The Bay Foundation of Morro Bay· Butte Environmental Council· Clean Water Action· Coast Action Network· Defend the Bay· Deltakeeper· Environment California· Friends of Butte Creek· Heal the Bay· Natural Resources Defense Council· The Ocean Conservancy· Pacific Coast Federation of Fishermen's Associations· San Diego Baykeeper· San Francisco Baykeeper· Surfrider Foundation Urban Creeks Council of California· Waterkeepers Northern California

Debbie Irvin, Clerk to the Board
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State Water Resources Control Board
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August 25, 2004

Re: Comments on "Draft Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" (July 22, 2004)

Dear Ms. Irvin:

On behalf of the Environmental Caucus of the AB 982 Public Advisory Group, we would like to thank you for the opportunity to submit comments on the "Draft Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" (Draft Policy). We appreciate staff's responsiveness to many of the comments we submitted on prior iterations of the Policy. We particularly appreciate the changes that strengthen the "weight of evidence" alternative data analysis and that add language emphasizing that all data can and must be considered in evaluating whether a water body is impaired.

As you know, on February 18, 2004 we submitted extensive comments outlining serious problems with the initial version of the Draft Policy. While a number of those issues have been addressed in the current version, the document has significant remaining problems. In an effort to comment on this version as efficiently and effectively as possible, we have chosen to provide our comments in the form of line-edits to the Draft Policy itself (*see* Attachment 1). This letter will highlight our major remaining concerns with the Draft Policy. Specifically:

- The statistical technique used for listing waters is inappropriate. In particular, its application to toxicants is illegal;
- The statistical technique used for delisting waters is not sufficiently rigorous and will result in numerous delistings of impaired waters and listing-delisting loops;
- The "Water Quality Limited Segments Being Addressed" section should be eliminated;
- The state must list waters impaired by pollution; and
- The Draft Policy's approach to beach water quality is deficient.

In addition, the Draft Policy, FED and Response to Comments fail to comply with CEQA. In our February 18, 2004 comments we provided extensive detail on these failures. These have not been adequately addressed. The Draft Policy, FED and Response to Comments do not adequately identify, analyze or mitigate the numerous significant impacts of the Policy, as more specifically described in our first letter.

This letter is not a comprehensive description of the revisions we suggest, and we ask that the Board carefully review the Attachment for the complete set of requested modifications. In addition, to the extent that comments made in our February 18, 2004 letter have not been addressed in this version of the Draft Policy, we incorporate by reference those comments.

The Statistical Technique Used For Listing Waters Is Inappropriate.

In our February 18, 2004 comment letter, we demonstrated that the statistical method selected by staff resulted in a very high likelihood of failing to list impaired water bodies. Although staff has changed its preferred statistical method for this version, it still remains extremely likely that the method will miss, and so fail to identify for listing, many impaired waters, especially at low sample sizes. While the improved alternative data analysis may catch some of those missed waters, the problem remains that, at best, the statistical method fails to streamline the current listing process. At worst, it could be intentionally used to avoid listing clearly impaired waters. We continue to recommend that the Board adopt the "raw score" 10% rule, which is relatively precautionary, easy to apply, and makes no unfounded assumptions about the condition of the water body. Moreover, as we demonstrated mathematically in our February 2004 comment letter, a strict application of the 10% rule actually results in "balanced" error rates, which means that the likelihood of mistakenly listing an impaired water body as clean is the same as the likelihood of mistakenly identifying a clean water body as impaired.[1] We would of course prefer to err on the side of clean water, which is the stated position of the Board as well; but at a minimum the error rates must be the same. The current draft continues to err on the side of dirty water, which we maintain is not the policy that this state should adopt.

Application of the statistical test to toxicants is illegal.

As we have emphasized in previous comments, there is no legal justification for applying any statistical test to water quality assessments for toxics. The California Toxics Rule (CTR) is the standard by which these assessments must be conducted, and it is abundantly clear about the number of permissible exceedances: no more than one in three years.[2]

[1] Environmental Caucus of the AB 982 Public Advisory Group, Comments on "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" (February 18, 2004), at Appendix 1, Attachment B.

[2] 40 C.F.R. 131.38 § (c) (2) (iii).

This strict standard reflects the high degree of risk associated with these dangerous and harmful chemicals: toxic pollutants pose substantial threats to human health and aquatic life, often at low concentrations and one-time exposures. Because the risks associated with failure to address impairment by toxics are so great, the decision rule applied to these pollutants should be as conservative as possible and should at least be consistent with standards. We continue to recommend that the Board revise the Draft Guidance to be consistent with the CTR standard.

Staff justifies its failure to revise the Draft Guidance in this regard by focusing on what might be meant by the phrase "on average" in the CTR's language: "no more than once every three years **on average.**" Staff proposed numerous contorted interpretations of this phrase in support of this misguided position in its response to comments, including the incredible:

> once every 3-years on the average might be interpreted to mean three times in nine years is acceptable, using this scenario—three exceedances occur in the first 3-years and followed by no exceedances during the next six years, thus aquatic life has recovered sufficiently.[3]

We urge the Board to reject these outrageous hypothetical interpretations in favor of a listing criterion that is a clean, clear reflection of both science and the CTR: listing should occur if more than one exceedance occurs in a period of three years.

The choice of statistical test (acceptance sampling by attributes) actually institutionalizes the failure to list impaired waters.

Acceptance sampling by attributes, which is the proposed statistical methodology in the current Draft Policy, may be a reasonable means to balance errors in certain statistical decision-making scenarios. However, in the context of water quality assessment, it requires the application of both a maximum acceptable exceedance rate and a minimum acceptable exceedance rate (corresponding to the "rejectable quality level" and the "acceptable quality level" in industrial quality control applications – the context in which this method is usually employed).[4] There are obvious philosophical difficulties with the implication that any water body can have too few exceedances; the Board should never seek to "balance error" at the expense of clean water.

Moreover, staff has arbitrarily chosen to set the parameter values for hypothetical clean and dirty populations at 0.1 (0.05) and 0.25 (0.2) respectively. This means that the former EPA listing criterion of 10%, rather than a maximum exceedance frequency, is now the "acceptable quality level" - the minimum number of exceedances below which

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[3] SWRCB, Final Functional Equivalent Document, Appendix B: Responses to Comments (July 2004) at B-42.

[4] In industrial applications of this methodology, the "acceptable quality level" controls the acceptance of lots that are "good enough." The goal is to reduce the cost of production, given the assumption that perfect lots are not cost-effective to produce. The "rejectable quality level" prevents sending to the consumer lots that are so defective as to be dangerous or unusable.

the Draft Policy assumes it is not cost effective to go. There is absolutely no biological or statistical justification for this proposition, which shifts the threshold exceedance frequency far upward of the traditional 10%.

The requirement for a minimum of three exceedances to list for low sample sizes has no scientific basis and is inconsistent with other listing criteria.

Staff has proposed a uniform, nonscientific, and arbitrary rule for low sample sizes: the "Rule of Three." In other words, three exceedances are required to list any water body for which the total number of samples is 20 or fewer, regardless of what underlying exceedance frequency is implied. This position is inconsistent with staff's "scientific rigor" argument for using statistical techniques in the first place, and creates a tremendous disincentive for monitoring.

The policy should instead require listing for any water body with a 10% exceedance frequency, including water bodies for which the total sample size is less than 21.[5] This would create an immediate incentive to gather additional samples from waters that either the Board or the regulated community believes to be actually clean. Contrary to staff's assertions ("[t]he impact of listing a water body that actually meets water quality standards is that the costs of developing a TMDL will be expended unnecessarily"[6]), such listing – even if erroneous – would not trigger immediate TMDL development with concomitant costs to the agency and the regulated community. Common sense and experience tell us that confirmatory monitoring would come first. Furthermore, the SWRCB's own Draft Impaired Waters Guidance explicitly provides for monitoring as an initial step in TMDL development to confirm impairment.[7]

<u>The Statistical Approach To Delisting Will Miss Numerous Impaired Waters and May Result In Inefficient and Problematic Listing – Delisting Loops.</u>

The Board has stated that it should be easier to list than to delist – a common-sense position for which we commend the Board. However, staff's proposed statistical approach simply does not reflect the Board's stated position in this regard, and in fact moves us further away from that goal. Specifically, the proposed rule explicitly makes delisting at least as easy as listing. Furthermore, the method could result in absurd cycles of listing and delisting, with water bodies bouncing off and on the list. We urge the Board to adopt a more rigorous approach to delisting waters.

Staff's responses to comments explicitly acknowledge that the delisting requirements are not more rigorous than the listing requirements, "so the burden of proof is equivalent."[8] This makes little sense. In contrast to listing decisions, where water

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[5] One or two exceedances will occur from 20% to 55% of the time in water bodies whose true exceedance rates are between 0.1 and 0.2.

[6] SWRCB, "Final Functional Equivalent Document, Appendix B: Responses to Comments" (July 2004) at B-46.

[7] California State Water Resources Control Board, "A Process For Addressing Impaired Waters In California: SB 469 TMDL Guidance" (December 2003) at 4-1.

[8] *Id.* at B-98.

body health is an open question to be evaluated, in delisting decisions we can hypothesize that the water being evaluated is impaired, since it is already on the list. Consequently, the degree of proof required to reject this hypothesis should be greater than the degree of proof required to list a water body when nothing is known about the water quality to begin with.

Accordingly, we recommend that more rigorous and meaningful decision rules be applied to listing and delisting. As noted above, we believe that the "raw score" 10% rule is adequate to make listing decisions, as it does not make implausible assumptions about the condition of the water body, provides insurance against uncertainty, and is easy to apply. For delisting, however, we recommend the application of the binomial statistical method to test the hypothesis that the water body has an underlying exceedance rate of 10% with 95% confidence, against the alternative hypothesis that the actual exceedance rate is lower than 10%. This method provides the additional statistical rigor that is necessary to overcome the data-based position that the water body is impaired (*i.e.*, has an underlying exceedance rate of greater than 10%).

The statistical method selected by staff results in a single critical exceedance rate applied to both listing and delisting.[9] Consequently, the values in Tables 3.1 and 4.1, and 3.2 and 4.2, are never more than one unit apart. This creates the possibility of a listing-delisting loop. Consider the following hypothetical situation: For some water body, there are thirty samples, of which five are exceedances. This would be just enough to be listed. However, if someone took one more sample, and it was clean, there would be thirty-one samples, of which five are exceedances. This would be enough to be delisted. If another sample were taken, and it was dirty, there would be thirty-two samples and six exceedances – enough to be relisted – etc.

This is an incongruous outcome, and one that neither resolves the question of whether the water body is impaired nor makes efficient use of limited water quality assessment and cleanup resources. We therefore recommend, in addition to the above modifications to the statistical test, that the data used to support a delisting decision be independent of the data used to support a listing decision. This would both create a strong incentive for additional monitoring and avoid possible listing-delisting loops.

For similar reasons, the alternative data analysis process for delisting should be modified to ensure that greater care is taken in delisting what has been already characterized as an impaired water body.

The "Water Quality Limited Segments Being Addressed" Section Should Be Eliminated.

In response to our previous comments, staff revised the Draft Policy such that the "Enforceable Programs" list is now the "Water Quality Limited Segments Being Addressed" list. Staff says that "[a]ll waters in the Water Quality Limited Segments

[9] The critical values for listing and delisting on tables 3.1 and 4.1, and 3.2 and 4.2 are not precisely the same, probably because the critical value is not an integer and staff rounded up for listing and down for delisting.

Being Addressed section of the list are on the section 303(d) list."[10] In response to our comment that the Enforceable Programs list would permit WQLS to specifically avoid a TMDL, staff states that: "[t]his section of the list is not an off-ramp because the waters will be addressed by the certified program in lieu of a TMDL, and within an adopted time frame."[11]

Clearly, then, the change from the "Enforceable Programs" list to the "Water Quality Limited Segments" section is purely cosmetic. At least under the previous version of the Draft Policy, the intent to avoid a TMDL by providing for a separate list was explicit; under the current version, it is disguised as a separate "section" of a 303(d) list for which – mysteriously and without any legal authority whatsoever – a TMDL will apparently not be required. Consequently, the Water Quality Limited Segments Being Addressed list remains in effect an "off ramp" – a means of providing a ticket out of doing something (developing a TMDL) that the law explicitly requires.

As we have noted previously, Section 303(d) expressly requires each state to identify waters within its boundaries for which "the effluent limitations required by section 301(b)(1)(A) and section 301(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters."[12] Thus, waters are to be listed, and TMDLs developed, whenever the effluent limits described in section 301(b)(1)(A) and (B) are insufficient to attain and maintain water quality standards.

Furthermore, the language of Section 303(d), when read in the overall context of the Clean Water Act as well as Section 301, clearly indicates that Congress intended the TMDL program to coexist with other enforcement and clean up programs under the Act. There is no indication that Congress intended the operation of the Clean Water Act as a whole to disable any specific element of the Act. Yet, this would be the effect of the Water Quality Limited Segments Being Addressed section. Such an impact cannot be allowed.[13]

The Clean Water Act provides a mechanism for doing precisely what is intended in the creation of additional lists or list sections: prioritizing segments for action. Specifically, Section 303(d) states that: "[t]he State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters."[14] Instead of trying to exempt certain waters from TMDL development on the basis of existing programs, the Board should use the existing programs as a factor in its prioritization analysis, discussed in Section 5 of the Draft Policy.

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[10] SWRCB, "Final Functional Equivalent Document, Appendix B: Responses to Comments" (July 2004) at B-75.
[11] *Id.*
[12] 33 U.S.C. §1313(d)(1)(A).
[13] *See Owasso Indep. Sch. Distr. No. I-011 v. Falvo*, 534 U.S. 426 (2002) ("It is a fundamental canon of statutory construction that the words of a statute must be read in their context and with a view to their place in the overall statutory scheme").
[14] 33 U.S.C. §1313(d)(1)(A).

If the Board decides to retain the Water Quality Limited Segments Being Addressed section, it should – at a minimum – require that the existing programs provide for attainment of the water quality standard prior to the next listing cycle. This is the only scenario under which the Board can ensure that the existing programs are, in fact, addressing the water quality impairment and thereby justify not developing a TMDL.

The State Must List Waters Impaired By Pollution.

As staff stated in its Response to Comments, "[i]f a water body does not meet water quality standards it should be placed on the 303(d) list."[15] Despite this lucid and accurate articulation of the law, the Draft Policy continues to limit listing of impaired water segments only where the impairment is due to toxicity, a pollutant or pollutants.

Water bodies that are impaired by any source of pollution must be listed. This position is supported both by the plain language of Section 303(d)(1)(A) and by legal opinions interpreting it, and has been supported by the Regional Boards as well in testimony and elsewhere. This position is also supported by the National Research Council, which found that the TMDL program "should encompass all stressors, both pollutants and pollution, that determine the condition of the waterbody."[16] The NRC found this step to be important because "activities that can overcome the effects of 'pollution' and bring about water body restoration – such as habitat restoration and channel modification – should not be excluded from consideration during TMDL plan implementation."[17]

The attached line edits recommend the creation of a "Water Quality Limited Segments for Which a TMDL Is Not Required" section of the 303(d) list to resolve these deficiencies. Impaired waters would be placed in this category if the impairment is solely and demonstrably the result of factors other than toxicity or a pollutant or pollutants.

The Draft Policy's Approach To Beach Water Quality Is Deficient.

In our February 18, 2004 comments, we recommended the use of a reference system approach to evaluate recreational uses. As currently drafted, the Draft Policy does not strongly recommend using a reference system approach. Additionally, when the reference system approach is used, the site-specific exceedance frequency derived from the reference system is applied in conjunction with the binomial model – an approach that results in overcompensation for potential error and an unreasonably high bar for listing.

In its response to comments, staff indicated that the EPA recommends using 10%, referencing a 1997 document. As we pointed out in our February comments, this recommendation was made with regards to the outdated EPA standard for fecal coliform.

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[15] State Water Resources Control Board, "Final Functional Equivalent Document, Appendix B: Responses to Comments" (July 2004) at B-117.

[16] National Research Council, "Assessing the TMDL Approach to Water Quality Management," p. 4 (Nat'l Academy Press, Wash. D.C., 2001), http://books.nap.edu/html/tmdl/ (NRC Report) (emphasis added).

[17] *Id.*

The more recent implementation guidance document for the EPA enterococcus criteria does not recommend 10%.[18]

Staff apparently believes that the binomial model should be used with the site-specific frequency because there is much uncertainty associated with bacteria measurements. However, this position fails to acknowledge that error associated with laboratory measurement of bacteria can also result in *underestimating* bacteria densities. Importantly, it seems that staff failed to consider that the bacteria standards are based on epidemiological results that were developed giving consideration to this same laboratory error. Consequently, the application of a statistical approach in this context will result in overcompensation for potential error and a high risk of erroneously failing to list impaired waters.

Allowing a 10% exceedance rate plus the statistical model results in an exceedance rate which is much higher than that observed at many beaches, including those with receiving storm drain flow and enclosed beaches that lack adequate circulation. For example, data analyses conducted for the bacteria TMDLs for Santa Monica Bay do not support a 10% exceedance rate. Analysis of five years of routine monitoring data at 55 beaches showed that 35 beaches had an average exceedance rate of less than 10% per year. In other words, 61% of the beaches routinely monitored in Santa Monica Bay have an exceedance rate of less than 10%, yet most of these beaches are monitored because they have sources of bacteria nearby such as storm drains.

Furthermore, rain advisories should be considered in the evaluation process for beaches in which routine monitoring is suspended during wet weather. As currently drafted, the Policy rewards local agencies that use rain advisories in lieu of monitoring because this information need not be the basis of 303(d) listing. If rain advisories and wet weather water quality monitoring were equivalent for the purposes of 303(d) listing, the incentive to not monitor would be removed.

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[18] EPA, "Draft Implementation Guidance of Ambient Water Quality Criteria for Bacteria" (May 2002).

Once again, we urge the Board to adopt the line edits provided in Attachment 1, which would address the above concerns as well as other remaining issues with the proposed Draft Policy. Thank you for considering these comments, and please feel free to call if you have any questions.

Sincerely,

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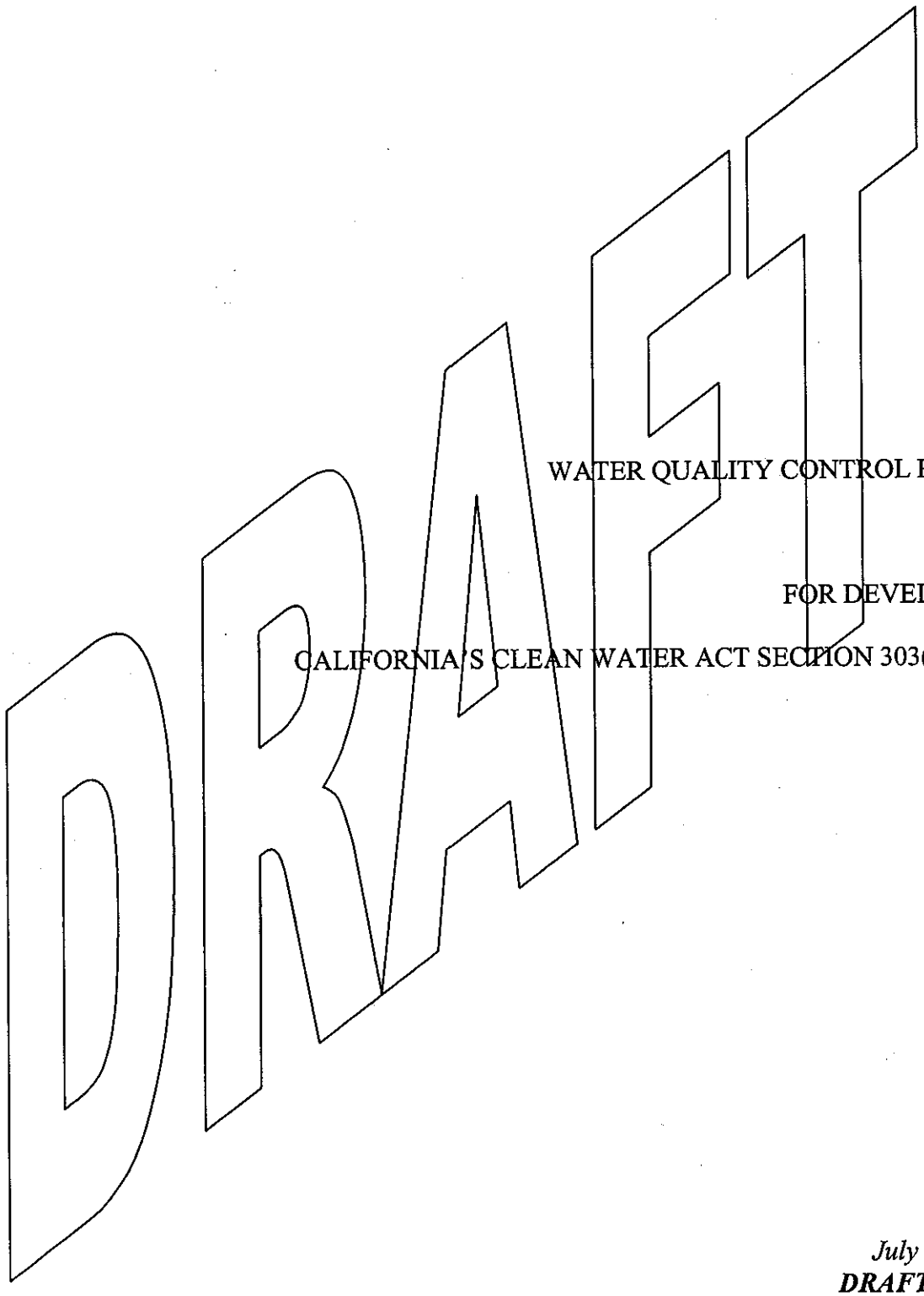
STATE WATER RESOURCES CONTROL BOARD



WATER QUALITY CONTROL POLICY

FOR DEVELOPING

CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST

July 22, 2004

DRAFT FINAL

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WATER QUALITY CONTROL POLICY FOR DEVELOPING CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST

1 Introduction

Pursuant to California Water Code section 13191.3(a), this State policy for water quality control (Policy) describes the process by which the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) will comply with the listing requirements of section 303(d) of the federal Clean Water Act (CWA). The objective of this Policy is to establish a standardized approach for developing California's section 303(d) list in order to achieve the overall goal of achieving water quality standards and maintaining beneficial uses in all of California's surface waters.

CWA section 303(d) requires states to identify waters that do not meet, or are not expected to meet by the next listing cycle, applicable water quality standards after the application of certain technology-based controls and schedule such waters for development of Total Maximum Daily Loads (TMDLs) [40 Code of Federal Regulations (CFR) 130.7(c) and (d)]. Water quality limited segments are defined as state waters "for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters. [33 USC 1313(d)(1)(A).] The states are required to assemble and evaluate all existing and readily available water quality-related data and information to develop the list [40 CFR 130.7(b)(5)] and to provide documentation for listing or not listing a state's waters [40 CFR 130.7(b)(6)]. The methodology to be used to develop the section 303(d) list [40 CFR 130.7(b)(6)(i)] is established by this Policy and includes:

- California Listing Factors and Delisting Factors;
- The process for gathering and evaluating of readily available data and information; and
- Total Maximum Daily Load (TMDL) scheduling.

This Policy applies only to the listing process methodology used to comply with CWA section 303(d). In order to make decisions regarding standards attainment, this Policy provides guidance for interpreting data and information as they are compared to beneficial uses, existing numeric and narrative water quality objectives, and antidegradation considerations. The Policy shall not be used to:

- determine compliance with any permit or waste discharge requirement provision;
- establish, revise, or refine any water quality objective or beneficial use; or
- translate narrative water quality objectives for the purposes of regulating point sources.

Data and information from water bodies shall be analyzed under the provisions of this Policy using a weight-of-evidence approach. The weight-of-evidence approach shall be used to evaluate whether the evidence is in favor of or against placing waters on or removing waters from the section 303(d) list (section 2). The following steps describe the weight-of-evidence approach:

1. Data and Information Preprocessing: All data and information for existing listings shall be solicited and assembled, as appropriate (sections 6.1.1 and 6.1.2.1). Water body fact sheets (section 6.1.2.2) describing the assessments shall be prepared. Evaluation guidelines (section 6.1.3), if needed, shall be selected and the quality of the data (section 6.1.4) and quantity of data (section 6.1.5) shall be assessed.

