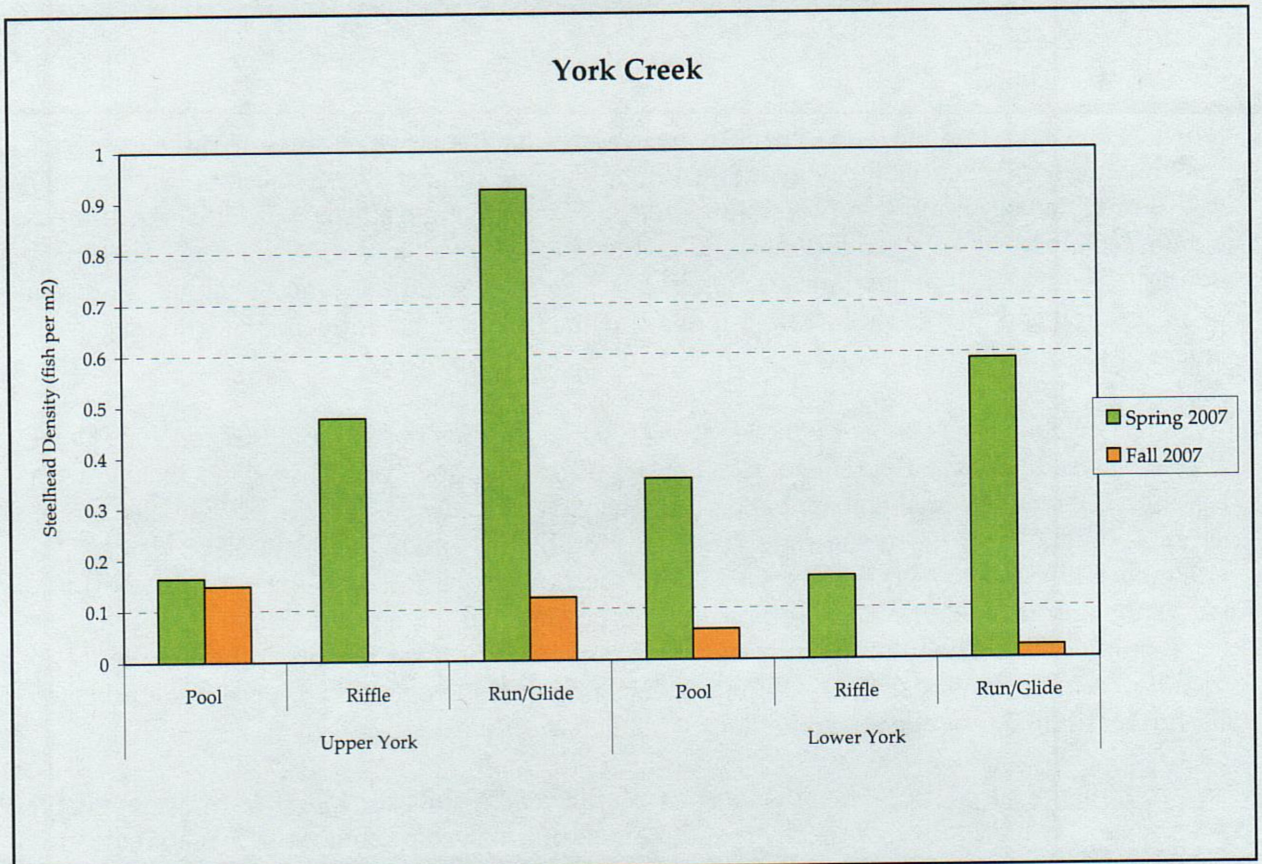

Figure 4. Standing crops of juvenile steelhead in York Creek in spring and fall 2007 show a substantial reduction likely as a result of flow depletion. Data from the NCRCD (2010)

steelhead may gain access to steep headwater streams in years of high flow and replenish "trout" populations. Populations of rainbow trout above dams in the Carmel River watershed are thought to have provided a mechanism for rebuilding anadromous steelhead runs after a prolonged drought had prevented steelhead spawning from 1987 to 1991 (Good et al. 2005, Boughton et al. 2006, Moyle et al. 2008). Landlocked populations of rainbow trout above Napa River dams likely have steelhead ancestry and should be fully protected.