2. Data and Information Processing: All data and information shall be evaluated using the decision rules listed in sections 3 or 4, as appropriate, and using applicable implementation factors (including, but not limited to, sections 6.1.2.2 and 6.1.5.1 through 6.1.5.9). RWQCBs shall also develop a schedule for completion of TMDLs (section 5). All other information not addressed under sections 3, 4, 5, or 6, shall be evaluated and presented in fact sheets.

3. Data Assessment: An assessment in favor of or against a list action for a water body-pollutant combination shall be presented in fact sheets. The assessment shall identify and discuss relationships between all available lines of evidence for water bodies and pollutants. This assessment shall be made on a pollutant-by-pollutant (including toxicity) basis, where such information is available. RWQCBs shall approve all decisions to list or delist a water segment (section 6.2).

2 Structure of the CWA Section 303(d) List

This section describes the categories of waters that shall be included in the section 303(d) list. Sections 3 and 4 contain the factors that shall be used to add and remove waters from the list. At a minimum, the California section 303(d) list shall identify waters where standards are not met, pollutants, pollution or toxicity contributing to standards exceedance, where such information is available, and the TMDL completion schedule. The section 303(d) list shall contain the following categories:

2.1 Water Quality Limited Segments for Which a TMDL Is Needed

Waters shall be placed in this category of the section 303(d) list if it is determined, in accordance with the California Listing Factors, that the water quality standard is not attained or it is expected that the standard will not be attained before the start of the next listing cycle; the standards nonattainment is due to toxicity, a pollutant, or pollutants; and remediation of the standards attainment problem requires one or more TMDLs.

The water segment shall remain in this category of the section 303(d) list until TMDLs for all pollutants have been completed, U.S. Environmental Protection Agency (USEPA) has approved the TMDLs, and implementation plans have been adopted. The water segment will then either remain in this category until it is demonstrated in accordance with section 4 that water quality standards are attained, or shall be moved to the Water Quality Limited Segments Being Addressed category.

2.2 Water Quality Limited Segments for Which a TMDL Is Not Needed

Waters shall be placed in this category of the section 303(d) list if the water quality standard is not attained or it is expected that the standard will not be attained before the start of the next listing cycle, and the standards nonattainment is due to factors other than toxicity or a pollutant or pollutants.

A water segment shall be placed in this category if it is determined, in accordance with the California Listing Factors, that standards are not attained in the water segment, or that the water segment is expected to fall out of attainment before the next listing cycle, solely due to factors other than toxicity or a pollutant or pollutants. If toxicity or pollutant(s) are suspected of contributing to the impairment or projected impairment, then the water segment shall be placed on the list described in Section 2.1.

The water segment shall remain in this category of the section 303(d) list until water quality standards are attained.

~~2.22.3~~ Water Quality Limited Segments Being Addressed

Water segments shall be placed in this category under two circumstances:

1. A TMDL has been developed and approved by USEPA and the approved implementation plan is expected to result in full attainment of the standard within an adopted time frame; or

2. If a RWQCB certifies under the provisions of the Water Quality Control Policy for Addressing Impaired Waters that- pollution control requirements other than TMDLs are reasonably expected to result in the attainment of the water quality standard within an adopted time frame, ~~not to exceed five years.~~ not to exceed the date by which the next list of impaired waters is due under federal regulations.

Waters shall only be removed from this category if it is demonstrated in accordance with section 4 that water quality standards are attained.

3 California Listing Factors

RWQCBs and SWRCB shall use the following factors to develop the California section 303(d) list.

3.1 Water Quality Limited Segments Factors

This section provides the methodology for developing the Water Quality Limited Segments category of the section 303(d) list (Sections 2.1 and 2.2). Waters meeting the conditions in section 3.1 exceed water quality standards.

In developing the list, the state shall evaluate all existing readily available water quality-related data and information. Data and information, collected during a known spill or violation of an effluent limit in a permit or waste discharge requirement (WDR), may be used in conjunction with other data to demonstrate that there is an exceedance of a water quality standard in the water body. Visual assessments or other semi-quantitative assessments shall also be considered ~~as ancillary lines of evidence to support~~ in evaluating a potential section 303(d) listing, and may be given greater weight where accompanied by quantitative information or where the quality of the information justifies a greater degree of reliance.

Water segments shall be placed on the section 303(d) list if any of the following conditions are met.

3.1.1 Numeric Water Quality Objectives and Criteria for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded in two or more samples within a three-year period.
~~as follows:~~

~~- Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.1.~~

- ~~For sample populations less than 21, when 3 or more samples exceed standards, the segment shall be listed.~~

3.1.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water

Numeric water quality objectives for conventional pollutants are exceeded in more than 10 percent of the samples with at least two exceedances. ~~as follows:~~

~~- Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.2.~~

- ~~For sample populations less than 26, when 5 or more samples exceed standards, the segment shall be listed.~~

For depressed dissolved oxygen, if measurements of dissolved oxygen taken over the day (diel) show low concentrations in the morning and sufficient or high concentrations in the afternoon, then it shall be assumed that nutrients are responsible for the observed dissolved oxygen concentrations if riparian cover, substrate composition or other pertinent factors can be ruled out as controlling dissolved oxygen fluctuations. ~~When continuous monitoring data are available, the seven-day average of daily minimum measurements shall be assessed.~~ In the absence of diel

measurements, concurrently collected measurements of nutrient concentration shall be assessed using applicable water quality objectives or acceptable evaluation guidelines (section 6.1.3) or~~and using the binomial distribution~~ as described in section 3.1.1.

3.1.3 Numerical Water Quality Objectives or Standards for Bacteria Where Recreational Uses Apply

In the absence of a site-specific exceedance frequency, a water segment shall be placed on the section 303(d) list if bacteria water quality standards in California Code of Regulations, Basin Plans, or statewide plans are exceeded as described in section 3.1.2~~ using the binomial distribution as described in section 3.1.2~~. RWQCBs asserting that data from a reference water segment or beach were not available must provide adequate documentation to support that assertion.

If a site-specific exceedance frequency is available, it should~~may~~ be used instead of the ten percent exceedance frequency as described in Table 3.1~~2~~. The site-specific exceedance frequency shall be the number of water quality standard exceedances in a relatively unimpacted watershed (i.e., a reference water segment). Those water bodies that exceed bacteria water quality standards at a greater frequency than a reference water body should be placed on the section 303(d) list. To the extent possible and allowed by water quality objectives, RWQCBs shall identify one or more reference beaches or water segments to compare the measurements.

For bacterial measurements from coastal beaches, if water quality monitoring was conducted April 1 through October 31 only, a four percent exceedance percentage shall be used only if a reference water segment or beach cannot be identified. If the exceedance is due to a beach closure related to a sewage spill, the water segment shall not be placed on the section 303(d) list, though recurring beach closures due to sewage spills shall be considered for listing. Beach postings that are not backed by water quality data shall not be used to support placement of a water segment on the section 303(d) list. Rain advisories shall be considered when evaluating beach waters for listing where routine wet weather monitoring is not conducted.

3.1.4 Health Advisories

A water segment shall be placed on the section 303(d) list if a health advisory against the consumption of edible resident organisms, or a shellfish harvesting ban has been issued by the Office of Environmental Health Hazard Assessment (OEHHA), or Department of Health Services and there is a designated or existing fish consumption beneficial use for the segment. In addition, water segment-specific data must be available indicating the evaluation guideline for tissue is exceeded.

3.1.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

A water segment shall be placed on the section 303(d) list if the tissue pollutant levels in organisms exceed a pollutant-specific evaluation guideline (satisfying the requirements of section 6.1.3) ~~using the binomial distribution~~ as described in section 3.1.1.

Acceptable tissue concentrations may be ~~based on composite samples~~ measured either as muscle tissue or whole body residues. Residues in liver tissue alone are not considered a suitable

measure. Samples can be collected either from transplanted animals or from resident populations.

3.1.6 Water/Sediment Toxicity

A water segment shall be placed on the section 303(d) list if the water segment exhibits ~~statistically significant~~ water or sediment toxicity ~~using the binomial distribution~~ as described in section 3.1.1. The segment shall be listed if the observed toxicity is associated with a pollutant or pollutants. Waters may ~~also~~ be placed on the section 303(d) list for toxicity alone. If the pollutant causing or contributing to the toxicity is identified, the pollutant shall be included on the section 303(d) list as soon as possible (i.e., during the next listing cycle).

Reference conditions may include laboratory controls (using a t-test or other applicable statistical test), the lower confidence interval of the reference envelope, or, for sediments, response less than 90 percent of the minimum significant difference for each specific test organism.

Appropriate reference and control measures must be included in the toxicity testing. Acceptable methods include, but are not limited to, those listed in water quality control plans, the methods used by Surface Water Ambient Monitoring Program (SWAMP), the Southern California Bight Projects of the Southern California Coastal Water Research Project, American Society for Testing and Materials (ASTM), USEPA, the Regional Monitoring Program of the San Francisco Estuary Institute, and the Bay Protection and Toxic Cleanup Program (BPTCP).

Association of pollutant concentrations with toxic or other biological effects should be determined by any one of the following:

A. Sediment quality guidelines (satisfying the requirements of section 6.1.3) are exceeded ~~using the binomial distribution~~ as described in section 3.1.1. In addition, using rank correlation, the observed effects are correlated with measurements of chemical concentration in sediments. If these conditions are met, the pollutant shall be identified as "sediment pollutant(s)."

B. For sediments, an evaluation of equilibrium partitioning or other type of toxicological response that identifies the pollutant that may cause the observed impact. Comparison to reference conditions within a watershed or ecoregion may be used to establish sediment impacts.

C. Development of an evaluation (such as a toxicity identification evaluation) that identifies the pollutant that contributes to or caused the observed impact.

3.1.7 Nuisance

A water segment shall be placed on the section 303(d) list if qualitative assessments of the water segment for nuisance water odor, taste, excessive algae growth, foam, turbidity, oil,- trash, and color, particularly but not necessarily where ~~are~~ associated with numerical water quality data, ~~that~~ meets any one of the following:

3.1.7.1 Nutrient-related

An acceptable nutrient-related evaluation guideline is exceeded ~~using the binomial distribution~~ as described in section 3.1.1 for excessive algae growth, unnatural foam, odor, and taste. Waters may also be placed on the section 303(d) list when a significant nuisance condition exists as compared to reference conditions, or when nutrient concentrations exceed levels shown to cause or contribute to excessive algae growth. If listing for nitrogen or phosphorus specifically, RWQCBs should consider whether the ratio of these two nutrients indicates which is the limiting agent.

3.1.7.2 Other Types

An acceptable evaluation guideline is exceeded ~~using the binomial distribution~~ as described in section 3.1.1 for taste, color, oil sheen, turbidity, litter, trash, and odor not related to nutrients. Water segments may also be placed on the section 303(d) list when there is significant nuisance condition compared to reference conditions.

3.1.8 Adverse Biological Response

A water segment shall be placed on the section 303(d) list if the water segment exhibits adverse biological response measured in resident individuals as compared to reference conditions ~~and these impacts are associated with water or sediment concentrations of pollutants as described in section 3.1.6~~. Indicators ~~Endpoints~~ for this factor include reduction in growth, reduction in reproductive capacity, abnormal development, histopathological abnormalities, and other adverse conditions.

Qualitative visual assessments or other semi-qualitative assessments may be used ~~as secondary lines of evidence~~ to support placement on the section 303(d) list, particularly in conjunction with other lines of evidence. These types of assessments include fish kills or bird kills related to water quality conditions.

For adverse biological response related to sedimentation, the water segment shall be placed on the section 303(d) list if adverse biological response is identified and effects are associated with clean sediment loads in water or with loads stored in the channel. Waters shall be placed on the section 303(d) list if evaluation guidelines (satisfying the conditions of section 6.1.3) are exceeded ~~using the binomial distribution~~ as described in section 3.1.1.

3.1.9 Degradation of Biological Populations and Communities

A water segment shall be placed on the section 303(d) list if the water segment exhibits significant degradation in biological populations and/or communities as compared to reference site(s), ~~and is associated with water or sediment concentrations of pollutants~~ including but not limited to differences in chemical concentrations, temperature, dissolved oxygen, and trash. This condition requires diminished numbers of species or individuals of a single species or other metrics when compared to reference site(s). The analysis should rely on measurements from at least two stations. Comparisons to reference site conditions shall be made during similar season and/or hydrologic conditions.

Association of chemical concentrations, temperature, dissolved oxygen, trash, and other pollutants shall be determined using sections 3.1.1, 3.1.2, 3.1.6, 3.1.7, 6.1.5.9, or other applicable sections.

For population or community degradation related to sedimentation, the water segment shall be placed on the section 303(d) list if degraded populations or communities are identified and effects are associated with clean sediment loads in water or with loads stored in the channel when compared to evaluation guidelines (satisfying the conditions of section 6.1.3) ~~using the binomial distribution~~ as described in section 3.1.1 or as compared to reference sites.

Bioassessment data used for listing decisions shall be consistent with section 6.1.5.8. For bioassessment, measurements at one stream reach may be sufficient to warrant listing ~~provided that the impairment is associated with a pollutant(s) as described in this section~~.

3.1.10 Trends in Water Quality

A water segment shall be placed on the section 303(d) list if the water segment exhibits concentrations of pollutants or water body conditions for any listing factor that shows a trend of declining water quality standards attainment. This section is focused on addressing the antidegradation component of water quality standards and threatened waters as defined in 40 CFR 130.2(j) by identifying trends of declining water quality. Numeric, pollutant-specific water quality objectives need not be exceeded to satisfy this listing factor. In assessing trends in water quality RWQCBs shall:

~~1.~~1. Use data sufficient to demonstrate a trend in deteriorating water quality as compared to baseline conditions~~Use data collected for at least three years;~~
~~2. Establish specific baseline conditions~~;
2. Specify the~~statistical~~ approaches used to evaluate the declining trend in water quality measurements;
~~4.~~3. Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate;
~~5.~~4. Determine the occurrence of adverse biological response (section 3.1.8), degradation of biological populations and communities (section 3.1.9), or toxicity (section 3.1.6); and
~~6.~~5. Assess whether the declining trend in water quality is expected to result in nonattainment of ~~not meet~~ water quality standards by the next listing cycle.

Waters shall be placed on the section 303(d) list if the declining trend in water quality is substantiated as called for in ~~(~~steps 1 through 54 above~~) and impacts are observed (step 5)~~.

3.1.11 Situation-Specific Weight of Evidence Listing Factor

When all other Listing Factors do not result in the listing of a water segment but information indicates non-attainment of standards, a water segment shall be placed on the section 303(d) list if the weight of evidence demonstrates that a water quality standard is not attained.

When recommending listing based on the situation-specific weight of evidence, the RWQCB must justify its recommendation by:

- Providing any data or information supporting the listing;

- Describing in fact sheets how the data or information affords a substantial basis in fact from which the listing can be reasonably inferred;
- Demonstrating that the weight of evidence of the data and information indicate that the water quality standard is not attained; and
- Demonstrating that the approach used is scientifically defensible and reproducible.

Table 3.1: Minimum Number of Measured Exceedances Needed to Place a Water Segment on the Section 303(d) List for Conventional or Other Pollutants Such That the Actual Exceedance Rate Is Greater Than or Equal to Ten Percent ($k_{list} = 0.1(N+1)$.

Sample Size	Place on the 303(d) list if at least this number of exceedances
10	2
12	2
19	2
26	2
33	3
41	4
48	4
56	5
64	6
72	7
80	8
89	9
97	9
105	10

TABLE 3.1: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR TOXICANTS.

Null Hypothesis: Actual exceedance proportion ≤ 5 percent.
Alternate Hypothesis: Actual exceedance proportion > 20 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
21 – 28	3
29 – 37	4
38 – 46	5
47 – 55	6
56 – 64	7
65 – 73	8
74 – 82	9
83 – 91	10
92 – 100	11
101 – 109	12
110 – 118	13
119 – 127	14

For sample sizes greater than 127, the minimum number of measured exceedances is established where α and $\beta \leq 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(n-k, n, 1 – 0.05, TRUE)
β = Excel® Function BINOMDIST(k-1, n, 0.20, TRUE)
where n = the number of samples,
k = minimum number of measured exceedances to place a water on the section 303(d) list,
0.05 = acceptable exceedance proportion, and
0.20 = unacceptable exceedance proportion.

TABLE 3.2: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

Null Hypothesis: Actual exceedance proportion ≤ 10 percent.
Alternate Hypothesis: Actual proportion > 25 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
26 – 30	5
31 – 36	6
37 – 42	7
43 – 48	8
49 – 54	9
55 – 60	10
61 – 66	11
67 – 72	12
73 – 78	13
79 – 84	14
85 – 91	15
92 – 97	16
98 – 103	17
104 – 109	18
110 – 115	19
116 – 121	20

For sample sizes greater than 121, the minimum number of measured exceedances is established where α and $\beta \leq 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(n-k, n, 1 – 0.10, TRUE)
β = Excel® Function BINOMDIST(k-1, n, 0.25, TRUE)
where n = the number of samples,
k = minimum number of measured exceedances to place a water segment on section 303(d) list,
0.10 = acceptable exceedance proportion, and
0.25 = unacceptable exceedance proportion.

3.2 Water Quality Limited Segment Being Addressed

This section provides the methodology for development of the Water Quality Limited Segments Being Addressed category (section 2.3). A water segment shall be placed on this portion of the section 303(d) list if the conditions for placement in the water quality limited segments category (section 3.1) are met and any of the following additional conditions are met:

1. A TMDL has been approved by USEPA for the pollutant-water segment combination and an implementation plan has been approved for the TMDL.
2. The RWQCB has certified under the provisions of the Water Quality Control Policy for Addressing Impaired Waters that pollution control requirements other than TMDLs are reasonably expected to result in the attainment of the water quality standard within an adopted time frame, not to exceed the period before the next 303(d) list is due under federal regulations ~~five years~~.

4 California Delisting Factors

This section provides the methodology for removing waters from the section 303(d) list (including the Water Quality Limited Segments Category and Water Quality Limited Segments Being Addressed category).

All listings of water segments shall be removed from the section 303(d) list if the listing was based on faulty data, and it is demonstrated that the listing would not have occurred in the absence of such faulty data. Faulty data include, but are not limited to, typographical errors, improper quality assurance/quality control procedures, or limitations related to the analytical methods that would lead to improper conclusions regarding the water quality status of the segment. To complete the reevaluation of a faulty listing: (1) the basis for the original listing shall be documented; and, (2) documentation shall be provided demonstrating that (a) the listing was based on faulty data or information, and (b) the listing would not have occurred but for these factors. Regional Boards seeking to delist a water segment on this basis must:

- Specify the approaches used to evaluate the faulty data and identify whether other data, including data on declining trends in water quality measurements, justify listing notwithstanding the faulty data;
- Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate;
- Demonstrate the absence of an adverse biological response (section 3.1.8), degradation of biological populations and communities (section 3.1.9), or toxicity (section 3.1.6); and
- Memorialize the analysis and conclusions in a fact sheet.

If objectives or standards have been revised and it is demonstrated that the site or water meets the new water quality standards or objectives, the water segment shall be removed from the section 303(d) list. The listing of a segment shall be reevaluated if the water quality standard has been changed and data and information are provided to demonstrate that the new standard or objective is not exceeded. Such data and information shall be independent of the data and information used to make the original listing decision, and shall be spatially representative of the water body, and temporally representative over a period of at least three years; and shall otherwise meet or exceed the data and related standards set forth in this Policy for listing of waters.

Any interested party may request an existing listing be reassessed under the delisting factors of this Policy. In requesting the reevaluation, the interested party must, using the delisting factors: state the reason(s) the listing is inappropriate and the Policy would lead to a different outcome; and provide the data and information necessary to enable the RWQCB and SWRCB to conduct the review. Such data and information shall be independent of the data and information used to make the original listing decision, and shall be spatially representative of the water body, and

temporally representative over a period of at least three years and shall otherwise meet or exceed the data and related standards set forth in this Policy for listing of waters.

Water segments or pollutants shall be removed from the section 303(d) list if any of the following conditions are met.

4.1 Numeric Water Quality Objectives, Criteria, or Standards for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are ~~not~~ exceeded fewer than two times in a three-year period. The minimum sample size is 22, and none of the samples used to support the original listing decision may be used to support the delisting decision. ~~as follows:~~

~~Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.1.~~

4.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water

Numeric water quality objectives for conventional pollutants are ~~not~~ exceeded in fewer than 10 percent of the samples. The minimum sample size is 22, and none of the samples used to support the original listing decision may be used to support the delisting decision. ~~as follows:~~

- ~~Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.2.~~

4.3 Numeric Water Quality Objectives for Bacteria in Water

Numeric water quality objectives or standards for bacteria are not exceeded as described in section 4.2. If a site-specific exceedance frequency was used to place the water on the section 303(d) list, then the same exceedance frequency shall be used in the assessment to remove waters from the section 303(d) list. ~~using the binomial distribution as described in section 4.2. If a site-specific exceedance frequency was used to place the water on the section 303(d) list, then the same exceedance frequency shall be used in the assessment to remove waters from the section 303(d) list.~~ To the extent possible and allowed by water quality objectives, RWQCBs shall identify one or more reference beaches or water segments in a relatively unimpacted watershed to compare the measurements.

4.4 Health Advisories

The health advisory used to list the water segment has been removed or the chemical or biological contaminant-specific evaluation guideline for tissue is no longer exceeded.

4.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

Numeric pollutant-specific evaluation guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.6 Water/Sediment Toxicity

Water/Sediment Toxicity or associated water or sediment quality guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.7 Nuisance

The water segment no longer satisfies the conditions for a nuisance listing or associated numerical water or sediment data meets any one of the following:

4.7.1 Nutrient-related

For excessive algae growth, unnatural foam, odor, taste, applicable numerical nutrient-related evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.7.2 Other Types

Acceptable numerical evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in sections 4.1 and 4.2 for color, oil sheen, turbidity, trash, taste, or odor not related to nutrients. These types of nuisance shall also be removed from the list when there is no significant nuisance condition when compared to reference conditions.

4.8 Adverse Biological Response

Adverse biological response is no longer evident or associated water or sediment numeric pollutant-specific evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.9 Degradation of Biological Populations and Communities

Water quality standards are attained and b~~B~~iological populations and community~~ies~~ degradation in the water segment is no longer evident as compared to reference site(s), or associated water or sediment numeric pollutant-specific evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.10 Trends in Water Quality

The factors for assessing trends in water quality (section 3.1.10) are not substantiated (steps 1 through 5~~4) or impacts are no longer observed (step 5)~~.

4.11 Situation-Specific Weight of Evidence Delisting Factor

When all other Delisting Factors do not result in the delisting of a water segment but information indicates attainment of standards, a water segment shall be removed from the section 303(d) list if the substantial weight of evidence collected over a consecutive three-year period demonstrates that ~~a~~ water quality standards are ~~is~~ attained in the water segment.

When recommending delisting based on the situation-specific weight of evidence, the RWQCB must justify its recommendation by:

- Providing any data or information supporting the delisting;
- Describing in fact sheets how the data or information affords a substantial basis in fact from which the justification for delisting can be reasonably inferred;
- Demonstrating that the substantial weight of evidence of the data and information indicates that the water quality standard is attained; and
- Demonstrating that the approach used is scientifically defensible and reproducible.

~~And shall otherwise meet the standards set forth in Chapter 4 (above).~~

Table 4.1: Maximum Number of Measured Exceedances Allowed to Remove a Water Segment from the 303(d) List for Conventional and Other Pollutants Such That Fewer than 10 Percent of Samples Exceed Water Quality Objectives With at Least 95% Confidence and Power.

Sample Size	Remove from 303(d) list if no more than this number of exceedances
22-28	0
29-45	1
46-60	2
61-75	3
76-88	4
89-100	5

TABLE 4.1: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR TOXICANTS.

Null Hypothesis: Actual exceedance proportion ≥ 20 percent.
Alternate Hypothesis: Actual proportion < 5 percent of the samples
The minimum effect size is 15 percent.

Sample Size	Delist if the number of exceedances equal or is less than
21 – 28	2
29 – 37	3
38 – 46	4
47 – 55	5
56 – 64	6
65 – 73	7
74 – 82	8
83 – 91	9
92 – 100	10
101 – 109	11
110 – 118	12
119 – 127	13

For sample sizes greater than 127, the maximum number of measured exceedances allowed is established where α and $\beta \leq 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.20, TRUE)
β = Excel® Function BINOMDIST(n-k-1, n, 1 – 0.05, TRUE)
where n = the number of samples,
k = maximum number of measured exceedances allowed,
0.05 = acceptable exceedance proportion, and
0.20 = unacceptable exceedance proportion.

TABLE 4.2: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

Null Hypothesis: Actual exceedance proportion ≥ 25 percent.
Alternate Hypothesis: Actual exceedance proportion < 10 percent.
The minimum effect size is 15 percent.

Sample Size	Delist if the number of exceedances equal or is less than
26—30	4
31—36	5
37—42	6
43—48	7
49—54	8
55—60	9
61—66	10
67—72	11
73—78	12
79—84	13
85—91	14
92—97	15
98—103	16
104—109	17
110—115	18
116—121	19

For sample sizes greater than 121, the maximum number of exceedances allowed is established at α and $\beta \leq 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.25, TRUE)
β = Excel® Function BINOMDIST(n-k-1, n, 1—0.1, TRUE)
where n = the number of samples,
k = maximum number of measured exceedances allowed,
0.10 = acceptable exceedance proportion, and
0.25 = unacceptable exceedance proportion.

5 TMDL Scheduling

A schedule shall be established by the RWQCBs and SWRCB for waters on the section 303(d) list that identifies the TMDLs that will be established within the current listing cycle and the number of TMDLs scheduled to be developed thereafter.

For water quality limited segments needing a TMDL, RWQCBs shall develop a completion schedule in compliance with federal law and regulation based on, but not limited to, the following criteria:

- Water body significance (such as importance and extent of beneficial uses, threatened and endangered species concerns, and size of water body);
- Degree that water quality objectives are not met or beneficial uses are not attained or threatened (such as the severity of the pollution or number of pollutants/stressors of concern) [40 CFR 130.7(b)(4)];
- Degree of impairment;
- Potential threat to human health and the environment;
- Water quality benefits of activities ongoing in the watershed;
- Potential for beneficial use protection and recovery;
- Degree of public concern;
- Availability of funding; and
- Availability of data and information to address the water quality problem.

All water body-pollutant combinations on the section 303(d) list shall be assigned a TMDL schedule date. In no circumstances shall the schedule for TMDL adoption exceed 13 years from the date of listing.

6 Policy Implementation

This section provides SWRCB guidance on implementation of this Policy. The most recently completed section 303(d) list shall form the basis for any subsequent lists.

6.1 Process for Evaluation of Readily Available Data and Information

- All readily available data and information shall be evaluated. To develop the section 303(d) list the RWQCBs and SWRCB shall use the following process.

6.1.1 Definition of Readily Available Data and Information

RWQCBs and SWRCB shall actively solicit, assemble, and consider all readily available data and information. Data and information that shall be reviewed include, but are not limited to: submittals resulting from the solicitation, selected data possessed by the RWQCBs, and other sources. At a minimum, readily available data and information includes paper and electronic copies of:

- The most recent section 303(d) list, and the most recent section 305(b) report;
- Drinking water source assessments;
- Municipal Separate Storm Sewer System (MS4) reports;
- Information on water quality problems in documents prepared to satisfy Superfund and Resource Conservation and Recovery Act requirements;
- Fish and shellfish advisories, beach postings and closures, or other water quality-based restrictions;
- Reports of fish kills, cancers, lesions or tumors;
- Dilution calculations, trend analyses, or predictive models for assessing the physical, chemical, or biological condition of streams, rivers, lakes, reservoirs, estuaries, coastal lagoons, or the ocean;
- Applicable water quality data and information from SWAMP, USEPA's Storage and Retrieval Database Access (STORET) or other USEPA databases and information sources, the Bay-Delta Tributaries Database, Southern California Coastal Water Research Project, and the San Francisco Estuary Regional Monitoring Program; and
- Water quality problems and existing and readily available water quality data and information reported by local, state and federal agencies (including receiving water monitoring data from discharger monitoring reports), citizen monitoring groups, academic institutions, and the public. The Federal agencies that shall be actively solicited for data and information include but are not limited to: U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, U.S. Geological Survey, and U.S. Fish and Wildlife Service.

6.1.2 Administration of the Listing Process

6.1.2.1 Solicitation of All Readily Available Data and Information

SWRCB and RWQCBs shall seek all readily available data and information on the quality of surface waters of the State. Readily available data and information shall be solicited from any interested party, including but not limited to, private citizens, public agencies, state and federal

governmental agencies, non-profit organizations, and businesses possessing data and information regarding the quality of the Region's waters.

Though the SWRCB and RWQCBs must specifically solicit all readily available data and assessment information, SWRCB and RWQCB may place emphasis in the solicitation on the data and information generated since the last listing cycle. For the purposes of this solicitation, information means any documentation, or citation to such documentation, describing the water quality condition of a surface water body. Data are considered a subset of information that consists of reports detailing measurements of specific environmental characteristics. The data and information may pertain to physical, chemical, and/or biological conditions of the State's waters or watersheds. Each RWQCB and the SWRCB shall document its methods and sources for soliciting existing and readily available data and information.

The solicitation letter may request that ~~I~~information solicited ~~should~~ contain the following:

- The name of the person or organization providing the information or citation to information;
- The name of the person certifying the completeness and accuracy of the data and information and a statement describing the standards exceedance;
- Mailing address, telephone numbers, and email address of a contact person for the information provided;
- A copy of all information provided, or a complete citation to a data source in which the information can be found. The submittal must specify the software used to format the information and provide definitions for any codes or abbreviations used;
- Bibliographic citations for all information provided; and
- If computer model outputs are included in the information, provide bibliographic citations and specify any calibration and quality assurance information available for the model(s) used.

The solicitation letter may request that ~~D~~data solicited ~~should~~ contain the following:

- Data in electronic form, spreadsheet, database, or ASCII formats. If possible, t~~T~~he submittal should use the SWAMP data format and should define any codes or abbreviations used in the database.
- Metadata for the ~~field~~ data, i.e., when measurements were taken, locations, number of samples, detection limits, and other relevant factors.
- Metadata for any Geographical Information System data must be included. The metadata must detail all the parameters of the projection, including datum.
- A copy of the quality assurance procedures.
- A copy of the data.
- Data from citizen volunteer water quality monitoring efforts require the name of the group and indication of any training in water quality assessment completed by members of the group. Data submitted by citizen monitoring groups should meet the data quality assurance procedures as detailed in section 6.1.4.
- For photographic documentation, adhere to the guidelines detailed in section 6.1.4.

Data and information previously submitted to RWQCBs, such as Discharge Monitoring Reports, need not be solicited if the data and information ~~are~~ remain available to RWQCBs.

6.1.2.2 RWQCB Fact Sheet Preparation

When data and information are available, each RWQCB shall prepare a standardized fact sheet for each water and pollutant combination that is proposed for inclusion in or deletion from the section 303(d) list. Fact sheets shall present a description of the line(s) of evidence used to support each component of the weight of evidence approach. Fact sheets shall be prepared for all data and information solicited. If the data and information reviewed indicate standards are attained, a single fact sheet may address multiple water and pollutant combinations.

The fact sheets shall contain the following:

A. Region
B. Type of water body (Bay and Harbors, Coastal Shoreline, Estuary, Lake/Reservoir, Ocean, Rivers/Stream, Saline Lake, Tidal Wetlands, Freshwater Wetland)
C. Name of water body segment (including Calwater watershed containing the downstream extent of the segment)
D. If available, the ~~P~~pollutant or type of pollution that appears to be responsible for standards exceedance
E. Medium (water, sediment, tissue, habitat, etc.)
F. Water quality standards (copy applicable water quality standard, objective, or criterion from appropriate plan or regulation) including:
    1. Beneficial use affected
    2. Numeric water quality objective/water quality criteria plus metric (single value threshold, mean, median, etc.) or narrative water quality objective plus guideline(s) used to interpret attainment or non-attainment
    3. Antidegradation considerations (if applicable to situation)
    4. Any other provision of the standard used
G. Brief Watershed Description (e.g., land use, precipitation patterns, or other factors considered in the assessment)
H. Summary of data and/or information
    1. Spatial representation, area that beneficial use is affected or determined to be supported, including a map, any site specific information, and reference condition
    2. Temporal representation
    3. Age of data and/or information
    4. Effect of seasonality and events/conditions that might influence data and/or information evaluation (e.g., storms, flow conditions, laboratory data qualifiers, etc.)
    5. Number of samples or observations
    6. Number of samples or observations exceeding guideline or standard
    7. Source of or reference for data and/or information
I. For numeric data include:
    1. Quality assurance assessment
J. For non-numeric data include:
    1. Types of observations
    2. Perspective on magnitude of problem

3. Numeric indices derived from qualitative data

K. Potential source of pollutant (the source category should be identified as specifically as possible)

L. Details of the p~~P~~rogram(s) addressing the problem, if applicable~~known~~

M. Data evaluation as required by sections 3 or 4 of this Policy

N. Recommendation

O. TMDL schedule (developed only for the section 303(d) list as required by section 5 of this Policy).

6.1.3 Evaluation Guideline Selection Process

Narrative water quality objectives shall be evaluated using interpretive evaluation guidelines. When evaluating narrative water quality objectives or beneficial use protection, RWQCBs and SWRCB shall identify evaluation guidelines that represent standards attainment or beneficial use protection. The guidelines are not water quality objectives and shall only be used for the purpose of developing the section 303(d) list. If appropriate evaluation guidelines cannot be identified or if evaluation guidelines do not result in listing in waters where some data indicate impairment, other data or information may be used per section 3.1.11.

To select an evaluation guideline, the RWQCB or SWRCB shall:

- Identify the water body and ~~,~~ pollutants~~,~~ or pollution that appear responsible for the impairment or projected impairment, and beneficial uses;
- Identify the narrative water quality objectives or applicable water quality criteria;
- Identify the appropriate interpretive evaluation guideline that potentially represents water quality objective attainment or protection of beneficial uses. If this Policy requires evaluation values to be used as one line of evidence, the evaluation value selected shall be used in concert with the other required line(s) of evidence to support the listing or delisting decision. Depending on the beneficial use and narrative standard, the following considerations shall be used in the selection of evaluation guidelines:

  Sediment Quality Guidelines for Marine, Estuarine, and Freshwater Sediments: RWQCBs may select sediment quality guidelines that have been published in the peer-reviewed literature or by state or federal agencies. Acceptable guidelines include selected values (e.g., effects range-median, probable effects level, probable effects concentration), and other sediment quality guidelines. ~~Only those sediment guidelines that are predictive of sediment toxicity shall be used (i.e., those guidelines that have been shown in published studies to be predictive of sediment toxicity in 50 percent or more of the samples analyzed).~~ RWQCBs may select sediment guidelines that are predictive of sediment toxicity (i.e., those guidelines that have been shown in published studies to be predictive of sediment toxicity in 50 percent or more of the samples analyzed). RWQCBs may select sediment guidelines that are predictive of potential impacts due to bio-accumulation.

Evaluation Guidelines for Protection from the Consumption of Fish and Shellfish: RWQCBs may select evaluation guidelines published by USEPA or OEHHA. Maximum Tissue Residue

Levels (MTRLs) and Elevated Data Levels (EDLs) shall not be used to evaluate fish or shellfish tissue data. In the event that guidelines have not been published by USEPA or OEHHA, RWQCBs may utilize evaluation levels based on chemical effects and properties. Evaluation Guidelines for Protection of Aquatic Life from Bioaccumulation of Toxic Substances: RWQCBs may select the evaluation values for the protection of aquatic life published by the National Academy of Science and other reputable sources. In the event that guidelines have not been published by USEPA or OEHHA, RWQCBs may utilize evaluation levels based on chemical effects and properties.

For other parameters, evaluation guidelines may be used if it can be demonstrated that the evaluation guideline is:

- Applicable to the beneficial use
- Protective of the beneficial use
- Linked to the pollutant or pollution under consideration
- Scientifically-based and peer reviewed
- Well described
- ~~Identifies a range above which impacts occur and below which no or few impacts are predicted. For non-threshold chemicals, risk levels shall be consistent with comparable water quality objectives or water quality criteria.~~

RWQCBs shall assess the appropriateness of the guideline in the hydrographic unit. Justification for the alternate evaluation guidelines shall be referenced in the water body fact sheet.

6.1.4 Data Quality Assessment Process

Even though all data and information must be used, the quality of the data used in the development of the section 303(d) list shall be of sufficient high quality to make determinations of water quality standards attainment. Data supported by a Quality Assurance Project Plan (QAPP) pursuant to the requirements of 40 CFR 31.45 are acceptable for use in developing the section 303(d) list.

The data from major monitoring programs in California and published U.S. Geological Survey (USGS) reports are considered of adequate quality. The major programs include SWAMP, the Southern California Bight Projects of the Southern California Coastal Water Research Project, USEPA's Environmental Monitoring and Assessment Program and other EPA monitoring programs, the Regional Monitoring Program of the San Francisco Estuary Institute, and the BPTCP.

Numeric data are considered credible and relevant for listing purposes if the data set submitted meets the minimum quality assurance/quality control requirements outlined below. A QAPP or equivalent documentation must be available containing, at a minimum, the following elements:

- Objectives of the study, project, or monitoring program;
- Methods used for sample collection and handling;
- Field and laboratory measurement and analysis;

- Data management, validation, and recordkeeping (including proper chain of custody) procedures;
- Quality assurance and quality control requirements;
- A statement certifying the adequacy of the QAPP (plus name of person certifying the document); and
- A description of personnel training.

A site-specific or project-specific sampling and analysis plan for numeric data should also be available containing:

- Data quality objectives or requirements of the project;
- A statement that data quality objectives or requirements were achieved;
- Rationale for the selection of sampling sites, water quality parameters, sampling frequency and methods that assure the samples are spatially and temporally representative of the surface water and representative of conditions within the targeted sampling timeframe; and
- Documentation to support the conclusion that results are reproducible.

The RWQCBs shall make a finding in the fact sheets on the availability of the QAPP (or equivalent), adequacy of data collection, analysis practices, and adequacy of the data verification process (including the chain of custody, detection limits, holding times, statistical treatment of data, precision and bias, etc). If any data quality objectives or requirements in the QAPP are not met, the reason for not meeting them and the potential impact on the overall assessment shall be documented.

Data without rigorous quality control can be used in combination with high quality data and information. If the data collection and analysis is not supported by a QAPP (or equivalent) or if it is not possible to tell if the data collection and analysis were supported by a QAPP (or equivalent), then the data and information should not be used by itself to support listing or delisting of a water segment unless justified by the situation-specific weight of evidence listing factor (section 3.1.11 or 4.11). . All data of whatever quality can be used as part of a weight of evidence determination (sections 3.1.11 or 4.11).

For narrative and qualitative submittals, the submission should, to the extent data and information are available~~must~~:

- describe existing or projected events or conditions that indicate impacts on water quality;
- provide linkage between the measurement endpoint (e.g., a study that may have been performed for some other purpose) and the water quality standard of interest;
- be scientifically defensible;
- provide analyst's credentials and training; and
- be verifiable by SWRCB or RWQCB.

For photographic documentation, the submission should: ~~must:~~

- identify the date;

- identify location on a general area map;
- either mark location on a USGS 7.5 minute quad map along with quad sheet name or provide location latitude/longitude;
- provide a thorough description of photograph(s);
- describe the spatial and temporal representation of the photographs;
- provide linkage between photograph-represented condition and condition that indicates impacts on water quality;
- provide photographer's rationale for area photographed and camera settings used; and
- be verifiable by SWRCB and RWQCB.

6.1.5 Data Quantity Assessment Process

Before determining if water quality standards are exceeded or are projected to be exceeded before the next listing cycle, RWQCBs have wide discretion establishing how data and information are to be evaluated, including the flexibility to establish water segmentation, as well as the scale of spatial and temporal data and information that are to be reviewed. The following considerations shall be documented in each water body fact sheet.

6.1.5.1 Water Body Specific Information

Data used to assess water quality standards attainment should be actual data that can be quantified and qualified. Information that is descriptive, estimated, modeled, or projected shall be considered~~may be used as ancillary lines of evidence for listing or delisting decisions~~. In order to be used in developing the lists:

- Data must be measured at one or more sites in the water segment;
- If applicable and available, environmental conditions in a water body or at a site must be taken into consideration (e.g., effects of seasonality, events such as storms, the occurrence of wildfires, land use practices, etc.); and
- The fact sheet shall contain a description of readily available pertinent factors such as the depth of water quality measurements, flow, hardness, pH, the extent of tidal influence, and other relevant sample- and water body-specific factors.

6.1.5.2 Spatial Representation

Samples should be representative of the water body segment. To the extent possible, samples should represent statistically or in a consistent targeted manner the segment of the water body.

Samples should be spatially independent. Factors that affect spatial independence, such as proximity to sources, should be considered. ~~Samples collected within 200 meters of each other should be considered samples from the same station or location. However, s~~Samples less than 200 meters apart may be considered to be spatially independent samples if justified in the water body fact sheet.

6.1.5.3 Temporal Representation

Samples should be representative of the critical timing that the pollutant or pollution is expected to impact the water body. Samples used in the assessment must be temporally independent. ~~If the majority of samples were collected on a single day or during a single short-term natural event~~

~~(e.g., a storm, flood, or wildfire), the data shall not be used as the primary data set supporting the listing decision.~~

Documentation should include the time of day in which the sample was taken, and, to the extent possible, the critical season for the pollutant and applicable water quality standard. In general, samples should be available from two or more seasons or from two or more events when effects or water quality objective exceedances would be expected to be clearly manifested.

Sampling ephemeral waters, during a specific season, or during human-caused events (except spills) should be used to assess significant pollutant-related exceedances of water quality standards. Timing of the sampling should include the critical season for the pollutant and applicable water quality standard. If the implementation of a management practice(s) has resulted in a demonstrably statistically significant change in the water body segment, ~~only~~ recently collected data [since the implementation of the management measure(s)] should be given higher priority for consideration~~ed~~. The water quality fact sheet should describe the significance of the sample timing.

6.1.5.4 Aggregation of Data by Reach/Area

At a minimum, data shall be aggregated by the water body segments as defined in the Basin Plans. In the absence of a Basin Plan segmentation system, the RWQCBs should -define distinct reaches based on hydrology~~ and relatively homogeneous land use~~.

If available data suggest that a pollutant may cause an excursion above a water quality objective, the RWQCB should, to the extent information is readily available, -identify land uses, subwatersheds, tributaries, or dischargers that could be contributing the pollutant to the water body. The RWQCBs should identify stream reaches or lake/estuary areas that may have different pollutant levels based on significant differences in land use, tributary inflow, or discharge input. Based on these evaluations of the water body setting, RWQCBs should aggregate the data by appropriate reach or area.

Data must be measured at one or more sites in the water segment in order to place a water segment on the section 303(d) list.

6.1.5.5 Quantitation of Chemical Concentrations

When available data are less than or equal to the quantitation limit and the quantitation limit is less than or equal to the water quality standard, the value will be considered as meeting the water quality standard, objective, criterion, or evaluation guideline.

When the sample value is less than the quantitation limit and the quantitation limit is greater than the water quality standard, objective, criterion, or evaluation guideline, further data should be collected to ensure an accurate listing decision~~the result shall not be used in the analysis~~.

The quantitation limit includes the minimum level, practical quantitation level, or reporting limit.

6.1.5.6 Evaluation of Data Consistent with the Expression of Numeric Water Quality Objectives, Water Quality Criteria, or Evaluation Guidelines

If the water quality objectives, criteria, or guidelines state a specific averaging period and/or mathematical transformation, the data should be evaluated in a consistent manner prior to conducting any statistical analysis for placement of the water on the section 303(d) list. If sufficient data are not available for the stated averaging period, the available data shall be used to represent the averaging period.

To be considered temporally independent, samples collected during the averaging period shall be combined and considered one sampling event. For data that is not temporally independent (e.g., when multiple samples are collected at a single location on the same day), the measurements shall be combined and represented by a single resultant value. For dissolved oxygen measurements, the minimum value shall be used to determine compliance with the water quality objective. For pH measurements, the minimum or maximum values of the data set shall be used to determine compliance with the water quality objective.

If the averaging period is not stated for the standard, objective, criterion, or evaluation guideline, then the samples ~~collected less than 7 days apart~~ shall be considered independently ~~averaged~~.

6.1.5.7 ~~Binomial Model Statistical~~Numerical Evaluation

Once data have been summarized, RWQCBs shall determine if standards are exceeded. The RWQCBs shall determine for each averaging period which data points exceed water quality standards. The number of measurements that exceed standards shall be reported in the water body fact sheet.

When numerical data are evaluated, all of the following steps shall be completed:

A. For each data point representing the averaging period, the RWQCB shall answer the question: Are water quality standards met?

B. If the measurement is greater than the water quality standard, objective, criterion, or evaluation guideline, then the standard is exceeded.

C. Sum the number of samples exceeding the standard, objective, criterion, or evaluation guideline.

D. Sum the total number of measurements (sample population).

E. Compare the result to the appropriate table (i.e., Tables 3.1, 3.2, ~~4.1,~~ or 4.12).

F. Report the result of this comparison in the water body fact sheet.

6.1.5.8 Evaluation of Bioassessment Data

When evaluating biological data and information, RWQCBs shall evaluate all readily available data and information and shall:

- Identify appropriate reference sites within water segments, watersheds, or ecoregions. Document methods for selection of reference sites.
- Evaluate bioassessment data at reference sites using water segment-appropriate method(s) and index period(s). Document sampling methods, index periods, and Quality Assurance/Quality Control procedures for the habitat being sampled and question(s) being asked.
- Evaluate bioassessment data from other sites, and compare to reference conditions. Evaluate physical habitat data and other water quality data, when available, to support conclusions about the status of the water segment.
- Calculate biological metrics for reference sites and develop Index of Biological Integrity if possible.

6.1.5.9 Evaluation of Temperature Data

Temperature water quality objectives shall be evaluated as described in sections 6.1.5.1 through 6.1.5.7. When "historic" or "natural" temperature data are not available, alternative approaches shall be employed to assess temperature impacts.

In the absence of necessary data to interpret numeric water quality objectives, recent temperature monitoring data shall be compared to the temperature requirements of aquatic life in the water segment. In many cases, fisheries, particularly salmonids, represent the beneficial uses most sensitive to temperature. Information on current and historic conditions and distribution of sensitive beneficial uses (e.g., fishery resources) in the water segment is necessary, as well as recent temperature data reflective of conditions experienced by the most sensitive life stage of the aquatic life species. If temperature data from past (historic) periods corresponding to times when the beneficial use was fully supported are not available, information about presence/absence or abundance of sensitive aquatic life species shall be used to infer past (historic) temperature conditions if loss of habitat, diversions, toxic spills, and other factors are also considered.

Determination of life stage temperature requirements of sensitive aquatic life species shall be based on peer-reviewed literature. Similarly, evaluation of temperature data shall be based on temperature metrics reflective of the temperature requirements for the sensitive aquatic life species, including but not limited to, the maximum weekly average temperature and upper lethal limit.

6.2 RWQCB Approval

At a public hearing, the RWQCB shall consider and approve each proposed list change as documented in water body fact sheet. Advance notice and opportunity for public comment shall be provided. RWQCB shall develop written responses to all comments. After consideration of all

testimony, RWQCBs shall approve a resolution in support of their recommendations for the section 303(d) list. RWQCBs shall submit to SWRCB the water body fact sheets, responses to comments, documentation of the hearing process, and a copy of all data and information considered. For the 2004 section 303(d) list, RWQCB approval of list changes is not required.

6.3 SWRCB Approval

During the development of the 2004 section 303(d) list, SWRCB shall perform all tasks required by this Policy.