Cumulative Effects Not Dealt With in Substance

As pointed out in previous comments, numerous scientific studies of the impacts of watershed disturbance on aquatic ecosystems in northern California indicate that damage cannot be prevented with on-site mitigation, if disturbance is too widespread (Ligon et al. 1999, Dunne et al. 2001, Collison et al. 2003). Water Board staff continues to argue that compliance with Napa County ordinances and Fish Friendly Farming measures during vineyard construction and operation will prevent increased sediment yield and elevated peak flows despite the fact that these activities cover tens of thousands of acres. Collison et al. (2003) point out that mitigation measures may appear to work until major storm events occur, at which time channel damage results.

It is disappointing that the Water Board staff refuses to consider a limit on road construction and road density, when roads likely contribute to increased peak flow and decreased baseflow (Wemple et al. 1996) by disrupting groundwater storage and increasing peak flows (Figure 5).

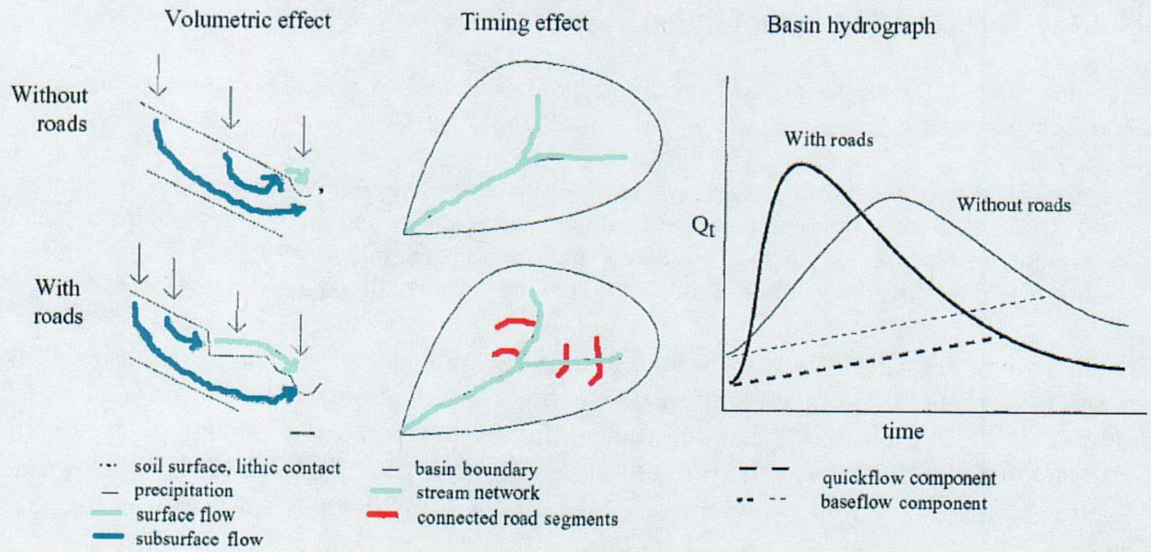

Figure 5. Illustration from Wemple et al. (1996) with color highlights added showing how groundwater storage can be decreased and the timing and magnitude of peak flow altered by road construction.

Wemple et al. (1996) point out that roads actually function to extend stream networks, which is one of the mechanisms for peak flows increase. Roads often cause gully erosion, particularly on steep ground, and these gullies not only contribute erosion but may also serve as channel extensions as well (Wemple et al. 1996).

The Water Board and NCRCD are conducting pilot projects in the Carneros and Sulfur Creek watersheds "to implement BMPs to identify, prioritize, and repair problem roads in the Carneros Creek and Sulphur Creek tributary watersheds", which is commendable. However, while incrementally reducing sediment contributions to the Napa River, cumulative effects damage is likely to continue because few or no roads or road segments are being decommissioned.