Subsequent to the 2004 listing cycle, SWRCB shall evaluate RWQCB-developed water body fact sheets for completeness, consistency with this Policy, and consistency with applicable law. The SWRCB shall assemble the fact sheets and consolidate all the RWQCB lists into the statewide section 303(d) list.

Before the adoption of the section 303(d) list, the SWRCB shall hold a public workshop. Advance notice and opportunity for public comment shall be provided. Comments shall be limited to the issues raised before the RWQCBs. Requests for review of specific listing decisions must be submitted to the SWRCB within 30 days of the RWQCB's decision. The SWRCB shall consider changes only to waters that are requested for review unless the SWRCB, on its own motion, decides to consider recommendations on other waters. The SWRCB shall give substantial deference to the RWQCB on decisions made under the Weight of Evidence approach described in Section 3.1.11. Subsequent to the workshop, the SWRCB shall approve the section 303(d) list at a Board Meeting. The approved section 303(d) list and the supporting fact sheets shall be submitted to USEPA for approval as required by the Clean Water Act.

7 Definitions

α (Alpha) is the statistical error of rejecting a null hypothesis that is true. This type of error is also called Type I error.

ALTERNATE HYPOTHESIS is a statement or claim that a statistical test is set up to establish.

β (Beta) is the statistical error of failing to reject a null hypothesis that is not true. This type of error is also called Type II error.

BINOMDIST is an Excel® function that is used to calculate the cumulative binomial distribution.

BINOMIAL DISTRIBUTION is a mathematical distribution that describes the probabilities associated with the possible number of times particular outcomes will occur in series of observations (i.e., samples). Each observation may have only one of two possible results (e.g., standard exceeded or standard not exceeded).

BIOACCUMULATION is the process by which a chemical is taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

BIOASSESSMENT is an assessment of biological community information along with measures of the physical/habitat quality to determine, in the case of water quality, the integrity of a water body of interest.

CONVENTIONAL POLLUTANTS include dissolved oxygen, pH, and temperature.

DIEL measurements pertain to measurements taken over a 24-hour period of time.

EFFECT SIZE is maximum magnitude of exceedance frequency that is tolerated.

NULL HYPOTHESIS is a statement used in statistical testing that has been put forward either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved.

RANK CORRELATION is the association between paired values of two variables that have been replaced by their ranks within their respective samples (e.g., chemical measurements and response in a toxicity test).

REFERENCE CONDITION refers to the characteristics of water body segments least impaired by human activities. As such, reference conditions can be used to describe attainable biological or habitat conditions for water body segments with common watershed/catchment characteristics within defined geographical regions.

STATISTICAL SIGNIFICANCE occurs when it can be demonstrated that the probability of obtaining a difference by chance only is relatively low.

TOXICANTS include priority pollutants, metals, chlorine, and nutrients.

TOXICITY IDENTIFICATION EVALUATION (TIE) is a technique to identify the unexplained cause(s) of toxic events. TIE involves selectively removing classes of chemicals through a series of sample manipulations, effectively reducing complex mixtures of chemicals in natural waters to simple components for analysis. Following each manipulation the toxicity of the sample is assessed to see whether the toxicant class removed was responsible for the toxicity.

WATER QUALITY LIMITED SEGMENT is any segment of a water body where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after application of technology-based effluent limitations required by CWA sections 301(d) or 306.

Environmental Caucus of the AB 982 Public Advisory Group

Comments on SWRCB, "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" 2/18/04

Caucus Members:[1]

The Bay Foundation of Morro Bay
Butte Environmental Council
Clean Water Action
Coast Action Network
Defend the Bay
Deltakeeper
Environment California
Friends of Butte Creek
Heal the Bay
Natural Resources Defense Council
The Ocean Conservancy
Pacific Coast Federation of Fishermen's Associations
San Diego Baykeeper
San Francisco Baykeeper
Surfrider Foundation
Urban Creeks Council of California
Waterkeepers Northern California

[1] These comments are on behalf of the Caucus generally and on behalf of each listed group individually. The comments have been prepared by these organizations and by consultants to these organizations.

Table of Contents

I. EXECUTIVE SUMMARY

The draft "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" ("Draft Policy" or the "Policy") is a dangerously flawed document that requires significant changes to comport with sound technical, policy and legal rules and requirements. Prepared by a coalition of California's leading environmental organizations that collectively represent more than 200,000 Californians, the following comments detail these flaws. These comments reflect the work of more than half a dozen scientists, statisticians and other experts who collectively have decades of experience in water quality and statistics.

Taken as a whole, the comments show that the State Water Resources Control Board (SWRCB) is being asked essentially to leap blindly from a precipice, taking the State of California on an unwise and illegal excursion that violates common sense, basic state and federal legal prescriptions, and fundamental scientific principles. The Draft Policy is opposed by essentially every key, non-discharger stakeholder in California, including those to whom deference is expected: U.S. EPA and the Regional Water Quality Control Boards (Regional Boards), who will be expected to implement this flawed directive. We, EPA (whose comments we attach) and the Regional Boards have pointed out a wide array of fundamental flaws with the Draft Policy, including the following:

- Typifying its approach, the Draft Policy first and foremost conspicuously fails to include "water quality protection" as one of its goals.
- The Draft Policy ignores the Legislature's express requirement that it utilize a "weight of evidence" approach, instead illegally substituting a far higher bar that has the effect of not listing numerous impaired waters.
- The Draft Policy is up to almost nearly 400 times more likely to fail to identify an actually impaired water than to accidentally list a "clean" water, an embedded bias that is flatly inconsistent with the Clean Water Act's intention that Section 303(d) serve as the Act's "safety net."
- The Draft Policy will almost certainly degrade water quality in California by admittedly removing waters now identified as impaired from the Section 303(d) List and reclassifying them as "clean" through statistical gymnastics. Yet, the Policy has been prepared without Clean Water Act anti-degradation analysis and is, in fact, inconsistent with this basic CWA provision.
- The Draft Policy is a recidivist violator of various "black letter" legal principles, including:
    - the statutory and regulatory mandate to implement, not alter, water quality standards through the TMDL program;
    - the statutory mandate to list "threatened waters"'
    - the statutory mandate to list and develop TMDLs for all waters for which water quality standards will not be met, without regard to whether particular "pollutants" or "pollution" are at fault;
    - the regulatory mandate to consider all "readily available" information; and
    - the statutory mandate to complete TMDLs for all impaired waters, regardless of whether "enforceable programs" exist that relate to the impairment.

- The Draft Policy ignores state law, including CEQA, by failing to identify environmental impacts associated with its proposal to redefine impaired waters as

"clean" and deny these waters and those who use them the protective benefits of the TMDL program.

- The Draft Policy's binomial model is too restrictive to consider many common and legitimate referents of impairment, including spatial distribution, ocular and other semi-quantitative information, and relative degrees of WQS violations.
- The "alternative" listing method does not, as the Draft Policy promises, actually offer reasonable flexibility and professional judgment; instead, it offers the Regional Boards a straightjacket methodology that fails to backstop the flaws in the Policy's primary statistical approach.
- The Functional Equivalent Document and actual Draft Policy differ in a number of key respects, creating significant confusion over what the Board intends the "real" policy to be (and thus creating logistical implementation nightmares).
- The U.S. EPA and the Regional Boards oppose the Draft Policy, and EPA has informed California that the proposal virtually guarantees that EPA will reject numerous elements of California's Section 303(d) list. Hence, the Policy, if adopted, will create a "train wreck" scenario in which California will invest millions of dollars in a listing process with no chance that EPA will accept it. In this regard, the Policy would constitute a clear and present waste of fiscal resources.

In these ways and more, the Draft Policy requires a thorough revision in order to be consistent with state and federal law, including its implementing legislation at Water Code § 13191.3. Toward this end, environmental advocates have prepared precise suggestions that would result in an acceptable Policy. Key attributes of the suggested approach include the following:

- Modify the SWRCB's preferred statistical model approach, making baseline assumptions that are more consistent with the letter and intent of the Clean Water Act and emphasizing the statistical model's role as a filter only, to be supported by a meaningful weight of evidence approach as a backstop.
- Recognize explicitly that any binomial approach has clear limits that require that it be inapplicable to certain pollutants, such as biologics and toxics.
- Allow best professional judgment to be exercised to a greater degree in a defined weight of evidence approach by creating sufficiently broad but clear guidance for its use.
- Permit all existing and readily available data and information to be considered in listing decisions, with data validity and quality acting as a secondary consideration rather than as an exclusion.
- Clarify and improve key rules and procedures governing interpretation of narrative water quality standards, sediment toxicity, recreational uses, bacteria, nutrients, and other matters, to comply with both legal and technical requirements and fundamentals.

The Environmental Caucus, as well as EPA and the Regional Boards, have raised these concerns repeatedly to the Board since early last year. Unfortunately, virtually all of our major concerns remain unaddressed. We urge the Board to reject this flawed Policy and adopt instead the specific suggestions contained in these comments.

II. BACKGROUND

A. Law

1. *The TMDL Program is the Clean Water Act's Safety "Net"*

Stripped of technicalities, Section 303(d) represents the Clean Water Act's "safety net."[2] It is the bedrock component of the Clean Water Act, the requirement that all waters be restored so that they are safe for fishing and swimming, and meet all other water quality standards.[3] As U.S. EPA Assistant Administrator for Water Robert Perciasepe noted five years ago:

> Almost twenty-five years after the passage of the [Clean Water Act], the national water program is at a defining moment .... The [Total Maximum Daily Load (TMDL)] program is crucial to success because it brings rigor, accountability, and statutory authority to the process.[4]

TMDLs are "the maximum amount of pollutants a water body can receive daily without violating the state's water quality standard."[5] Specifically, Section 303(d) requires the states to identify, and U.S. EPA independently to review and assess, those waters within their boundaries for which existing technology-based pollution controls are not stringent enough to ensure that the water quality standards ("WQSs") applicable to such waters are achieved and maintained.[6] Because Congress made clear that TMDLs must be calculated not only for waters that do not meet water quality standard, but also those that are not expected to meet those standards, it is clear that "threatened" waters must also be listed.[7]

The resulting list is called the "303(d) list." For each water body and type of pollution listed on a 303(d) list, the state must calculate the total maximum daily load (or "TMDL") necessary to implement the applicable WQS.[8] In simple terms, then, each TMDL defines the maximum amount of a type of pollution (*e.g.*, oil or grease) that an individual water body can assimilate in a day without violating its WQSs (*i.e.*, without becoming "dirty"). Once a TMDL is calculated for a water body and pollutant, any allowable pollution is allocated among the various dischargers of that pollutant to the water body for which the TMDL has been established.[9]

2. *The Consequences for Listing Unimpaired Waters Are Insignificant*

Legal developments in California in recent years have essentially eliminated any negative consequence of a mistaken listing (*i.e.*, including a "clean" water on the 303(d) list). Prior to

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[2] Houck, Oliver A., *The Clean Water Act TMDL Program* 49 (Envtl. Law Inst. 1999).
[3] *See* 33 U.S.C. § 1313(d).
[4] New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs), Memorandum from Robert Perciasepe, Assistant Administrator for Water, U.S. EPA, to Regional Administrators and Regional Water Division Administrators, U.S. EPA (August 8, 1997).
[5] *Alaska Center for Environment v. Browner*, 20 F.3d 981, 983 (9th Cir. 1994).
[6] 33 U.S.C. § 1313(d)(1) and (2); *see also* 40 C.F.R. § 130.7(b)(1).
[7] *Id.*
[8] 33 U.S.C. § 1313(d)(1)(C).
[9] 40 C.F.R. §§ 130.2(g)-(i). The TMDLs must be set "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." 33 U.S.C.A. §1313(d)(1)(c).

2001, dischargers mentioned two concerns prominently: the presumption that listing equates to a permit finding of no assimilative capacity and the inclusion of alternative final effluent limits in permits based on the mere fact of a listing. However, the Board's order in Order WQ 2001 – 06 ("Tosco") addressed those implications.[10] As a result, given the undisputed fact that Section 303(d) functions as the last effective regulatory approach to remedying threatened or impaired waters, it is clear that the implications of not listing an actually impaired waterway are far more severe than those attendant to any improper listing of a non-impaired waterway.

3. The Listing Regulation Must Be Consistent with the Mandate of Section 303(d) and the Policy Choices Embodied Therein

Any regulation or policy, including this 303(d) Listing Policy, must be consistent with the mandate of its enabling statute, in this case, Section 303(d) of the Clean Water Act.[11] Importantly, "in reviewing an agency's statutory construction, [courts] must reject those constructions that are contrary to clear congressional intent or frustrate the policy that Congress sought to implement." *Brower v. Evans*, 257 F.3d 1058, 1065; *Bureau of Alcohol, Tobacco and Firearms* 464 U.S. at 97 (stating that courts must not "rubber-stamp . . . administrative decisions they deem inconsistent with a statutory mandate or that frustrate the congressional policy underlying the statute.")

The current draft of the Listing Policy is inconsistent with both the clear mandate of Section 303(d) and Congressional policy and intent underlying Section 303(d) in a number of ways. For example, as discussed further herein, the Listing Policy's binomial approach fails to accurately assess impaired water bodies. Thus, the listing policy's binomial approach is contrary to Section 303(d)'s clear mandate to identify waters in California where effluent limitations are not stringent enough to implement any water quality standards.[12] Additionally, the Listing Policy frustrates not only the letter of the law but broader Congressional policy and intent in enacting Section 303(d). For example, as is broadly accepted, Section 303(d) represents the Clean Water Act's "safety net."[13] It is the bedrock component of the Clean Water Act, enacted 30 years ago, that all waters be restored so that they are safe for swimming, and meet all other water quality standards.[14] Yet not only does the binomial model failure to assure that these standards are met in impaired waters, it also fails to account for "threatened" waters (waters not expected to meet water quality standards) as required by the text of Section 303(d) and implementing regulations.[15]

B. Facts

According to the SWRCB's 2002 303(d) list summary tables, 685 waters in the state are listed as "impaired," with 1883 water body/pollutant combinations represented. These waters represent a significant amount of the state's limited supply of water, but unfortunately because of limited monitoring dollars it is likely that they represent only a fraction of the waters that could

[10] In Tosco, the Board stated that it "agrees with Tosco, WSPA, and other petitioners, that a 303(d)-listing alone is not a sufficient basis on which to conclude that a water necessarily lacks assimilative capacity for an impairing pollutant. The listing itself is only suggestive; it is not determinative." (Tosco at 20.) The Board further stated that it "concludes that the alternative final limits findings [in a permit based on the fact of a water's inclusion on the 303(d) list] are inappropriate for several reasons." (Id. at 22.)

[11] *See Bureau of Alcohol, Tobacco and Firearms v. Federal Labor Relations Authority*, 464 U.S. 89, 97 (1983).

[12] *See Brower*, 257 F.3d at 1065.

[13] Houck, *supra* n. 1.

[14] *See* 33 U.S.C. §1313(d).

[15] *See Brower*, 257 F.3d at 1065.

be impaired. According to the state's 2002 305(b) report, for example, only 22% of the state's coastal shoreline miles, 34% of its lakes and reservoirs, and 15% of its rivers and streams are monitored; there is no information at all on the percentage of the state's other water bodies that are monitored. Given that we have found so many waters impaired with the limited information that we have, it seems to follow that we could expect a number of additional listings if an appropriate level of monitoring is performed in the state.

WATER BODY TYPE	TOTAL WATER BODIES LISTED	TOTAL ESTIMATED SIZE AFFECTED	UNIT
Bays and Harbors	43	456338	acres
Coastal Shorelines	97	119	miles
Estuaries	36	99857	acres
Lakes/ Reservoirs	68	255465	acres
Rivers/Streams	430	26545	miles
Saline Lakes	3	291761	acres
Wetlands, Tidal	4	66672	acres
Wetlands, Freshwater	4	73598	acres

The 2002 303(d) list tables indicate that approximately 800 TMDLs are left to be done on this list. However, according to the 2002 305(b) report, only 18 have been adopted by the SWRCB to date, and only nine completed TMDLs currently await adoption by the SWRCB, OAL or EPA. Clearly, the state must move forward far more expeditiously to address this problem. However, rather than support a strong effort to identify and clean up both impaired and threatened waters (thus avoiding future impairments), the Draft Policy appears to take the approach of pretending there is not a problem to begin with by making it artificially difficult to list impaired waters, and by avoiding threatened waters altogether.

III. THE STATE SHOULD TAKE A PRECAUTIONARY APPROACH TO LISTING AND DELISTING

The Precautionary Principle is embodied in Principle 15, adopted at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro:

> Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

In short, the Precautionary Principle is a sophisticated way of expressing euphemisms that have always guided our day-to-day lives: "err on the side of caution," "safety first!" and "an ounce of prevention is worth a pound of cure." It is the common sense logic of the Precautionary Principle that gives it its intuitive appeal, and makes opponents of the Precautionary Principle most uncomfortable. "For too long the 'common sense' appeal of the [Precautionary Principle] has gone unopposed," according to a memorandum written on behalf of the American Chemistry Council (formerly the Chemical Manufacturers Association) that proposes a campaign to stigmatize the principle.[16] It is no wonder that the Precautionary Principle makes some members of the regulated community nervous – its application would prevent reverse the burden of proof,

[16] Nichols-Dezenhall, Precautionary Principle Campaign Proposal (November 2003)

prohibiting potentially dangerous practices until it is demonstrated that environmental exposures resulting from these practices are not harmful. Such a demonstration would be difficult since the evidence shows that the rates of diseases linked to environmental exposures have risen dramatically in the past few decades.[17]

We can think of few policy decisions where it is more critical to employ the precautionary principal than those the Draft Policy is designed to facilitate: the listing of impaired water bodies. The Section 303(d) programs are our last line of defense in the protection of our waterways, applied only after other Clean Water Act provisions have failed.[18] As such, it is all the more important that these programs ensure that all impaired waterways are identified; the consequences of missing them include threats to human health and aquatic life, and if impaired water bodies are ignored by the 303(d) program, they are ignored altogether.

At bottom, the Precautionary Principle is about dealing with uncertainty. Uncertainty in science – as in life – is pervasive; the elimination of scientific uncertainty is impossible.[19] This is the very reason the Precautionary Principle came into being in both its technical and euphemistic forms; it expresses the "safe" way of handling this uncertainty. However, the Draft Policy is replete with provisions that favor tolerance of environmental risk. In an effort to reduce the potential for alleged and unsupported economic outlays, the Draft Policy takes an anti-precautionary approach, requiring the demonstration to a high level of certainty that harm is occurring before taking action. The Draft Policy, in essence, is using the lack of scientific certainty related to impairment as an excuse for inaction: exactly what the Precautionary Principle proscribes.

Scientific uncertainty has been used by polluters and regulators as a rationale for inaction for decades. These polluters and regulators take advantage of scientific uncertainty by interpreting a scientific "we don't know" as "the science says it's OK." Opponents of the Precautionary Principle claim that its supporters want to impose regulatory measures supported by nothing more than vague and baseless fears, regardless of whether there is evidence to support their fears.[20] In situations of scientific uncertainty of the kind found at the heart of most environmental, health and safety controversies, however, the anti-precautionary approach sets up perverse incentives. For example, the risk-creators are often best positioned with respect to both knowledge and resources to investigate the potential hazards of their actions. However, by permitting them to proceed unrestrained until harm has been proven, anti-precautionary policies approach creates disincentives for them to undertake such investigations.[21] These precise disincentives are evident in the Draft Policy's proposals. By adopting the position that a water body is clean until proven dirty, the Draft Policy creates disincentive for dischargers to contribute to additional, much-needed monitoring, because such monitoring might be used to build the case that the water segment is, in fact, impaired.

An important first step toward implementation of the Precautionary Principle is full disclosure: decision-making processes need to clearly identify and evaluate areas of uncertainty, and all unknown but potential risks should be clearly articulated. An unknown cost should not

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[17] Katie Silberman, The Precautionary Principle: Answers to Frequently Asked Questions, Center for Environmental Health (May 28, 2003).
[18] *See* 33 U.S.C. § 1313(d)(1)(A).
[19] NRC Report at 4.
[20] Center for Progressive Regulation, Perspectives Series: The Precautionary Principle, *available at* http://www.progressiveregulation.org/perspectives/precaution.cfm.
[21] *Id.*

automatically be assigned a value of zero merely because its extent or causalities are not yet completely understood. Policies should encourage an open and public debate about the various interests that could be impacted by the uncertainty and the tradeoffs between them. In the absence of this disclosure, the public is ill-equipped to evaluate its tolerance for the uncertainties inherent in environmental policy.

The Precautionary Principal precludes using uncertainty as the rationale for inaction. By contrast, the Draft Policy is the antithesis of a precautionary approach. It hides policy decisions behind the curtain of a statistical method that is designed to resolve uncertainty in only one way: if there is uncertainty, don't list. At every turn the Policy chooses to reduce the risk of taking an unnecessary action while increasing the risk of leaving a serious environmental problem unaddressed. Moreover, the Draft Policy does not result in a articulation of, and is incapable of balancing, the many uncertain but possible outcomes at stake in every single listing decision.

IV. THE STATE MUST LIST IMPAIRED AND THREATENED WATERS

The Clean Water Act Section 303(d)(1)(A) requires listing of those waters for which the effluent limitations in Sections 301(b)(1)(A) and (B) "are not stringent enough to implement any water quality standard applicable." Section 303(d)(1)(C) mandates that TMDLs "shall" be established for those waters. Nothing in these sections allows for listing and TMDL development criteria other than a consideration of whether water body at issue is impaired or threatened. However, contrary to this mandate, and even contrary to what we believe are impermissibly expansive federal interpretations of this legislative mandate, the Draft Policy allows for numerous impaired and threatened waters to avoid listing and TMDLs. These flaws are detailed below.

A. The State May Not Directly or Indirectly Use "Off-Ramp" Lists Such As the Enforceable Program List

Section 2 of the Draft Policy states that the Clean Water Act Section 303(d) list is comprised of the following categories: the Water Quality Limited Segments category, the TMDLs Completed Category, and the Enforceable Program category. We appreciate that most of the past attempts to create illegal "off-ramp lists" (such as the Monitoring List, Planning List[22] and Watch List) have not been pursued in the Draft Policy. We also appreciate the statement in Section 2 of the Draft Policy that listed waters should remain on the list until water quality standards are attained, a position that is consistent with the letter and intent of the Clean Water Act.

However, the Enforceable Program list still remains in effect an "off-ramp" list that must be integrated completely into the 303(d) list. Section 2 of the Draft Policy makes the Enforceable Programs list a subset of the 303(d) list. Normally, in light of Clean Water Act Section 303(d)(1)(C)'s mandate to prepare TMDLs for listed waters, this inclusion would be interpreted as an indication that the waters on that sublist would require development of a TMDL. However, the FED makes clear that the intent of the Draft Policy is to allow impaired waters on the vaguely defined and often unenforceable "Enforceable" Program list to specifically avoid TMDLs. In effect, then, these waters are not "listed" waters, a point that must be corrected.

[22] Section 6.2.5.5 references placement of water bodies on a "planning list." Since this is not referenced elsewhere in the Draft Policy of FED, we assume it is a typo and should be edited out.

The FED explains that the Draft Policy is "focus[ed] on the development of a narrowly defined section 303(d) list that includes only those waters that do not meet water quality standards and a TMDL is needed to resolve the pollutant problem."[23] It then applies this overall position to the Enforceable Program list, obliquely yet obviously stating that TMDLs, despite the logical conclusion that would be drawn from the Draft Policy, are not required for waters on that list. Specifically, the FED states that "[w]here control measures are unsuccessful or unreasonable delays . . . are experienced, waters should be moved to the portion of the section 303(d) list where TMDLs are required."[24] It follows from this statement that, until the undefined conditions are met, TMDLs are not required.

We strongly oppose the Board's proposal to create such an Enforceable Program list for several reasons. Most importantly, we believe that there is absolutely no basis under the Clean Water Act for failing to list any impaired water body, as that term is defined under section 303(d) of the Act, on the section 303(d) list and preparing a TMDL for that water bode. Moreover, as shown below, the proposed list will seriously undercut the state's TMDL program.

First, the proposed Enforceable Program list is inconsistent with the plain text of section 303(d) of the Clean Water Act. Section 303(d) expressly requires each State to identify waters within its boundaries for which "the effluent limitations required by section 301(b)(1)(A) and section 301(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters." 33 U.S.C. §1313(d)(1)(A). Thus, waters are to be listed, and TMDLs developed, whenever the effluent limits described in section 301(b)(1)(A) and (B) are insufficient to attain and maintain water quality standards. Importantly, sections 301(b)(1)(A) and (B) of the Act expressly relate only to effluent limits for point sources designed to meet the standards of best practicable control technology (technology-based standards) and specific POTW secondary treatment and pretreatment requirements. In general, when a statutory provision specifically includes certain items, it implies the exclusion of others. *See e.g., In re Cybernetic Svcs., Inc.*, 252 F.3d 1039 (9th Cir. 2001), *cert. denied*, 122 S.Ct. 1069 (2001). As such, only when certain baseline effluent limits, as discussed above, are stringent enough to implement all water quality standards in a particular waterway may the State Board fail to list that water.

In contravention of the clear dictates of the Act, staff have proposed to exclude impaired waters from the section 303(d) list for a variety of improper reasons, including the alleged availability of a remediation planning documents, unenforceable nonpoint pollution best management practices, storm water permits, and enforcement actions.

For instance, the Draft Policy is proposing that the exercise of enforcement prerogatives can constitute a basis not to list an impaired waterway.[25] This proposed "out" is beyond the scope of Section 303(d), as discussed above. Moreover, as further discussed below, given that the requirements of Section 301 of the Act are over 25 years old, it is far too late in the day to rely on enforcement to subvert the intent of Section 303(d).

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[23] FED at 43.

[24] *Id.* at 44.

[25] The State Board has even gone so far as to propose to place a water body on an Enforceable Program List where a discharger submits a letter to the State Board discussing its individual clean up efforts (*e.g.*, Chevron/Texaco for Castro Cove). This hardly qualifies as an enforcement program, and in any event, plainly unlawfully expands the scope of the express language of section 303(d), as discussed above.

Similarly, the Board has proposed to de-list or has refused to list several water segments for trash based on coverage by municipal storm water permits. Yet again, this exception exceeds the language of the Clean Water Act. First, the SWRCB has expressly taken the position that it would not include "strict" numeric effluent limits in Section 402 municipal storm water permits.[26] As such, no argument can be made that these (non-existent) limitations will suffice to control the trash problem. Second, to the extent that municipal storm water permits include non-numeric effluent limits for trash, it is clear that these permits have been ineffective in controlling the problem notwithstanding the fact that they were first issued in 1991, thirteen years ago. Hence, there is no evidence in the record to support the premise that permit conditions that limit trash are sufficient to avoid the clear mandate of Section 303(d).

More disturbingly, the Draft Policy proposes to place on an Enforceable Program list impaired waters for which no enforceable program exists! Specifically, the FED asserts that discharge controls on point sources must be "enforceable," but nonpoint sources can be listed merely if there is an "agency sponsored watershed plan or other [completely unspecified] programs that will obviate the need for a TMDL."[27] There is no parallel requirement that these be "enforceable."

None of these "justifications" for failing to list impaired waters can be squared with the statute. For this reason, the Board is not free—whatever its perspectives on how section 303(d) should operate—to graft an Enforceable Program list exception onto this part of the Clean Water Act.

Second, the language of Section 303(d), when read in the overall context of the Clean Water Act as well as Section 301, clearly indicates that Congress intended the TMDL program to coexist with other enforcement and clean up programs under the Act. There is no indication that Congress intended the operation of the Clean Water Act as a whole to disable any specific element of the Act. Yet, this would be the effect of the Enforceable Program list. Such an impact cannot be countenanced.[28]

Third, the proposed Enforceable Program list contravenes the U.S. Environmental Protection Agency's ("EPA") 2004 Integrated Water Quality Monitoring and Assessment Report Guidance ("2004 Integrated Guidance").[29] While the 2004 Integrated Guidance is also inconsistent with section 303(d) of the Clean Water Act, the State Board's proposal goes beyond even what is contemplated by the 2004 Guidance. Specifically, the 2004 Integrated Guidance describes an alternative category of waters for which other pollution control requirements are stringent enough to implement any applicable water quality standard.[30] On their face, the enforcement actions and clean up programs proposed by the State Board do not fall within the ambit of "other pollution control requirements." Further, the 2004 Integrated Guidance states that "these requirements must be specifically applicable to the particular water quality problem" and that "monitoring should be scheduled ... to verify that the water quality standard is attained

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[26] *See In the Matter of the Petitions of Building Industry Assoc. of San Diego County and Western States Petroleum Assoc.*, Water Quality Order 2001-15 (November 15, 2001).

[27] FED at 43.

[28] *See Owasso Indep. Sch. Distr. No. I-011 v. Falvo*, 534 U.S. 426 (2002) ("It is a fundamental canon of statutory construction that the words of a statute must be read in their context and with a view to their place in the overall statutory scheme").

[29] U.S. EPA, "Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act" (July 21, 2003) ("2004 Integrated Guidance").

[30] 2004 Integrated Guidance at 5.

as expected."[31] The Guidance also requires that the water quality standard must be expected to be attained within a short amount of time.[32] The FED instead expands this to allow the waters to remain without a TMDL unless there are "unreasonable delays" (again, undefined).[33]

Fourth, the legitimacy of an Enforceable Program list is severely undercut by the timing of this proposal. The requirements of Section 301 are over 25 years old, while many of the programs, permits, or enforcement options that would serve as bases to exclude waters from the Section 303(d) list are also years if not decades old. California's patent inability to resolve water quality problems over the years through the use of the very same options it now touts as definitive solutions underscores that these programs are not, in fact, necessarily "solutions" to the identified impairments. If they were, the waters at issue would be in attainment by now. Aside from the other legal problems discussed above, it is simply too late at this juncture to use the specter of Section 301(b)(1)(A) and (B) effluent limits enforcement, municipal storm water permits, or any other program, such as BPTCP, as a basis to end-run Section 303(d). This conclusion is also supported by the fact that impaired waters were required to be listed and TMDLs developed and implemented pursuant to Section 303(d) over 20 years ago.[34] California's own delay in establishing TMDLs cannot now open the door to the use of later-developed alternatives to further limit the operation of the already delayed TMDL program. Because the proposed Enforceable Program list ignores the Board's own experience with the "alternatives" to 303(d) listing and the temporal intent of Section 303(d), it is unlawful and unwise.

Lastly, in addition to all of the above, we are concerned that the proposed Enforceable Program list will create a circular feedback loop whereby numerous impaired waters will never be properly listed and subject to a TMDL that will ensure the water body will be restored. For instance, under the proposed program, the State Board may elect to place a water body on the Enforceable Program list due to the existence of an "alternative enforceable program" during any given listing cycle, with very little justification or assurance that water quality standards will be met. Then, at the next listing cycle, even if the water body is still impaired, the Board may again elect to place the water on the Enforceable Program list based on the same alternative program. This may continue indefinitely under the program as proposed by the Board. The result of such an indefinite feedback loop will be that numerous waters that are impaired will remain impaired. This is completely at odds with the intent of Section 303(d).

Accordingly, we urge the Board to eliminate the unimplementable and illegal Enforceable Program list.

B. The State Must List "Threatened" Waters

Despite our comments on this issue last year, the Draft Policy still contains no mention of the methodology for identifying and listing threatened waters. TMDL regulations at 40 C.F.R. § 130.7(c)(1)(ii) and § 130.2 state specifically that "TMDLs shall be established for all pollutants preventing or expected to prevent attainment of water quality standards." (Emphasis added.) U.S. EPA similarly states on page 8 of its 2004 Integrated Guidance that "[w]aters should be placed [on the 303(d) list] when it is determined . . . that a pollutant has caused, is suspected of causing, or is projected to cause an impairment or threat." (Emphasis added.)

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[31] *Id.*
[32] *Id.*
[33] FED at 44.
[34] *See e.g., Scott v. Hammond,* 741 F.2d 992 (1984).

EPA raised this issue with Board staff last June as follows:

> The proposed policy provides no clear provisions for assessing and listing threatened waters. Pursuant to the requirements of 40 CFR 130.7, as interpreted in out 1991 and 1997 guidance documents, EPA expects each state to describe how it will assess whether waters which currently attain standards will likely fall out of attainment during the next listing cycle. The proposed policy makes reference to the use of certain types of data for trend analysis purposes, but does not actually describe how or if such data analysis will be interpreted as threatened. We expect the listing policy to clearly show how the requirement to consider threatened waters was addressed.[35]

By contrast, the state's Draft Policy makes no mention of threatened waters. Instead, Section 2.1 of the Draft Policy limits listing to waters where "the water quality standard is not attained, the standards nonattainment is due to a pollutant or pollutants, and remediation of the standards attainment problem requires a TMDL." "Threatened" waters are conspicuously absent.

In the January 28th public workshop on the Draft Policy, the Board raised the question of whether reactivation of the rejected "Monitoring List" would address this concern. It would not. As noted in our past comments, the "Monitoring List" is another example of an off-ramp list that includes numerous waters, both impaired and threatened, that should be properly listed on the 303(d) list. For instance, in the Los Angeles Region alone, several clearly impaired waters were placed on the prior Monitoring List, including the Dominguez Channel for toxics and Calleguas Creek Watershed-Conejo Creek for unnatural foam and scum. So in other words, threatened waters are supposed to be listed; because the Monitoring List was designed to keep waters off the 303(d) list, it is patently inapplicable.

We ask that the Board follow EPA's direction and specifically address the listing of threatened waters.

C. The State Must List Waters Impaired by Natural Sources

Section 3.1 of the Draft Policy states that water segments for which standards exceedances reflect "natural background conditions" shall not be placed on the 303(d) list. This directly contradicts the 9th Circuit's recent rejection of the proposition that Section 303(d) only applied with respect to waters where effluent limits existed for a particular pollutant.[36] In doing so, the court emphasized that both the listing obligation and TMDL development obligation are triggered when water bodies do not attain water quality standards, regardless of the source of pollution.[37] It also contradicts the position of the National Research Council, which found that

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[35] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

[36] *Pronsolino v. Nastri*, 291 F.3d 1123, 1138 (9th Cir. 2002).

[37] *Id.* ("Water quality standards reflect a state's designated uses for a water body and do not depend in any way upon the source of pollution." *at* 1137; "Thus, 303(d) is structurally part of a set of provisions governing an interrelated goal-setting, information-gathering, and planning process that, unlike many other aspects of the CWA, applies without regard to the source of pollution." *at* 1138).

the TMDL program "should encompass all stressors . . . that determine the condition of the waterbody."[38]

More significantly, it contradicts both the Clean Water Act (which contains no exemption for impairments due to natural sources) and the TMDL regulations. For example, 40 C.F.R. § 130.2(g) defines "load allocation" for purposes of developing a TMDL as "[t]he portion of a receiving water's loading capacity that is attributed either to . . . nonpoint sources of pollution or to natural background sources." (Emphasis added.) The regulations thus clearly contemplate the listing for waters impaired by natural sources. Moreover, the language of 130.2(g) indicates that *Pronsolino's* approval of TMDLs for nonpoint pollution extends logically to natural sources as well, as both are addressed in the definition of "load allocation."

As noted by EPA in a letter to the SWRCB last June, waters impaired by natural sources cannot be excluded from listing unless the state's adopted water quality standards clearly contain such exclusions.[39] To the best of our knowledge, no natural source exclusions exist in state water quality standards provisions. The natural sources exclusion thus must be removed from the policy.

D. The State Must List Waters Impaired by "Pollution"

Section 3.1 of the Draft Policy similarly states that water segments for which standards exceedances reflect "pollution" (*e.g.*, "physical alteration of the water body that cannot be controlled") shall not be placed on the 303(d) list. This position is reiterated in Section 2.1, which limits listing to waters impaired by "a pollutant or pollutants." We disagree with this proposition, and maintain that water bodies that are impaired by any source of pollution must be listed. This position is supported both by the plain language of Section 303(d)(1)(A) and by legal opinions interpreting it, and has been supported by the Regional Boards as well in testimony and elsewhere

This position is also supported by the National Research Council, which found that the TMDL program "should encompass all stressors, both pollutants and pollution, that determine the condition of the waterbody."[40] The NRC found this step to be important because "activities that can overcome the effects of 'pollution' and bring about water body restoration – such as habitat restoration and channel modification – should not be excluded from consideration during TMDL plan implementation."[41]

Accordingly, ask that this limitation be struck.

E. The State Must Develop a TMDL Regardless of Whether the Impairing Pollutant Has Been Identified

It is not clear from Section 2 of the Draft Policy whether it is necessary to identify the impairing pollutant(s) in order to list a water body. The text states that one can list only where "a

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[38] National Research Council, "Assessing the TMDL Approach to Water Quality Management," p. 4 (Nat'l Academy Press, Wash. D.C., 2001), http://books.nap.edu/html/tmdl/ (NRC Report) (emphasis added).
[39] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).
[40] NRC Report at 4 (emphasis added).
[41] *Id.*

pollutant has caused or is suspected of causing standards not to be attained." This language presumes that one must identify the pollutant(s) at issue in order to make this determination.[42]

The Clean Water Act does not require identification of the pollutant at issue before listing is made. EPA implements this legislative intent by clearly stating in its 2004 Integrated Guidance that "States should include impaired waters in Category 5 [303(d) list] . . . even if the specific pollutant is not known."[43] In addition, many if not all Basin Plans contain WQS for general conditions ("no toxics in toxic amounts") that would need TMDLs if impairments of those conditions were found; Section 2 would appear to (illegally) prevent that.

Section 3.1.6 of the Appendix and Issue 5C of the FED require the identification of causative pollutant(s) before a TMDL can be developed for toxicity. Toxicity is one of the most significant measures of impairment, because unlike a chemical concentration, it is a biological measurement that can be more linked to ecological significance. Observation of toxicity in one or more test species indicates the potential for impacts to multiple untested species in the water body, which in turn, affects the overall ecological health of the water body. Because toxicity is a measure of significant biological response, indefinite delay or failure to develop TMDLs to mitigate toxicity impairment would be one of the most damaging possible outcomes for the long-term protection of California's aquatic resources of this Draft Policy.

Requiring identification of the causative pollutant(s) will indefinitely delay the development of toxicity TMDLs because the burden of establishing the cause of toxicity is shifted solely to the Regional Boards. This burden can be onerous because the cause-and-effect link cannot be typically established through simple or standardized tests, and special studies are often required.[44] The Draft Policy offers no process for how this identification will be completed by the Regional Boards and requires no timeframe. Further, there is no directive in the Draft Policy for potentially-contributing parties to complete of the subsequent studies needed to identify the cause of the toxicity. The unintended result of this policy could be to completely block the TMDL process from applying to water bodies exhibiting toxicity.

This result is unnecessary because, contrary to the assertion in the FED that the pollutant(s) associated with toxicity must be identified in order to complete a TMDL, case studies of POTW effluents show that cost-effective source controls can mitigate toxicity even when the specific causative pollutants have not been identified. Precedent has already been established at the federal and state level regarding requirement of source control to mitigate toxicity without identification of the specific pollutant or pollutants that cause the toxicity. For example, POTWs are required to ensure a balanced indigenous population of marine organisms exists outside the zone of initial dilution of the discharge. If not, the POTW must upgrade to full secondary treatment, even if the specific pollutants causing the toxicity have not been identified. Examples of how successful this policy has been at restoring marine life around POTW

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[42] Similar language runs throughout the Policy, including in Section 6.2.3.

[43] 2004 Integrated Guidance at 10.

[44] Identification of pollutants causing toxicity can be complicated by several factors. Low levels of multiple pollutants can act synergistically to cause toxicity. Most of the water bodies in California receive inputs of multiple toxic pollutants. Often, comparison of chemical concentrations to water column criteria or sediment quality guidelines may not indicate exceedances, yet the chemicals are collectively contributing to overall toxicity. Toxicity identification can be also be significantly limited by the routinely-used toxicity identification techniques. For example, current TIE methods differentiate the cause of toxicity by categories of pollutants (e.g., metals, semi-volatiles, etc.) and not by specific pollutants, and cannot identify pollutants that are causing toxicity at concentrations below routine laboratory detection methods (*e.g.*, PAHs, one of the most toxic and ubiquitous class of pollutants, cause toxicity at levels well below routinely-used laboratory methods.)

discharges are plentiful. Historically, the effluent discharged from LA County's Joint Water Pollution Control Plant was toxic to sea urchin bioassays, and field studies showed degraded urchins and other echinoderm populations near the outfall. Although the actual pollutant or pollutants causing the toxicity were never fully identified, LA County implemented source control efforts to reduce toxicity overall, and the ecology around the outfall has been restored. Another example is the recovery of the benthic community in Santa Monica Bay around LA City's Hyperion sewage treatment plant outfall. Again, costly efforts to specific identify pollutants causing the toxicity and impairment were never fully successful, yet upgrades to the POTW have resulted in dramatic, measurable improvements in the benthic assemblages adjacent to the outfall.

Similarly, the policy must allow listing for adverse biological response and degradation of biological populations and communities alone, without identification of the causative pollutants. The Draft Policy requires the identification of the specific pollutant or pollutants causing adverse biological response and/or degradation of biological populations and communities before waters can be listed for these impairments. Specifically, the Draft Policy states that a water body can be listed for adverse biological response or significant degradation in biological populations and/or communities if these impairments are shown compared to reference condition(s), *and* these impacts are associated with water or sediment concentrations of pollutants as described in section 3.1.6. The Draft Policy does not allow for listing solely for these impairments without the causative pollutant(s). Furthermore, section 3.1.6 appears to restrict how these causative pollutants are identified to a very narrow range of methodologies. Since studies conducted to assess biological impacts often do not definitively identify causative pollutants, this policy could effectively eliminate the state's ability to list water bodies that have been scientifically demonstrated to be unable to support their beneficial uses. As demonstrated by the case studies of POTW effluents above, cost-effective source control can mitigate biological impairments even when the specific causative pollutants have not been identified.

Therefore, the policy must allow listing and move forward with TMDL development even where the impairing constituents are not known. The identification process, if shown by the regulated community to be necessary to the control of the impairment, can be built into the implementation schedule of the TMDL. By doing this, the SWRCB is providing a process that provides some certainty that impairments will be mitigated in a controllable timeframe.

F. The State Must List the Whole of an Impaired Water Body

EPA's 2004 Integrated Guidance discusses how waters should be segmented in the Integrated 303(d)/305(b) report.[45] EPA mandates that states "document the process used for defining water segments in their methodologies." Section 6.2.5.6 attempts to do this but fails because California has not identified a uniform definition of "assessment units," a water body segmentation scheme described in U.S. EPA guidance. Since this section only confuses the issue without providing guidance to the regional boards, it should be eliminated entirely or rewritten.

Requiring the regional boards to "identify" various properties of an impaired water body is beyond the scope of identifying an impaired water body. Arbitrary pooling of data from adjacent reaches and/or segments, as described in Section 6.2.5.6, has no scientific foundation. Adjacent reaches and/or segments should only be joined together for data analysis purposes if it is the intent of the regional board to list the combined reaches/segments as a single 303(d) listed

[45] 2004 Integrated Guidance at 2-3.

water body. Joining adjacent reaches together for the purposes of data analysis and meeting listing sample count requirements could have the effect of making impaired waters appear to be unimpaired and/or making clean waters appear to be impaired. If the water body to be listed contains multiple reaches then for listing purposes, the reaches should be considered a single water body.

G. The State Must List Waters Impaired by Invasive Species

The Policy states at Section 2.1 that only those waters impaired by "pollutants" shall be listed. The FED similarly states in numerous places that only impairments caused by "a pollutant" shall be included on the 303(d) list.[46] As discussed above, we disagree with this proposition, and maintain that water bodies that are impaired, regardless of the source of pollution, must be listed.

We thus strongly disagree with the FED's recommendation that waters impaired by invasive species not be listed because invasive species are not "pollutants."[47] In addition to the fact that all waters should be listed regardless of the source of the impairment, there is no basis in law or fact for the conclusion that aquatic invasive species are not "pollutants" under the Clean Water Act. Invasive species clearly fit the definition of "pollutant" under Clean Water Act Section 502(6), which broadly defines the term to include:

> dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, *biological materials*, radioactive materials, heat wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into water.

(Emphasis added.) Courts have interpreted the definition of "pollutant" expansively, stating that it "encompass[es] substances not specifically enumerated but subsumed under the broad generic terms" listed in Section 502(6).[48] Similarly, courts have stated that the definition of pollutant is "meant to leave out very little."[49]

In the definition above, the term "biological materials" has been interpreted by U.S. EPA and the courts to include harmful organisms, which would include invasive species. For example, in proposing revisions to the TMDL regulations, U.S. EPA stated that "all microbial contaminants that may be discharged to waters of the U.S. (*e.g.* bacteria, viruses and other organisms) fall under the term 'biological materials'."[50] EPA's finding is consistent with a common sense interpretation of the term "biological materials" as including organisms, and makes no artificial distinctions as to the location or source of the organisms. EPA similarly has acknowledged that "[d]ifferent biological organisms, such as bacteria (*e.g.*, fecal coliform),

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[46] *E.g.* "At this time, USEPA believes that invasive species should not be included within the definition of 'pollutant,' as defined by the CWA, and, therefore, waters impacted by them should not be included on the section 303(d) list." FED at 89.

[47] FED at 90.

[48] *U.S. PIRG v. Atlantic Salmon of Maine* (U.S. Dist. Ct. Maine, Aug. 2001), http://www.med.uscourts.gov/Site/opinions/kravchuk/2001/MJK_08282001_1-00cv150_USPIRG_v_Heritage.pdf, citing *United States v. Hamel*, 551 F.2d 107 (6th Cir. 1977).

[49] *Id.*, citing *Sierra Club, Lone Star Chapter v. Cedar Point Oil Co.*, 73 F.3d 546, 566-568 (5th Cir. 1996), *cert. denied*, 519 U.S. 811 (1996).

[50] 64 Fed. Reg. at 46017 (August 23, 1999).

algae, dead fish, live fish, fish remains, and plant materials have been considered pollutants under this definition by various courts."[51]

The courts and other states have repeatedly agreed with this interpretation of "biological materials."[52] For example, the court in *National Wildlife Federation v. Consumers Power Co.*, 862 F.2d 580, 585 (6th Cir. 1988) found that live fish were "biological material" under the Clean Water Act. There is no logical distinction between native versus non-native fish for the purposes of determining what is "biological material," especially in light of the fact that in many cases it is extremely difficult to determine whether an organism is native or non-native to a particular ecosystem.

Recognizing this lack of a logical distinction, states around the country have already identified 34 water bodies around the country as impaired for "exotic species," as well as 783 for "noxious aquatic plants";[53] many of the latter are likely "noxious" because they are non-native to the area in which they are listed (such as *Caulerpa taxifolia*, the subject of proposed listings in Regions 8 and 9). Pathogens, which can be native or non-native to an area and which EPA already regulates in municipal and other discharges, have been identified as the source of impairment in 5,512 listings around the country.[54]

The State Board itself approved the listing of various waters in Region 2 as being impaired by "exotic species," including the Carquinez Strait, Richardson Bay, San Francisco Bay (Central), San Francisco Bay (Lower), San Francisco Bay (South), San Pablo Bay, Suisun Bay, and the Sacramento/San Joaquin Delta. In approving the listings, the State Board approved the listings' staff report, which found that "[e]xotic species meet the definition of 'pollutant' at Section 502 of the Clean Water Act."[55]

EPA acknowledged in its recent ballast water report that "[d]ifferent biological organisms, such as bacteria (*e.g.*, fecal coliform), algae, dead fish, live fish, fish remains, and plant materials have been considered pollutants under [Clean Water Act Section 502(6)] by various courts." Moreover, EPA is already regulating invasive species in ballast water through the Section 312(n) program, and is regulating numerous categories of invasive species – such as pathogens – through other programs. It is neither legally nor logically supportable for the state to conclude that "local" organisms are pollutants while "out-of-towners" are not. The only issue to consider is whether the water body at issue is impaired by pollutants, which invasive species are.

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[51] U.S. EPA, Draft Report, "Aquatic Nuisance Species in Ballast Water Discharges: Issues and Options," p. 32 (September 10, 2001).