As pointed out above, additional development of vineyards or rural residential areas will increase water demand and, unless limits are set, ultimately there will be no water left for fish. It is highly commendable that the Water Board is a catalyst for a cooperative effort between the State Water Resources Control Board Water Rights Division (WRD), California Department of Fish and Game (CDFG), Napa County and the National Marine Fisheries Service (NMFS) to maintain stream flows. Furthermore, Water Board staff is recommending that compliance with all water rights laws be a criterion for eligibility for a waste discharge permit or to obtain a waiver of waste discharge requirements. The highest priority for flow protection needs to be in Dry Creek, as recommended by Dewberry (2003), because it has the highest standing crop of juvenile steelhead and represents the best remaining habitat (Bradbury et al. 1995).

The response to comments (SFBRWQCB 2009) states that "staff will propose that landowners develop a stream and riparian corridor management plan to passively or actively recover geomorphic and ecological processes in unstable channel reaches" as part of waste discharge permits or WDRs. The problem is that such on site treatment will not succeed because the footprint of development is too large and processes such as sediment flux and elevated peak flow will be confounding. Similarly, if groundwater withdrawals that effect surface flow and drop the near stream water table are not prevented or abated, then riparian tree mortality will occur or riparian restoration will become much more challenging.

Monitoring Tools and Their Application

The SFBRWQCB (2009) responded to criticism of monitoring tools in previous comments in the following way:

> "The US Environmental Protection Agency and independent peer reviewers have found the proposed sedimentation parameters (streambed permeability and redd scour) and the associated monitoring program acceptable. In response to previous comments by Living Rivers Council on this topic, we also have indicated our intent to monitor turbidity, and residual pool volume."

I agree that scour and fill of the stream bed is a reliable indicator of spawning success and that scour and fill targets of 15 cm are appropriate. However, recent literature (Horner et al. 2005, Kondolf et al. 2008) indicate that use of permeability as an indicator of spawning gravel quality and fish egg and alevin survival and growth remain problematic. Kondolf et al. (2008) point out that each permeability sample only represents the area within 20 cm radius and describe potential problems:

> "A small number of permeability tests may not accurately characterize a habitat zone such as a riffle, and the number of these tests required to accurately characterize the permeability of a habitat zone could be prohibitive. Field workers who have used these methods commonly report one or two orders of magnitude variability in permeability estimates within a habitat zone or over small intervals of the stream (Bush 2006). This variability may be a combination of leakage along the annulus of the standpipe, small zone of influence for individual tests, and a highly heterogeneous natural environment."

American River gravel quality studies by California State University at Sacramento (CSUS) (Horner et al. 2005) used three methods of measuring permeability, but results did not agree. They found values of permeability using the Terhune (1958) standpipe and methods of Barnard and McBain (1994) ranging from zero cm/hr to more than 100,000 cm/hr. Only three sites rated less than the 7000 cm/hr. target set in the Napa River TMDL. The 7000 cm/hr is not based on literature that correlates it with successful salmon or steelhead egg and alevin survival. Kondolf et al. (2008) recommend gauging the fitness of fry emerging from the gravel where measurements have been taken to establish the relationship of permeability and other gravel quality metrics and the growth and survival of salmonids. If metrics with better known relationships were used (McNeil and Ahnell 1964), then such difficult and expensive correlation studies would not be necessary.

While the Water Board staff has committed to measuring turbidity and residual pool depth due to requests from LRC, there is no defined plan for establishment of continuous recording turbidity stations or any indication of where residual pool depths will be measured. At least ten continuous recording turbidity meters need to be installed in Napa River tributaries as soon as possible to discern whether restoration measures are working. For example, Carneros Creek has well identified problems with excess sediment over supply (Pearce and Grossinger 2005) and the NCRCD and Water Board staff are treating roads to reduce sediment yield. Consequently, a continuous turbidity meter on Carneros Creek needs to be installed as soon as possible to facilitate adaptive management.

Sincerely,

Patrick Higgins

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Appendix A. Map of reaches of high juvenile steelhead production in the Napa River (FONR)