[52] Some individuals have mistakenly referred to *Asso. To Protect Hammersley v. Taylor Resources* (9th Cir., Aug. 2002) as support for the conclusion that Section 502(6) cannot include invasive species. However, this case, which addressed releases from caged mussels, only addressed the situation in which the discharges did not harm the waters at issue. In particular, the court stated that it "need not decide whether the addition of biological materials to the water in concentrations significantly higher than natural concentrations could support a conclusion that such biological materials are 'pollutant[s]' under the Act . . . ." *Id.* at fn. 9. By definition, the invasive species proposed here for listing exist at higher than natural concentrations.

[53] *See* http://oaspub.epa.gov/waters/national_rept.control#TDOC.

[54] *Id.*

[55] California Regional Water Quality Control Board, San Francisco Bay Region, "Prevention of Exotic Species Introductions to the San Francisco Bay Estuary: A Total Maximum Daily Load Report to U.S. EPA," pp. 1, 7-8 (May 8, 2000) ("TMDL Report"), www.swrcb.ca.gov/rwqcb2/download/Tmdl.pdf.

EPA "believes that TMDL's can be determined for any pollutant."[56] We ask that recommendation in Issue 4H of the FED accordingly be changed from Alternative 3 to Alternative 1 ("[l]ist water bodies under CWA section 303(d) for invasive species that impact water quality and develop TMDLs").

V. THE STATE MUST USE AND CONSIDER ALL READILY AVAILABLE INFORMATION

A. General Comments

The body of regulations and guidance that bear on 303(d) listing are unambiguous about the information that should be considered in making listing decisions: all of it. TMDL regulations state clearly that "[e]ach State shall assemble and evaluate all existing and readily available water quality-related data and information to develop the [303(d)] list."[57] The regulations go on to mandate that local, state and federal agencies, members of the public, and academic institutions "should be actively solicited for research they may be conducting or reporting."[58] Furthermore, EPA's 2004 Integrated Guidance similarly states that "[a]ll existing and readily available data and information must be considered during the assessment process."

The regulations and guidance are even more explicit about not excluding data on the basis of age and sample size. The Integrated Guidance states clearly that "[d]ata should not be excluded from consideration solely on the basis of age,"[59] and "does not recommend the use of rigid, across the board, minimum sample size requirements in the assessment process."[60] EPA adds that "the methodology should provide decision rules for concluding nonattainment even in cases where target data quantity expectations are not met, but the available data and information indicate a reasonable likelihood of WQC exceedance."[61] As an illustration, EPA explains that "[w]hen considering small numbers of samples, it is important to consider not only the absolute number of samples, but also the percentage of total samples, with concentrations higher than those specific in the relevant WQC."[62] EPA applied these rules in its review of California's 2002 303(d) list, finding that "it is inconsistent with federal listing requirements for the State to dismiss a water from further consideration in the Section 303(d) listing process simply because a minimum sample size threshold was not met for a particular water body. This is particularly true . . . where the impairments are caused by toxic pollutants."[63]

In sum, EPA's rules with respect to the use of data in listing decisions could not be clearer:

- All readily available information should be considered;
- Data should not be discounted solely on the basis of age; and
- Use of minimum sample sizes are not appropriate.

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[56] 43 Fed. Reg. 60662 (Dec. 28, 1978).
[57] 40 C.F.R.§ 130.7(b)(5).
[58] 40 C.F.R.§ 130.7(b)(5)(iii).
[59] 2004 Integrated Guidance at 23-24.
[60] *Id.* at 25.
[61] *Id.* at 26.
[62] *Id.* at 27. EPA refers the reader to Section D.6, page 47 last paragraph through page 50 of CALM for further discussion of this point.
[63] Letter from Alexis Strauss, U.S. EPA Region IX to Celeste Cantu, SWRCB (July 25, 2003).

SWRCB's proposed policy, however, contravenes of all of these recommendations by establishing rigid data quality requirements, setting upper limits on the age of data to be considered, and using minimum sample sizes for most assessments. Specifically, the state's Draft Policy limits information to "[o]nly the most recent data and information (up to 10-years old)," though data older than 10 years might be used for limited purposes and then only in conjunction with newer data.[64] Similarly, the Draft Policy also states that "[g]enerally . . . a minimum of 10 or 20 temporally independent samples is needed from each water body segment for placement on the planning list or the section 303(d) list, respectively"; though "[f]ewer samples may be used on a case-by-case basis" as described in the California Listing Factors portion of the state Guidance on page 31. EPA has already admonished SWRCB on these policy elements, stating on page 6 of the July 25th letter that it is "inconsistent with federal listing requirements for the state to dismiss a water from further consideration . . . simply because a minimum sample size threshold was not met for a particular water body."[65] The Draft Policy's arbitrary restrictions ensure that listing decisions will be based on something less than complete information, and that regulators will be unreasonably constrained from the very beginning of the listing process. This is contrary to the intent of the Clean Water Act, and to good public policy in general. The policy should be revised to be consistent with EPA's regulations and guidance requiring the use of all data, regardless of age and sample size.

Section 6.2.5.1 of the Draft Policy states that only "actual data that can be quantified and qualified" may be used to "assess water quality standards attainment," as opposed to information that is "descriptive, estimated, modeled or projected." The EPA rejected this proposal last June, stating that it is "inconsistent with federal guidance that water quality modeling is a viable method of listing or de-listing," and contrary to federal regulations at 40 C.F.R. § 130.7(b)(5)(ii) that "require the consideration of information from . . . models in the assessment process."[66]

The limitations on data age, sample size and modeling are blatant limitations imposed by the Draft Policy on the use of data. However, the Policy unfortunately contains several more illegal data limitations that should also be remedied.

B. Data Quality Requirements Impermissibly Exclude Data and Information from Consideration

According to Section 6.2.4 of the Draft Policy, only "high quality" data may be "used in the development of the section 303(d) list." Data is considered to be of acceptably high quality if supported by a Quality Assurance Project Plan ("QAPP") developed pursuant to 40 C.F.R. § 31.45 or according to California's Surface Water Ambient Monitoring Program's Quality Assurance Management Plan (QAMP).[67] Other data may be considered only to "corroborate other data and information with appropriate quality assurance and quality control." EPA specifically rejected this proposal last June, stating that "[t]his is simply too restrictive and does

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[64] Draft Policy, Sections 3.1 and 6.2.5.2.

[65] EPA makes this statement when adding back Humboldt Bay, San Antonio Creek, Bolsa Chica, Anaheim Bay and Huntington Harbor, all of which had a relatively low number of samples but which had a very high percentage of those samples exceeding standards. EPA states that this action was consistent with 1997 and 2002 EPA technical guidance documents that recommend listing where toxics standards are exceeded more than once in any three year period.

[66] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

[67] FED at 201.

not fit with federal regulations stating that States will consider all readily available information."[68] EPA added that

[t]hese provisions do not provide a 'good cause' rationale for excluding data and information from consideration (see 40 CFR 130.7(b)). These regulatory provisions provide a rebuttable presumption that all readily available data and information will be used in the assessment process. A great deal of useful data . . . would appear to be excluded from consideration under the proposed rule, an outcome which appears in consistent with federal requirements.[69]

No changes have been made to address this concern, which remains a problem with respect to the federal TMDL regulations as well as state law. For example, these data requirements appear to be more stringent than the principles governing the admissibility of evidence and opportunities for public participation typically used in California administrative proceedings.[70] In addition, these provisions of the Draft Policy appear to set a higher burden of proof than typically used in California administrative proceedings, which is "preponderance of the evidence."[71] Because of these illegal data exclusions, EPA found that the state may "miss a significant number of impaired and threatened waters."[72] This potential for serious error must be addressed through a revision that adheres to the regulation's mandate to consider all existing and readily available data and information.

C. Statistics Cannot Be Used as an Excuse to Limit the Data That May Be Considered

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[68] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

[69] *Id.*

[70] *See, e.g., Gaytan v. Workers' Compensation Appeals Board,* 134 Cal.Rptr.2d 516, 529-530 (2003) (discussing party's opportunity to present evidence and have it considered); *McBail & Co. v. Solano County Local Agency Formation Comm.,* 72 Cal .Rptr.2d 923, 926-28 (1998) (discussing agencies' obligation to adequately consider "all relevant factors", and disapproving agency's effort to require a party to make a factual showing beyond that required by statute); *Mohilef v. Janovici,* 58 Cal.Rptr.2d 721, 736 (1996) ("it is well established that a 'presentation to an administrative agency may properly include evidence that would not be admissible in a court of law'"); *Desmond v. County of Contra Costa,* 25 Cal.Rptr. 840, 846-847 (1993) (approving use of non-expert opinion testimony in agency proceeding); *County of San Diego v. Assessment Appeal Board,* 195 Cal.Rptr. 895, 900-901 (1983) (setting aside Board's decision because "it chose to disregard competent evidence"; *Calif. Hotel and Motel Assn.,* 157 Cal.Rptr. 840 (1979) (discussing public participation objectives of California's Administrative Procedures Act); see also *California Optometric Assn.* 131 Cal.Rptr. 744 (1976) and *Carmel Valley View, Ltd.,* 130 Cal.Rptr. 249 (1976).

[71] *See, e.g., Mann v. Dept. of Motor Vehicles,* 90 Cal.Rptr. 2d 277, 282-283 (1999) ("Evidence Code section 115 provides in part that '[e]xcept as otherwise provided by law, the burden of proof requires proof by a preponderance of the evidence.", rejecting argument that department "had the burden of producing 'clear and convincing [proof] to a reasonable certainty" in administrative proceeding); *San Benito Foods v. Veneman,* 58 Cal.Rptr.2d 571 (1996) (rejecting argument that agency's hearing officer was required to apply a "clear and convincing evidence" standard of proof in administrative proceeding); *In the Matter of Permits 19259 and 19260,* State Water Resources Control Board, 1987 WL 54550 (1987) ("Permittee asserts that the standard of proof in this case should be that of clear and convincing proof to a reasonable certainty." "Generally, the proper standard of proof in cases where no fundamental vested right is involved is the preponderance of the evidence standard....We conclude that changes in water right permits likewise are subject to the preponderance standard and substantial evidence review."); *Rosas v. Workers' Compensation Appeals Board,* 20 Cal.Rptr.2d 778, 783-87 (1993) (the burden of proof in a workers' compensation proceeding "manifestly does not require the applicant to prove causation by scientific certainty"); and *Western Oil and Gas Asso. V. Air Resources Board,* 208 Cal.Rptr. 850, 858 (1984) ("The Board therefore should not be required to wait until substantial adverse effects are scientifically verified before adopting appropriate standards."

[72] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

The Draft Policy as written also does not effectively make it possible to use "all readily available information." Several of the policy's provisions have the effect – direct or indirect – of causing data to be reduced in significance or ignored altogether.

First, by requiring hypotheses testing and statistical confidence determinations, the Alternative Data Evaluation provisions would fail to use certain types of data that would have been considered under a weight of evidence approach. As discussed elsewhere in this letter, data indicating spatial and temporal variability would continue to be ignored. Moreover, assessments under the Alternative Data Evaluation would be limited to a single line of evidence rather than consider multiple lines (especially if they conflict). For instance, assessment of nutrient over-enrichment risk involves examining nitrogen compounds, phosphates, chlorophyll a, benthic algae, dissolved oxygen, pH, etc.; the Alternative Data Evaluation would not permit all of these factors to be evaluated comprehensively.

Second, the policy's generalized requirements for data averaging and combining data from adjacent reaches appear to be arbitrary and have the effect of eliminating data that should be considered. Section 6.2.5.4. ("Temporal representation") states that, in general, samples should be available from two or more seasons or from two or more events when exceedances would be expected. This statement is unclear and could be misinterpreted. Does the policy mean two different seasons, or sampling from the same season in two different years? Depending on the parameter measured and site-specific conditions, either of these interpretations could be appropriate. As with spatial independence, temporal independence is based on site-specific conditions, and proscribed guidance or requirements should be avoided to ensure all valid data is used in the listing process.

Even where data are allowed, the policy as written also does not effectively make it possible to use "all readily available information" because it does not take into account some approaches to water quality assessment. For example, the Alternative Data Evaluation (Section 3.1.11) requires hypotheses testing and statistical confidence determinations when some methods, such as the "weight of evidence" approach, utilize data representing multiple variables that would not have been considered under the Draft Policy's Alternative Data Evaluation process. Assessment of nutrient over-enrichment risk, for instance, involves examining nitrogen compounds, phosphates, chlorophyll a, benthic algae, dissolved oxygen, pH, etc. Determination of impairment often involves the relationships between these parameters as opposed to the level of any single parameter. Additionally, impairments associated with biological degradation, nuisance (including trash) impacts, excessive sedimentation, and narrative objectives are typically observed through data that typically can not be assessed using the narrow assessment requirements of Section 3.1.11.

The policy's generalized requirements for data averaging and combining data from adjacent reaches (Section 6.2.5.9) do not seem to be based on scientific methods and will have the effect of eliminating data that should be considered. For example, the policy indicates that "If the averaging period is not stated for the standard, objective, criterion, or evaluation guideline, then the samples collected less than 7 days apart shall be averaged." Samples collected within a 7-day time frame may be considered temporally independent if justified.

The seven-day time frame is arbitrary. No justification or data are presented that indicates that the duration of seven days between sampling events is required to ensure temporal independence. More importantly, the time frame required for temporal independence is specific to each location and site-specific conditions that existed at the time of sample such as the

weather conditions. For example, the sampling of a water body before and after a rain event, although within a seven-day period, would produce two very different samples that should be considered temporally independent. If the seven-day rule were applied, however, any increased pollutant caused by the rains could be masked by the pre-rain conditions. Water quality data collected from the routine monitoring of California beaches is another example of a dataset in which this the seven-day rule would be inappropriately applied. At many of our most popular and polluted beaches, coastal beach sampling is conducted daily. Analysis of this type of data has indicated temporal independence of these daily samples[73]. Another example is objectives for dissolved oxygen. If the 7-day rule was applied to a basin plan standard such as "at no time shall the dissolved oxygen saturation fall below 85%", the averaging requirement would completely eliminate scientifically pertinent data. Streams with oxygen problems often have very high values during the day and very low values shortly before dawn. In other cases, impairments can take place during flows that may take place only a few days per week. The requirement for averaging could have the effect of allowing fish kills every Tuesday and Thursday, yet never reach the threshold required for listing. We do not support a policy which considers it acceptable to "kill all of the fish some of the time, and some of the fish all of the time."

D. Data Should Not Be Required to Be Presented in SWAMP Format

The SWAMP data format is extremely complicated and would preclude the inclusion of numerous valuable data sets. While we firmly believe that quality assurance is of the utmost importance for all data that is to be solicited, we feel the required SWAMP format would place an undue burden on submitting entities and reduce the overall amount of data solicited. Citizen volunteer monitoring programs, such as the one used by Heal the Bay (with a SWCRB-approved QAPP) to provide data for the development of the Malibu Creek Bacteria and Nutrient TMDLs, represent an extremely valuable source of additional data. These data are routinely used to fill data gaps by providing additional sampling resources both spatially and temporally.

Requiring all data to be in SWAMP format to be considered by the State or Regional Boards would substantially limit the amount of data that could be included in the review process because many entities such as nonprofit groups, academic professionals, and private citizens would have to invest significant resources to submit data in the SWAMP format. The requirement that solicited data must be submitted in the SWAMP format should be removed to realistically allow the submission of data collected from a variety of different sources, in particular, nonprofit organizations, academic sources, and private citizens.

E. Specific Spatial and Temporal Representation Requirements Are Arbitrary and Illegal

Specifically-defined spatial and temporal representation requirements also should be removed from the policy. Section 6.2.5.3 ("Spatial representation") states that samples collected within 200 meters of each other shall be considered the same station or location. Samples collected less than 200 meters apart may be considered spatially independent if justified. Section 6.2.5.4. ("Temporal representation") states that, in general, samples should be available from two or more seasons or from two or more events when exceedances would be expected.

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[73] Boehm, A.B., Kim., J.H., Mowbray, S.L., McGee, C.D., Clark, C.D., Foley, D.M., Wellman, D.E., Grant, S.B., 2002, "Decadal and shorter period variability of surf zone water quality at Huntington Beach, CA," *Environmental Science and Technology*, 36 (18): 3885-3892.

The 200 meters requirement is arbitrary. No justification or data is presented that indicates that a 200-meter requirement for spatial independence is applicable to California waters in general. More importantly, spatial independence is largely water body-specific. As pointed out in the FED (page 205), in California there are many water body types such as lakes, rivers, coastal estuaries and lagoons, and bays, all with varying degrees of climatic, geologic, and geographic characteristics, that can be affected by widely varying physical conditions. The distance of 200 meters has a totally different meaning for water quality along a stretch of coastal beach versus a portion of a small, meandering stream or a coastal estuary. For example, most NDPES permit receiving water monitoring requires sampling upstream and downstream of discharge points. These two points can easily be located within 200 meters of each other, yet data collected from these two points should be considered spatially independent. Similarly, data collected at the discharge point of a flowing storm drain into the surf zone is measuring a different condition than a point located 100 meters away from the discharge point.

Using 200 meters in the policy will likely have unintended consequences. Defining spatial representation in terms of this arbitrary distance can easily become a de facto rule applied to all water quality data, particularly by inexperienced Regional Board staff. Requiring justification for using a different distance could be interpreted as benchmark that is too difficult to meet by overburdened staff. Overall, this 200 meter definition could easily result in the disregard of valid data in the listing process, and for small water bodies, may make it very difficult to obtain enough data to even consider the water body for listing. These provisions should be replaced with a requirement that data evaluations consider the spatial representation of the samples, particularly for samples collected in close geographic proximity relative to site-specific characteristics and the location of potential sources.

Similarly, the temporal representation requirement is unclear and could be misinterpreted. Does the policy mean two different seasons, or sampling from the same season in two different years? Depending on the parameter measured and site-specific conditions, either of these interpretations could be appropriate. As with spatial independence, temporal independence is based on site-specific conditions, and proscribed guidance or requirements should be avoided to ensure all valid data is used in the listing process. The provisions of the current Draft Policy should be replaced with a requirement that data evaluations consider the temporal representation of the samples, particularly in light of site-specific characteristics including seasonal variability and input events.

Finally, the Draft Policy's requirements for combining data from adjacent reaches similarly have the capacity to make a bad segment look good or a good segment look bad (Section 6.2.5.6). Combining data from adjacent reaches without a scientifically defensible reason censors data by artificially impacting measures of central tendency, sample count, and capability for complying with statistical confidence requirements of the policy.

VI. THE OVERARCHING PROPOSED STATISTICAL METHODOLOGY IS BIASED HEAVILY AGAINST LISTING IMPAIRED WATERS

A. Overall Critique of Methodology

"There are three kinds of lies: lies, damned lies and statistics."
- *Autobiography of Mark Twain.*

"Scientific uncertainty . . . cannot be entirely eliminated."
- *NRC Report*

The purpose of environmental assessment methodologies in general is to protect the environment, as well as society and the economy. Most methodologies provide for some level of "confidence" in the assessments: how confident can we be that the methodology is right when it says there is not a serious problem? How confident are we that it was correct when it told us that there is a problem?

An ideal methodology would provide for confidence in both of these assertions. However, using conventional statistics there is always a trade-off: the more confident we are that the method was correct when it told us that there wasn't a problem, the less confident we can be that it rightly told us that there was.[74] The decisionmaker's solution to this trade-off should reflect society's priorities and the purpose of the environmental assessment.[75]

In an attempt to eliminate one type of uncertainty – the type that the SWRCB apparently believes (but has not shown) would result in economic damage – the SWRCB's proposed listing factors would forsake environmental confidence. The results could be catastrophic: in some circumstances the factors would result in listing criteria that are so unrealizable in practice that aquatic life in a water segment could be dead by the time monitors acquired enough exceedances to meet the threshold. Even in the absence of such catastrophes, however, a policy that is protective of putative economic concerns at the expense of water quality is plainly at odds with the Clean Water Act's purpose for Section 303(d). Assessment under Section 303(d) of the Clean Water Act should work in favor of protecting water quality. As discussed elsewhere in this letter, the 303(d) listing procedure and TMDL development is a "safety net" – the last hope for protection and improvement in water quality in a program that already reflects Congress' view that such protection is both environmentally and economically desirable.

B. The Methodology Is Technically Flawed

The use of statistics in making water quality assessment decisions should not be duplicative, and should not ignore unusual water quality conditions.

According to the FED, the use of statistics in making water quality decisions will help answer the question "[d]oes a water quality sample accurately reflect actual conditions in the

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[74] Robert R. Sokal and F. James Rohlf, *Biometry: The Principles and Practice of Statistics in Biological Research* (1995) at 162.
[75] M. Jeya Chandra, Statistical quality control (CRC Press, 2001) at section 6.2.

water body?"[76] There are several reasons why a water quality sample might not reflect actual conditions in the water body; these include: (1) the sample was improperly collected, analyzed, or reported; (2) the sample came from a location in the water body in which water quality conditions differ from the norm; and (3) the sample was taken at a time when water quality conditions differed from the norm.[77]

In general, the first issue – whether data was correctly collected, analyzed and reported – is addressed at the monitoring and analysis stage, for which the Draft Policy sets "data quality requirements." According to the FED, data is considered to be of acceptable quality if supported by a Quality Assurance Project Plan ("QAPP") developed pursuant to 40 C.F.R. § 31.45 or according to California's Surface Water Ambient Monitoring Program's Quality Assurance Management Plan (QAMP).[78] QAPPs developed according to either the federal or SWAMP guidelines will contain assurances against erroneous laboratory procedures, systematic error sources, extraction and instrument error, and data transfer protocols to protect against transfer errors, and transcription, calculation, and input errors.[79] Taken together, these assurances substantially mitigate the possibility of operator and instrument error, and create a very high level of confidence that samples under these programs were properly collected, analyzed and reported. Consequently, the application of statistics in the manner proposed would duplicate the error-management mechanisms of QAPPs.

The second two issues – that the sample was collected at a time or location that does not reflect the normal water quality in the water body – are not related to error at all. In fact, such samples do reflect the actual conditions of the water body at some time and in some place. The application of most conventional statistical methods to datasets containing such samples would tend to "erase" their impact, instead of prompting evaluation of the conditions that gave rise to such unusual data.[80] Consequently, the application of statistics under these circumstances has the effect of masking hotspots, periodic inputs of constituents, and trends.

Furthermore, according to EPA, the "[10% rule-of-thumb] is intended to account for measurement error and the potential that small data sets may not be fully representative of receiving water conditions."[81] In other words, the 10% rule is not an "acceptable" exceedance rate; there is no such thing as an acceptable exceedance rate – water bodies should be added to the list whenever they do not meet water quality criteria. Instead, the 10% rule is a convenient means of establishing confidence in data that indicate that any samples exceed water quality criteria. It is, therefore, redundant to apply both statistics and the 10% rule to the same data set.

EPA raised this issue with the SWRCB last June, stating plainly that the reliance on the 10% exceedance rule

> is based on an incorrect reading of EPA guidance concerning allowable water quality exceedance rates. The assertion that EPA endorses the use of a 10%

[76] FED at 141.
[77] Samantha Bates, et al., "Bayesian Uncertainty Assessment in Deterministic Models for Environmental Risk Assessment," NRCSE Technical Report Series No. 058 (November 13, 2000) at 2 ("In addition to this uncertainty, there may be *variability,* natural heterogeneity in the population of interest or across space and time.").
[78] FED at 201.
[79] *See, e.g.,* Max Puckett, Quality Assurance Management Plan for the State of California's Surface Water Ambient Monitoring Program ("SWAMP"), California Department of Fish and Game, Monterey, CA (2002), *available at* http://www.swrcb.ca.gov/swamp/docs/swamp_qapp.pdf.
[80] *See* Sokal and Rohlf, *supra,* at 157-169.
[81] 2004 Integrated Guidance at 30.

> standards exceedance rate is incorrect. The EPA 305(b) guidance (1997) refers to the use of a 10% exceedance rate as a method for assessing data sample sets – not as an acceptable exceedance rate in the 'population'. The use of this exceedance rate in a binomial assessment method has not been shown to be protective of water quality nor consistent with water quality standards requirements. It is likely that use of this exceedance rate will increase the number of water bodies that do not meet water quality standards, which are missed in the listing decision. Moreover, use of a 10% exceedance rate test has never been acceptable for toxic pollutants where aquatic life uses are at issue.[82]

EPA recommended instead criteria development approaches based on a 95% compliance rate for conventional pollutants and a more stringent compliance rate for toxic pollutants of "at least 99%" in the context of a binomial method, or "where 2 or more samples exceed the [CTR rule standards for aquatic life] in any 3 year period."[83] EPA also criticized the use of the model's arbitrary selection of five exceedances for sample sets less than 20, finding that "there is no technical rationale for this decision."[84]

In sum, we believe that statistics should not be used to mask real (if unusual) water quality characteristics, and should never be applied in a duplicative fashion. SWRCB's proposed listing methodology does both. The selection of the binomial approach implicitly endorses "erasing" important but infrequent or spatially isolated exceedances. The use of the binomial approach together with the 10% rule is duplicative, overcompensating for uncertainty and making it extremely difficult to demonstrate impairment – no matter how genuine. Moreover, the selection of such a rigid decision model disregards the existence of the already protective QAPP program. The SWRCB must incorporate these factors into the final decision rule.

> *Under the Draft Policy's binomial approach, the level of confidence required to reject the null hypothesis is too high*

The binomial statistic used by the SWRCB in its proposed guidance is designed to test the hypothesis that 10% of the samples in a set of data measuring a constituent will exceed the water quality objective for that constituent. The method permits rejection of this hypothesis only when the data demonstrate to a 90% certainty that the assumption is untrue. In other words, the methodology asks the question: "assuming the water body has a 10% exceedance rate, how many dirty samples would I have to see before I was 90% sure that 10% is not the true exceedance rate?"

One consequence of requiring this level of confidence before the hypothesis can be rejected is that the data must not only demonstrate difference from the hypothesized condition, they must demonstrate significant difference.[85] In the case of SWRCB's proposed binomial approach, it is not enough for the data to indicate that there are more than 10% exceedances; they must demonstrate that there are significantly more. As EPA put it: "[s]tarting with the assumption that a water is 'healthy' when employing hypothesis testing [like the binomial approach] means that a water will be identified as impaired and placed in Category 4 or 5, only if

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[82] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).
[83] *Id.*
[84] *Id.*
[85] *See* Sokal and Rohlf at 159.

substantial amounts of credible evidence to refute the presumption that the water is not impaired are brought to light."[86] In the case of SWRCB's binomial approach, the evidence required is practically unattainable. For example, for some sample sizes, a demonstration that the actual exceedance rate is greater than the 10% necessitates a 30% exceedance rate. We vigorously oppose requiring this level of proof that water quality standards are exceeded.

As noted by EPA above, the Draft Policy's hypothesized 10% exceedance rate appears to be based on a misunderstanding of EPA's 10% rule-of-thumb. As discussed above, the 10% rule is itself a means of mitigating against uncertainty in data – it is not an acceptable level of exceedance. SWRCB, however, proposes requiring a strong demonstration that samples not only exceed water quality criteria, but also exceed the confidence buffer provided by the 10% rule. There is no logical reason for selecting this exceedance rate: it is not based on prior information on the condition of the water body. Nevertheless, the rigidity of this statistical has the effect of entrenching this assumption and making it nearly impossible for data to disprove it.

The binomial model "masks" spatial and temporal variability and disregards exceedance magnitude

As noted above, the binomial model – like most conventional statistical approaches – tends to mask spatial and temporal variability by treating unusual data points as erroneous rather than reflections of a water quality condition that is either spatially or temporally variable.

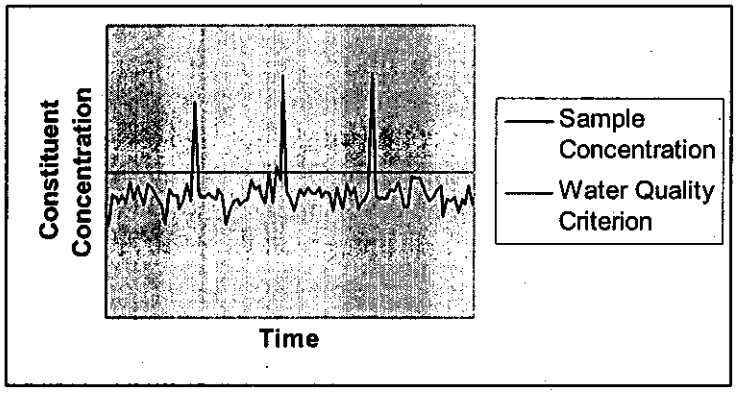

Figure 1: Periodic temporal variability.

The binomial approach fails to account for periodic temporal variability. Figure 1, above, illustrates this type of variability. In this simulation, 100 samples are analyzed, but only three exceed the water quality criterion. Under the binomial methodology as proposed by SWRCB, this water body would remain unlisted despite the fact that these exceedances clearly occur at regular intervals and could reflect seasonal input or some other regular event. Seasonal or regular inputs of many constituents pose risks to human health and aquatic life, and should not be ignored.

[86] 2004 Integrated Guidance at 28.

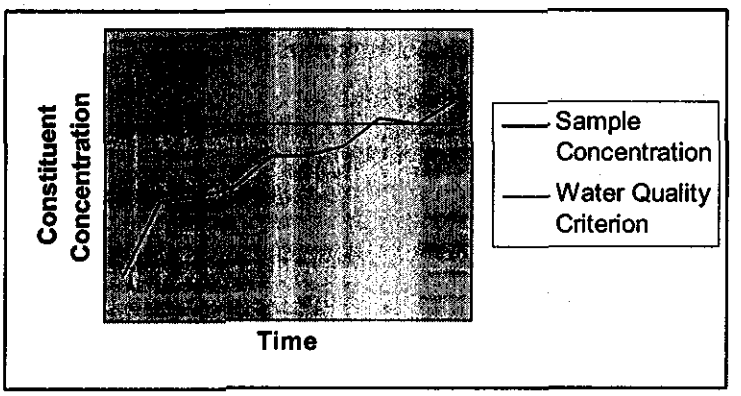

Figure 2: Trend temporal variability.

The binomial approach fails to account for temporal variability arising from a trend. Figure 2, above, illustrates this type of variability – in this case, increasing concentration of some constituent over time. In this simulation, 10 samples are analyzed and two exceed the water quality criterion. Under the binomial methodology as proposed, this water body would remain unlisted despite the fact that there is an obvious trend indicating decreasing water quality. Such a trend should not be ignored and cannot be, given the fact that "threatened" waters must be identified and included on the Section 303(d) List. The listing methodology should ensure that water bodies showing decreasing water quality conditions are listed.

The binomial approach fails to account for spatial variability. Spatial variability occurs when sample concentrations vary depending on their origin within the assessment unit. A dataset composed of 20 samples might have only two exceedances of a water quality criterion – not enough for listing under California's proposed Policy. However, if both exceeding samples originated from a particular area within the assessment unit, they should be cause for alarm. The listing methodology should ensure that water bodies in which there are "hotspots" of high constituent concentrations are listed.

Finally, the binomial approach fails to account for exceedance magnitude. In other words, even if the excursions above the criterion are enormous, as long as fewer than the critical number of exceedances are observed, the binomial will not call for listing the water body. In light of the protections against collection and analysis error inherent in the data quality requirements, we believe that high-magnitude exceedances are most likely reflections of real water quality conditions, and simply cannot be ignored. Even if high-magnitude exceedances reflect unusual water quality conditions, such conditions may nonetheless have serious adverse impacts on human health and aquatic life. The listing methodology should ensure that water bodies with high-magnitude exceedances are listed. There is no basis stated for, and no evidence in the record in support of, the Draft Policy's approach to this issue.

The binomial approach is severely biased against precautionary listing decisions.

Conventional hypothesis testing approaches have two types of "error" associated with them: Type I error and Type II error. Type I error occurs when a statistical model rejects a true hypothesis. Type II error occurs when a statistical model accepts a false hypothesis. In the case of SWRCB's proposed methodology, the hypothesis is that the water body is clean.

Consequently, a Type I error would be where the model indicates that water body is impaired when it is actually clean; and a Type II error would be where the model indicates that the water body is clean when it is actually impaired.

As noted above, all hypothesis-testing statistics have some probability of both types of errors, but the likelihood of these errors can be controlled to some extent. EPA recommends that states attempt to minimize the likelihood of making both types of errors.[87] They acknowledge, however, that "[w]ith a fixed number of samples, as the probability of Type I error decreases, the probability of Type II error increases."[88] Consequently, there will always be a tradeoff between Type I and Type II error, and a state will have to either express a preference for one type of error or another, or else balance the likelihood of making each error type.

The selection of a favored error type, then, should reflect the priorities of the state as well as the requirements of the law. As illustrated in Table 1, California's policy is 81 to 362 times more likely to fail to list an impaired water body than it is to list a clean one. Implicit in this is that California is up to 362 times more concerned with preserving TMDL-development resources than it is with preserving water quality. We find this preference unconscionable and, as noted elsewhere, inconsistent with the intent of Section 303(d). As we explain in a later section of this letter, a strict application of the Precautionary Principle consistent with the Clean Water Act would call for a reversal of these priorities – that California should prefer to err in favor of listing, thus fulfilling its obligation to protect and enhance the quality of its waters. At a minimum, the probability of failing to list an impaired water body should be substantially reduced, even at the expense of increasing the probability of erroneously listing a clean one.

[87] 2004 Integrated Guidance at 28.
[88] *Id.* at 28.

Sample Size	Listing threshold	Probability of listing a clean water body	Probability of failing to list impaired water body	Error Type Ratio
10	3	0.002	0.175	89
12	4	0.001	0.208	362
19	5	0.001	0.151	213
26	6	0.001	0.123	169
33	7	0.001	0.107	153
41	8	0.001	0.091	122
48	9	0.001	0.084	124
56	10	0.001	0.076	111
64	11	0.001	0.070	102
72	12	0.001	0.065	97
80	13	0.001	0.061	93
89	14	0.001	0.056	81
97	15	0.001	0.054	81
105	16	0.001	0.052	81

Table 1: Probabilities of making listing errors under the Draft Policy. The probabilities and listing criteria are derived in Attachment A to Appendix I.

As described in more detail below, the Draft Policy relies heavily either on the statistical model or on the assumptions and confidence bounds underlying the statistical model, to the point that essentially the entire methodology, including the "alternative" data evaluation process, is an extension of this model. As a result, the entire Draft Policy suffers from the deficiencies of the statistical model and its bias in favor of ignoring dirty waters. Details for specific constituents and categories of constituents are detailed below. In short, the Draft Policy must be significantly overhauled, as described in Section VIII. below, if it is to be both legally and technically supportable.

C. The Methodology Is Legally Deficient

1. The Methodology Violates Water Quality Standards Provisions

EPA said it most clearly: the proposed "[p]rocedures for assessing exceedances of numeric standards for many pollutants conflict with existing water quality standards, most

notably toxics."[89] EPA's 1997 and 2002 technical guidance documents similarly "recommend listing of toxic pollutants in cases where standards are exceeded more than once in any three year period."[90] The details behind these findings are provided below.

The Policy's Statistical Test is Unlawfully Inconsistent With Water Quality Standards for Toxics.

The statistical testing procedures at the heart of the Policy[91] violate section 303 (d) because they will fail to list (or cause to be delisted) a large number of waterways in which water quality standards ("WQSs") are not being achieved. The Clean Water Act requires California to identify those waters for which existing technology-based pollution controls are not stringent enough to ensure that the WQSs are applicable to such waters are achieved and maintained.[92] These standards are established under CWA § 303 by the State or U.S. EPA. Once established in a basin plan, policy or rulemaking these standards have the force of law.

For example, the California Toxics Rule ("CTR") establishes standards for 126 of the most toxic pollutants. The CTR includes chemicals such as dioxin, the most toxic synthetic chemical know to man; potent neurotoxins like the heavy metals mercury and lead; dangerous chlorinated compounds like PCBs and DTT; and the pesticide acrolein, a component in tear gas.

The CTR standards for these dangerous and harmful chemicals include two types of numeric criteria, chronic criteria and acute criteria. An acute criterion "is the highest in-stream concentration of a priority toxic pollutant consisting of a short-term average not to be exceeded more than once every three years on the average."[93] A short-term average is a one hour average. This means that the waterway will be severely damaged if pollutant levels exceed the acute numeric criteria for more than one hour in three years. Therefore, if one sample is taken per day the standard will be violated if the criterion is exceeded twice out of every 1095 consecutive samples (*i.e.*, eighteen hundredths of one percent, or 0.18%). A chronic criterion "is the highest in stream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average." Here, if one sample is taken every fourth day the standard will be violated if the criterion is exceeded twice out of every 273 consecutive samples (*i.e.*, seventy-three hundredths of one percent, or 0.73%).

The Policy does not include a single provision that incorporates or acknowledges the allowable exceedance frequency language of the CTR standards. The Policy operates on the assumption that the standard is the numeric criteria alone. This is not the case. The beneficial uses are themselves a part of the policy.[94] Thus, the exceedance frequency that protects that beneficial use is an absolutely essential aspect of the standard. Moreover, the CTR itself establishes a procedure for altering the allowable exceedance frequencies.[95] The procedure requires EPA review and approval.[96] The failure of the policy to incorporate the CTR

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[89] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).
[90] Letter from Alexis Strauss, U.S. EPA Region IX to Celeste Cantu, SWRCB (July 25, 2003).
[91] Policy §§ 3.1.1 through -3.1.11 and §§ 4.1through 4.10, including the Alternate Data Evaluation procedures set forth in section 3.1.11 and 4.10.
[92] 33 U.S.C. § 1313(d); 40 C.F.R. § 130.7(b)(1), 130.10.
[93] 40 C.F.R. 131.38 § (c) (2) (iii).
[94] 33 U.S.C. §1313(c)(2)(A).
[95] 40 C.F.R. 131.38 § (c) (2) (v).
[96] *Id.*

allowable exceedance frequency renders it utterly unable to protect the underlying beneficial uses. The FED provides no explanation for this radical departure from the CTR standards.

Instead, the Policy disregards this part of the standards and establishes its own "critical rate of exceedances" of 10%. This exceedance rate is then combined with a statistical test that raises the bar even higher.[97] This mechanism simply cannot be reconciled with the CTR standards. This switch results in a test that is less protective than the standard by orders of magnitude. Using the examples discussed above, where 1095 samples are taken rather than requiring 2 exceedances as called for by the CTR, the Policy demands 123 in order to list. In the case of 273 samples the policy demands 35. Thus the Policy requires 121 and 33 more hits, respectively, than the CTR standard. This implies that in these examples the Policy is 15 to 60 times less protective of the beneficial use than the plain language of the standard. Even at much smaller sample counts the Policy is disturbing. For sample populations of less than twenty the policy requires 5 samples to exceed the CTR value. This is a range of 25-100% exceedances, with no possibility that sample populations of less than 5 will be listed.

Moreover, the Policy's test substitutes an orange for an apple. The CTR allowable exceedance frequency is independent of the number of samples taken. Whether 10 samples are taken or 500 the question is whether over three years the numeric values have been exceeded more than once. In stark contrast, the Policy's hypothesis testing is tied to sample count and totally divorced from any time period. 10% is required regardless of whether the samples are taken over a month or 10 years. This creates a perverse result. Under the Policy the frequency of impairment that is allowed will vary wildly depending upon the number of samples that are taken over a given period of time. For example if 500 samples are taken over a three year period the Policy requires 60 exceedances before a listing will occur, whereas, for 100 samples 15 exceedances will suffice. This suggests that one water body is permitted to exceed the numeric criteria four times as often as another merely because more samples have been taken. This is simply arbitrary.

In defense of its methods, the FED states that its statistical test is designed to reduce "variability, uncertainty, and the potential for error."[98] However, the FED provides absolutely no evidence to demonstrate that sampling data for the toxic chemicals on the CTR list are subject to variability, uncertainty or the potential for error. There is nothing presented to justify the extreme consequences described above. In fact, all the available evidence suggests just the opposite -- that there is an exceedingly small likelihood of wrongly detecting a CTR constituent in the water column. Quality control procedures such as those set forth in the SWAMP Quality Assurance Project Plan include provisions for both field and laboratory blank samples and ultra-clean sampling techniques. These provisions provide protection against false positive detections. The science shows that there is a vastly greater likelihood that sampling will not detect the presence of one of these toxic chemicals even when it may be present at a level that cause impairment. *Id.* Consequently the statistical test applied to CTR constituents and similar standards is arbitrary and capricious and conflicts with the mandates of the CWA. A measure

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[97] This 10% rate is then tested using the binomial model with a 90% confidence interval. In all cases this mechanism worsens the problem by requiring an even larger number of sample exceedances in order to demonstrate the water body should be placed on the list. *See* Draft Policy Tables 3.1 and 4.1.

[98] FED at 143. In other sections we demonstrate that the Policy actually addresses "variability, uncertainty, and the potential for error" in an incredibly biased manner. The Policy intentionally increases the error of not listing polluted waterways in order to reduce the chance of wrongly listing an unimpaired waterway.

with the potential to reduce protections for waterways must be justified by ample evidence of a problem. No justification is provided.

The Policy's Statistical Test is Unlawfully Inconsistent With Water Quality Standards for Other Constituents.

The CTR standards are but one example of the inappropriate application of the statistical test to a water quality standard. The statistical test is similarly problematic as applied to parameters that include, but are not limited to:

- narrative Basin Plan objectives for Toxicity, which typically allow "no toxics in toxic amounts" or simply "no toxicity." The Policy's approach would allow "toxics in toxic amounts" and "toxicity" in excess of 10% of the time before triggering a listing.
- numerous Basin Plan objectives for conventional pollutants which rarely allow an exceedance rate of 10% or greater
- natural sources

The Policy's Statistical Test Constitutes an Illegal Modification of Existing Water Quality Standards.

Despite numerous assertions to the contrary in the FED, the proposed Policy's statistical test will in effect alter and modify existing water quality standards. As described above, the policy substitutes its statistical test (10% "Critical Exceedance Threshold" coupled with a binomial hypothesis test) for the exceedance frequency specified in various water quality standards. Of greatest concern is the substitution contemplated for the frequency specified for toxic chemicals by the CTR.

The FED argues that because the Policy does not change the standard for all purposes, the standard has not been changed and points to other uses of standards such as the development of effluent limits and enforcement of standards that will not be directly impacted by the Policy.[99] This argument amounts to the following: if a standard is not changed for all purposes it is changed for none. This illogical reasoning must be rejected. The Policy will alter standards for purposes of the CWA's bedrock TMDL program, arguably the most important purpose for which standards are used. That is enough to trigger the standards revision process.

When a state revises or adopts a new water quality standard, the new or revised standard must be submitted to the EPA for review and approval.[100] Such revisions are subject to public review and comment.[101] More importantly, the revision must be supported by a finding that the revised standards will protect beneficial uses.[102] In addition, federal regulations set forth the minimum requirements for a standards revision, which include an articulation of the "methods and analyses conducted to support" the revision and an attorney general certification.[103]

None of these requirements have been met. The state does not intend to submit the Policy to U.S. EPA for review. The Policy and the FED have not been forthright about the

[99] FED at 143.
[100] 33 U.S.C. 1313(c)(2) and 40 C.F.R. § 130.9(a)(3), 131.5, 131.21(c)(2)(e).
[101] 40 C.F.R. § 131.20.
[102] 40 C.F.R. §§ 131.6(c), 130.3, 131.2.
[103] 40 C.F.R. § 131.6.

standards change and consequently the public has been excluded from participation in this process. The Policy and FED do not and cannot make the required finding regarding beneficial uses. Nor have methods and analyses been conducted to support the revision and no attorney general certification has been prepared. In short the WQSs revision meets none of these requirements and is consequently illegal.

The FED references a court decision regarding Florida's listing policy[104] asserting that Florida's statistical approach "has been found to neither formally nor in effect establish new or modified existing water quality standards or policies generally affecting those water quality standards (*Florida Public Interest Group et al. vs. U.S. EPA et al.*, 2003)."[105] The Board should take little comfort in the Florida decision because the case's holding is far narrower than the FED suggests.[106] The petitioners in the Florida case brought suit against U.S. EPA for failing to exercise its non-discretionary duty to review the Florida Policy as a change in standards under CWA section 303(c)(2). The court did determine that U.S. EPA's duty was not triggered, however, the courts decision was explicitly predicated on U.S. EPA's administrative finding that the Policy did not modify WQSs. Here, EPA has made no such finding; rather, EPA has come to precisely the opposite conclusion regarding California's Listing Policy.[107] Assuming a California court provides the same level of deference to U.S. EPA as the court in the Florida case, California' procedure will be found to be an illegal change in standards.

2. *The Adoption of the Methodology Would Violate California's Antidegradation Policy*

State antidegradation policy, which incorporates federal antidegradation policy,[108] requires that California "maintain existing Beneficial Uses of navigable waters, preventing their further degradation." *PUD No. 1 of Jefferson County v. Washington Dept. of Ecology*, 511 U.S. 700, 705 (1994); *see also* SWRCB Resolution No. 68-16; 40 C.F.R. § 131.12. Under the policy, the state must make an "antidegradation finding" if water quality is reduced as a consequence of an action taken by the State Board. *See* Memorandum from William Attwater, SWRCB Chief Counsel, to Regional Board Executive Officers 5 (Oct. 7, 1987) ("antidegradation policy is triggered by a lowering of surface water quality") ("Attwater Memo"); Memorandum from James W. Baetge, Executive Director, SWRCB, *Antidegradation Administrative Procedure Update*, at 4 (July 2, 1990) ("Antidegradation APU"). Consequently, the policy's applicability "need not be triggered by a discharge or any particular 'activity'." USEPA, Region IX letter to Edward Anton, Acting Executive Director, SWRCB (May 26, 2002). Rather, an antidegradation analysis must be conducted and antidegradation effects must be considered whenever there is the potential for an increase in the emissions of a pollutant, "even if there is no other indication that the receiving waters are polluted." Antidegradation APU at 4; *see also In re Rimmon C. Fay*, SWRCB WQO 86-17 at 21 (Nov. 20, 1986).

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[104] Florida Public Interest Research Group Citizen Lobbing, Inc., et al., v. U.S. EPA et al. 4:02vc408-WS (2003, N. D. Fla.) Order Granting Defendants' Motion for Summary Judgment.

[105] FED at 143-144.

[106] In addition, we believe the Florida case was wrongly decided.

[107] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

[108] The State Water Resources Control Board has construed California's antidegradation policy, which is embodied in SWRCB Resolution 68-16, to incorporate the federal antidegradation policy embodied in 40 C.F.R. § 131.12 wherever that policy applies (i.e. to waters of the United States). *See In re Rimmon C. Fay*, SWRCB WQO 86-17 at 17-18 (Nov. 20, 1986); *see also* Memorandum from William Attwater, SWRCB Chief Counsel, to Regional Board Executive Officers 2 (Oct. 7, 1987).

As concerning the statistical methodology adopted by the state for establishing the 303(d) list, the FED, which analyzes the consequences of implementing this methodology, readily admits that the statistical method of establishing the 303(d) list will remove currently listed water bodies from that list without any new information that demonstrates that that water body is not truly impaired. *See* FED at 167, 174, 182-83. The resulting abandonment of TMDLs and their attendant waste load allocations for these previously listed water bodies would, or at least could potentially, result in an increase in mass emissions of pollutants to these water bodies over and above what would be allowed with a TMDL was in place. This increase in emissions is sufficient to trigger the state's antidegradation policy. *See* Antidegradation APU at 4.

Furthermore, given that application of the statistical methodology will result in truly impaired water bodies not being listed (*see supra*), any antidegradation analysis will reveal that adopting the statistical methodology is prohibited. This can be easily demonstrated. The first step in conducting any antidegradation analysis is to determine whether or not the proposed action will lower water quality. Antidegradation APU at 7; *see also* Region 9, U.S. EPA, *Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12* at 3 (June 3, 1987) ("EPA Guidance"). The next step is determining whether water quality is better than necessary to support designated uses. Antidegradation APU at 7. If water quality is not better than necessary to support designated uses, the action is prohibited. *Id.*

As discussed above, the "delisting" of a previously listed water body will reduce water quality in that water body. Then, by definition, given some or all of the "delisted" water bodies will be actually impaired (due to the propensity of the methodology to favor de-listing impaired waters), associated water quality is not better than necessary to support designated uses. Therefore, under California's antidegradation policy, the "delisting" as a result of applying the statistical methodology is prohibited. Antidegradation APU at 7; EPA Guidance at 10; *see also In re Rimmon C. Fay*, SWRCB WQO 86-17 at 21 (given that increase in suspended solids and associate bacteria caused by reduction in level of treatment *may* contribute to a violation of water quality objectives, reduction in treatment is inconsistent with the requirement that existing instream water uses and the level of water quality necessary to protect them shall be maintained and protected). Given that the adoption of the statistical method results in violations of California's antidegradation policy, adopting the Draft Policy itself violates antidegradation policy.

3. Application of the Methodology Would Create Conditions Constituting Further Violations of the Anti-Degradation Policy

Aside from the impropriety of establishing this methodology absent an anti-degradation analysis and consistency with anti-degradation requirements, the methodology's requirements are sufficiently insensitive so as to trigger additional violations of these provisions over time. Section 3.1.10 of the Draft Policy, which addresses "trends in water quality," is <u>not</u> a substitute for a methodology for identifying threatened (or impaired) waters for a number of reasons. Most significantly, listing a water body based on declining water quality should not require the determination of the occurrence of adverse biological response, degradation of biological populations and communities, or toxicity, as Section 3.1.10 recommends. This Section sets an artificially high bar for assessing "threatened" waters for purposes of listing, as discussed in more detail elsewhere in these comments.

Determining that a water body is violating antidegradation requirements (the stated focus of this section) before being listed for declining water quality should not require the observation

of such severe reactions to pollution. These observations often indicate impairment without Section's 3.1.10's accompanying requirements (three years of data and statistical analyses compared to baseline conditions).

More specifically, the requirement that adverse biological response, degradation of biological populations or toxicity is observed in and of itself is too onerous because most water quality monitoring does not include these more expensive and sophisticated tests. Under this policy, many water bodies with declining water quality would not be listed because these tests were not conducted. Importantly, there would be a disincentive to perform these tests or assessments. The end result of this policy would be a severe impact must be observed before the State can determine that antidegradation requirements are being violated. This is unacceptable and in violation of the antidegradation requirements of the CWA and State policy, and as a result the requirement that staff must "[d]etermine the occurrence of adverse biological response, degradation of biological populations and communities, or toxicity" must be removed from the list of requirements the Regional Boards must meet to list a water body for declining trends in water quality.

4. The Methodology Violates CEQA

Under CEQA, a state or local agency must initiate environmental review prior to carrying out or approving any discretionary action that may have a significant impact on the environment.[109] If the agency finds that a project may have a significant effect on the environment, the agency must prepare an environmental impact report ("EIR").[110]

CEQA provides a limited exemption from its EIR requirement for state agency regulatory programs whose written documentation containing environmental information serves as a functional equivalent of an EIR, and the Porter-Cologne Act contains an additional exemption associated with the issuance of waste discharge requirements.[111] The State Board Draft Policy process has been certified as functionally equivalent program to which the Porter-Cologne Act exemption does not apply.[112]

While an environmental impact report ("EIR") is not required for certified regulatory programs, the Board's decision to adopt a Draft Policy must still comply with the policies and provisions of CEQA from which it is not specifically exempted.[113] Thus the broad policies expressed in CEQA at Pub. Res. Code § 21000 and the substantive standards of CEQA at Pub. Res. Code § 21001 as well all other provisions of CEQA apply to review and approval of the Draft

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[109] *See Friends of Westwood, Inc. v. City of Los Angeles,* 191 Cal. App.3d at 267, 269-270.

[110] Pub. Res. Code § 21100(a); *Bozung v. Local Agency Formation Com.* (1975) 13 Cal. 3d 263, 277-279. CEQA defines a "significant effect" as a "substantial, or potentially substantial, adverse change." Pub. Res. Code, § 21068. This means that an activity has a significant effect if it "has the potential to degrade the quality of the environment." See also 14 Cal. Code Reg. § 15382; *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal. App. 4th 786, 795; *Azusa Land Reclamation Co. v. Main San Gabriel Basin Watermaster, supra,* 52 Cal. App.4th at 1192. (Citing Pub. Res. Code § 21083.) (emphasis added.)

[111] Pub. Res. Code § 21080.5(a); *Sierra Club v. State Bd. of Forestry, supra,* 7 Cal. 4th at 1229-1230; *Citizens for Non-Toxic Pest Control v. Department of Food & Agriculture* (1986) 187 Cal. App. 3d 1575, 1584.

[112] 14 Cal. Code Reg. § 15251(g).

[113] *See* § 21080.5(c) (Certified regulatory programs exempt from the provisions of Chapter 3 (commencing with section 21100) and Chapter 4 (commencing with section 21150) and with the timetable section for judicial review (section 21167.) *Mountain Lion Foundation v. Fish & Game Commission* 16 Cal. 4th 105, 114 (1997); *Sierra Club v. State Board of Forestry* 7 Cal. 4th at 1228, 1230,1231.

Policy.[114] This includes CEQA directives that an agency consider the cumulative impacts of its project approvals,[115] provide timely and adequate responses to comments made by the public,[116] and consider feasible alternatives to the proposed action.[117]

The guiding principle in the review of projects under CEQA is that CEQA must be interpreted so as to afford the fullest possible protection to the environment.[118] EIRs and their functional equivalents under certified programs demonstrate to an apprehensive citizenry that the agency has analyzed and considered the ecological implications of its action.[119] These CEQA policies are also included in the State Board's regulations at 23 Cal. Code Reg. 3775 *et seq.*

The FED fails to identify, analyze and mitigate numerous significant and potentially significant adverse environmental effects of the project.

CEQA requires that EIRs and functionally equivalent documents identify and analyze all significant and potentially significant adverse environmental effects of the project. CEQA defines "significant effects" as a "substantial, or potentially substantial, adverse change." Pub. Res. Code, § 21068. (emphasis added.) *See also* Pub. Res. Code § 21083(a); *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal. App. 4th 786, 795; This means that an activity has a significant effect if it "has the potential to degrade the quality of the environment." *See also* 14 Cal. Code Reg. § 15382; *Azusa Land Reclamation Co., supra,* 52 Cal. App.4th at 1192.

The CEQA Guidelines require a mandatory finding of significance for projects that will cause "substantial adverse effects on human beings, either directly or indirectly," as well as projects with "potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species." 14 Cal. Code Reg. § 15065. *See also* CEQA guidelines, Appendix G, § XVII ("Mandatory Findings of Significance.")

The FED summarily concludes that there will be absolutely no impact from this sweeping and dramatic policy change, not even a "less than significant impact." FED, Environmental Checklist, pp. 242-248. Potentially adverse environmental effects are disposed of in a series of curt and conclusory paragraphs with no analyses whatsoever. FED, Environmental Effects of the Proposed Policy, at 218-241. Potentially significant adverse environmental effects are

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[114] *Sierra Club*; *Ultramar, Inc. v. South Coast Air Quality Management District* (1993) 17 Cal.App.4th 689, 699; *EPIC v. Johnson* 170 Cal.App.3d at 609-611. *Accord Schoen v. CDF, supra,* 58 Cal. App. at 565-567; *Friends of Old Trees v. CDF, supra,* 52 Cal. App. 4th at 1394. *Laupheimer v. State of California* (1988) 200 Cal.App.3d 440, 462; *Gallegos v. State Bd. of Forestry, supra,* 76 Cal. App.3d at 952; *Natural Resources Defense Council, Inc. v. Arcata Nat'l. Corp.* (1976) 59 Cal.App.3d 959, 963, 969.

[115] *EPIC v. Johnson, supra,* 170 Cal. App. 3d at 625

[116] *Id.* at 622; *Dunn-Edwards Corp. v. Southcoast Air Quality Management District* (1993) 19 Cal. App. 4th 519, 534; Pub. Res. Code § 21080.5(d)(2)(D).

[117] *Friends of Old Trees v. Dept. of Forestry and Fire Protection, supra,* 52 Cal. App. 4th at 1404-1405. *See also* §§ 21080.5(d)(3), 21080.5(d)(2)((A)

[118] *Laurel Heights* 47 Cal.3d at 390; *Friends of Mammoth v. Board of Supervisors* (1972) 8 Cal.3d 247, 259.

[119] *Sierra Club,* 7 Cal. 4th at 1229; *EPIC v. Johnson,* 170 Cal.App.3d at 609-11. *See also* Pub. Res. Code § 21080.5(d)(3)(i)-(ii) (written documentation for a certified regulatory program shall include a description of activity, alternatives, and mitigation measures to minimize significant environmental impacts, and shall be available for a reasonable time for review and comment by the general public.)

afforded only a single word of discussion -- the word "None." These findings are not supported by any evidence in the record and are in fact contradicted by numerous other findings and evidence set forth in the FED.

This policy establishes the mechanism by which polluted waterways will be admitted to and removed from the Clean Water Act's backstop pollution cleanup program. The TMDL program serves as the final protection for the many beneficial uses of California's waters, including drinking water supply, water contact recreation, sport and commercial fishing, habitat for fish and wildlife, and preservation of rare and endangered species. Consequently, the Policy determines in reality how much protection these beneficial uses will ultimately enjoy and in specific instances whether beneficial uses will remain available or not. The degree to which the Policy is or is not precautionary and conservative regarding the listing of impairments will directly increase or decrease the number of waterways where beneficial uses are protected and attained.

To put this in context there are currently 685 waterways with a total of 1,883 different pollutant impairments.[120] It is expected that numerous other water body pollutant combinations will be proposed for listing in the coming years. A single water body that does not meet standards is by itself a significant impact. The Policy has the potential to impact hundreds if not thousands of waterways. All of these impacts must be identified, analyzed and mitigated by the Board.

Moreover, since the Draft Policy applies to virtually every regulated pollutant, and determines whether discharges of these pollutants will be reduced in the future, it is self evident that the policy will impact the quantities of these pollutants being released into the environment. Consequently, the policy has the potential to influence the wide array of problems linked to pollution, including human health problems such as cancer, pathogen caused disease, and disruption of the endocrine, immune and neurological systems; as well as ecological impacts such as harm to fisheries and wildlife and reducing the fitness of endangered and threatened species; and the degradation of the aesthetic enjoyment of the environment. The FED wholly fails to identify, analyze and mitigate any of these potentially significant effects.

The FED Fails To Identify, Analyze and Mitigate Significant Adverse Impacts to Impaired Waterways That Will Not Be Listed or Will Be Removed from the List

As discussed elsewhere in our comments the Policy guarantees that numerous impaired water bodies will not be listed (or will be delisted) including:

- water bodies whose impairment is periodic or episodic;
- water bodies whose impairment is recent, even if the data shows a clear trend over time toward the current exceedance of standards;
- water bodies whose impairment is supported by older data even in the absence of more recent counter-indicative data;
- water bodies in which an impairment is not uniformly distributed in the water body, for example, a water body where downstream pollutant concentrations are higher than upstream concentration if samples taken throughout the water body are employed in the statistical test;

[120] 2002 303d List

- impaired waterways in which only a moderate number of sample have been taken;
- water bodies impaired with toxic chemicals whose sampling does not satisfy the "Critical Exceedance Threshold" set forth in the Policy;
- water bodies whose impairments are not amenable to statistical testing;
- water bodies impaired by pollution rather than pollutants;
- water bodies impaired by exotic species;
- water bodies impaired by natural sources; and
- water bodies impaired by toxicity where no pollutant has been identified.

Moreover, the statistical test described in the Policy and FED exhibits a profound bias in the manner it deals with error. This bias ensures that numerous and repeated errors will be committed by decision makers in their listing and delisting efforts. These errors will consistently result in the failure to list impaired waterways and will reduce the overall size of the list. The FED demonstrates that much of this error is avoidable. The FED, further, concedes that under the proposed policy vastly fewer water bodies will be listed than under the status quo process. The FED also describes alternatives that would provide far greater protection against these sorts of harmful impacts. Nevertheless, every time a choice is presented amongst alternatives that would impact the size of the list, or the likelihood of failing to list an impaired water body the Policy selects a choice that would either reduce the size of the list, and/or increase the probability of errors that would leave severely polluted waterways off the list or remove them from the list.

For example, in describing the selection of the null hypothesis for the Policy's statistical approach the FED states that the selected hypothesis "gives the Board greatest control over the error of incorrectly adding water bodies to the section 303(d) list,"[121] at the expense of controlling "the error of not identifying real water quality problems that can have impacts on aquatic life or human health."[122] The FED also notes that the policy's choice of hypothesis will likely cause another important impact, reduced incentives for dischargers to collect samples. "[T]here may be reduced incentives to increase sample sizes because more data may indicate that water quality standards are not being met and the water should be listed."[123] In other words, the policy's choice of hypothesis may increase the chances that water quality problems will go undiscovered and therefore unaddressed.

Perhaps more disturbing is the FED's discussion of the Policy's choice to use 10% as the so called "Critical Exceedance Threshold." The FED states:

> If a 10 percent value were used for evaluating sample data, the number of decisions to list waters would be reduced by approximately 14 percent from the listing decisions approved during the 2002 section 303(d) process.[124] Figure 18 on page 174 of the FED provides a graphic illustration of this frightening choice.

Further compounding this problem is the selection of the Exact Binomial Test as the statistical test for determining compliance. As discussed elsewhere in our comments, the Policy's choice to employ the combination of the Binomial Test and a 90% confidence interval

[121] FED at 148
[122] FED at 149.
[123] *Id.*
[124] FED at 172.

for listing decisions will result in a dramatically greater (81to362 times greater) likelihood of erroneous decisions that fail to list dirty waterways (Type II error) than erroneous decisions that list a clean water way (Type I error). The FED itself concedes this fact.[125] The Policy also concedes that other statistical methods such as EPA's "Raw Score" method would "significantly lower" this type of error.[126] Further, the FED concedes that "[u]sing a 90 percent confidence level in exact binomial tests . . . would likely result in fewer water bodies placed on the section 303(d) list."[127]

Finally, the Policy's choice to employ minimum sample size and a high exceedance rate for small sample populations will result in a dramatic reduction in the number of listings from current listing practices.[128] The combined impact of all of these choices is a Policy that will create dramatically less protection for the beneficial uses of California's waters than is currently available. The Policy will cause a demonstrably higher level of pollution with consequent human health and environmental impacts. These effects are adverse and significant. Consequently, the FED must identify, analyze and mitigate for them. In the absence of such identification, analysis and mitigation any approval of the policy violates CEQA.

The FED Fails to Adequately Describe the Environmental Setting of the Project.

The Environmental Setting section of the FED is deeply flawed and falls far short of CEQA's requirements. CEQA requires a full description of the environmental setting in which a project occurs. The FED utterly fails to describe California's widespread pollution problems and degraded beneficial uses. As such it is inadequate under the law.

The first step in evaluating the impacts of a project is to assess existing impacts and conditions, so CEQA requires a full description of the environmental setting in which a project occurs.[129] In *San Joaquin Raptor v. County of Stanislaus,*[130] the Court of Appeal applied CEQA Guidelines § 15125 to set aside an EIR for a housing subdivision for failing to adequately describe the existing environmental setting of the site. The Court found that in the absence of such a description, it is "impossible for the [FEIR] to accurately assess the impacts the project will have on wildlife and wildlife habitat or to determine appropriate mitigation measures for those impacts." *Id.*[131]

The Court in *San Joaquin Raptor* also cited *Remy et al., Guide to the Cal. Environmental Quality Act* (Guide to CEQA) (7th ed. 1993) as follows:

> The Guide to CEQA explains the significance of adequate consideration of the existing environmental setting: "Because the concept of a significant effect on the environment focuses on changes in the environment, this section requires

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[125] FED at 152, Table 12 ("high Type II error (n<20).
[126] FED at 153, *and see* FED at 162, Figure 15.
[127] FED at 166.
[128] FED at 181-183.
[129] *San Joaquin Raptor v. County of Stanislaus* 27 Cal. App. 4th at 722-723.
[130] 27 Cal. App. 4th at 722-223.
[131] CEQA Guidelines § 15125 provides: "An EIR must include a description of the environment in the vicinity of the project, as it exists before the commencement of the project, from both a local and regional perspective. The description shall be no longer than is necessary to an understanding of the significant effects of the proposed project and its alternatives. (a) Knowledge of the regional setting is critical to the assessment of environmental impacts. Special emphasis should be placed on environmental resources that are rare or unique to that region and would be affected by the project."

> an EIR to describe the environmental setting of the project so that the changes can be seen in context. The description of the pre-existing environment also helps reviewers to check the Lead Agency's identification of significant effects." (Guide to CEQA, *supra*, p. 579.)[132]

The Court concluded:

> We must interpret the Guidelines to afford the fullest possible protection to the environment." (*Kings County Farm Bureau v. City of Hanford*, supra, 221 Cal.App.3d at 720.) Careful review of the administrative record demonstrates that the FEIR's description and consideration of the site and surrounding area is so incomplete and misleading that it fails to meet the standard set forth in State CEQA Guidelines section 15125.[133]

The Third District Court of Appeal in *Communities for a Better Environment v. California Resources Agency*[134] recently upheld the principle that in order to assess the cumulative impacts of a project an accurate description of the environmental setting is essential, noting that, in assessing cumulative impacts, an agency must take into consideration past impacts on the environment to determine whether additional impacts may be significant.[135]

The Environmental Setting section of the FED appears to simply cut and paste the watershed descriptions from California's nine regional Basin Plans.[136] The FED does not describe the vast amounts of pollutants and pollution that have been and continue to be discharged into California's waters. No effort is made to quantify these discharges in terms of mass, toxic effect or other impact. The FED makes no effort to describe the widespread violations of standards and impairments in each of these watersheds. The FED does not describe the numerous water bodies in California that are in danger of becoming impaired by pollutants. Nor does the FED make any attempt to describe the beneficial uses that have been harmed by these impairments.

For example, the FED does not describe the human communities who eat fish contaminated with bio-accumulative toxins, the swimmers who are put at risk by bacteria impairments, or the threatened and endangered species whose success is compromised, populations diminished and habitat degraded by these impairments. In fact in the entire document not one word is spent on describing these problems. Further, the FED fails to include information about rising cancer rates, immuno-deficiencies and other human health problems that have been or may in the future be linked to pollution.[137] This information about the

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[132] *Id.* at 722-723.
[133] *Id.*
[134] 103 Cal. App. 4th _____.
[135] *Communities for a Better Environment v. California Resources Agency*103 Cal. App. 4th at 117 (proposed guidelines "would turn cumulative impact analysis on its head by diminishing the need to do a cumulative impact analysis as the cumulative impact problem worsens.")
[136] FED at 6-30.
[137] *See, e.g.*, USGS, "The Quality of Our Nation's Waters, Nutrients and Pesticides," Circular 1225 (1999); Samuel H. Wilson, M.D., William A. Suk, Ph.D., M.P.H.; "Biomarkers of Environmentally Associated Disease, Technologies, Concepts, and Perspectives," Lewis Publishers, CRC Press LLC, 2002; David O. Carpenter, Kathleen Arcaro, and David C. Spink: "Understanding the Human Health Effects of Chemical Mixtures," *Environmental Health Perspectives* 110(suppl 1):25-42 (2002); Ted Schettler, M.D., Gina Solomon, M.D., Maria Valenti, and Annette Huddle; *Generations at Risk, Reproductive Health and the Environment*, MIT Press, 1999; Michael C., Newman and Michael A. Unger; *Fundamentals of Ecotoxicology*, Lewis Publishers, CRC Press, 2003; Jones-Lee &

environmental setting is essential to support an analysis of the cumulative impacts of this policy and the analysis of alternatives. Further, without this information it is impossible for the public to fully evaluate the Board's decision. Consequently without this additional information the FED is inadequate under the law.

The FED Fails to Adequately Consider and Mitigate the Cumulative Impacts of the Policy.

The FED asserts the policy will not result in any cumulatively significant impacts. This assertion is supported by a mere two pages of discussion, most of which focuses on federal legal requirements pertaining to listing and TMDLs. No effort is made to analyze impacts that may result from individual or repeated failures to list impaired waterways. This contravenes CEQA's requirement that cumulative impacts be considered and mitigated.

The CEQA Guidelines require a mandatory finding of significance for a project with "possible environmental effects, which are individually limited but cumulatively considerable." "Cumulatively considerable" means that the incremental effects 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."[138]

No effort is made if the FED to analyze impacts that may result from individual or repeated failures to list impaired waterways when combined with the impacts of other policy decisions such as the recently adopted waivers for agricultural and silvicultural waste in the Central Valley, the proposed California Non-Point Source Plan, the proposed amendments to the Ocean Plan, the ongoing NPDES permitting program or numerous other water board projects. Likewise no effort has been made to identify, analyze or mitigate the health impacts that arise from the repeated exposure of humans to the pollutants and pollution resulting from this policy when combined with other sources such as from air sources, food sources, workplace exposures, etc. Nor has a similar analysis of the cumulative ecological effects of these pollutants and this pollution when combined with that of other sources been conducted. This contravenes CEQA's requirement that cumulative impacts be identified, considered and mitigated.

The FED Is Inconsistent with Policy and Fails to Accurately Describe the Proposed Project.

In its description of the Policy the FED sets forth a variety of measures that if implemented would to some extent mitigate some of the Policy's adverse environmental impacts. However, these measures cannot be found in the Policy itself. These inconsistencies are misleading and cause the FED's project description to be inaccurate.

Lee, "Organophosphate Pesticides as Pollutants of Urban Lakes, Streams Creeks" (1999); Reigart & Roberts, "Recognition and Managment of Pesticide Poisonings," Fifth Edition, (1999); Heavner (CALPIRG), "Toxics on Tap: Pesticides in California Drinking Water Sources" (1999); Kathryn R. Mahaffey, Ph.D., "Meythylmercury: Epidemiology Update," USEPA, Presentation to Fish Forum in San Diego (2004); USFDA, "Draft Advice For Women Who Are Pregnant, Or Who Might Become Pregnant, and Nursing Mothers, About Avoiding Harm To Your Baby Or Young Child From Mercury in Fish and Shellfish" (Dec. 10, 2003); Subcommittee on Nitrate and Nitrite in Drinking Water, Committee on Toxicology, National Research Council, "Nitrate and Nitrite in Drinking Water" (1995).

[138] 14 Cal. Code Reg. § 15065(c). *See also Communities For a Better Environment v. California Resources Agency* (2002) 103 Cal. App. 4th 98, 114 ("environmental damage often occurs incrementally from a variety of small sources.") *Kings County Farm Bureau, supra,* 221 Cal.App.3d at 720-721.

Exacerbating the confusion, the Policy does not make clear what legal significance the FED will have after adoption of the policy. Will the FED descriptions of these measures be binding on the SWRCB and RWQCBs? Will the FED act as guidance in interpreting the Policy? Will the measures described in the FED simply be disregarded after Policy adoption?

Among the measures set forth in the FED which do not appear in the Policy are:

- a weight of evidence alternative listing procedure;
- a weight of evidence approach to determine the pollutants(s) that may cause toxicity;
- a procedure for listing nutrients which allows the use of "models, scientific literature, data comparisons, to historical values or to similar but unimpacted streams, Basins Plan objectives, other scientifically defensible methods" in making a listing decision;
- a procedure, which allows "both quantitative and qualitative data and information in the evaluation of nuisance." (i.e. odor, taste, excessive algae growth, foam, turbidity, oil, litter or trash and color.)
- a case-by-case interpretive approach to the listing of sedimentation providing that "general guidelines to trigger listing" and stating that a water body can be listed if any one of the following conditions are met: beneficial use impairment caused by increased sediment loads; evidence that beneficial use impacts are caused by sediment; nuisance caused by sediment loads, or exceedances of turbidity objectives. .

None of these important mechanisms are clearly and explicitly set forth in the Policy document. Each procedure would operate as a mechanism to soften the impact of the Policy's rigorous requirements such as the binomial hypothesis test.

For example, the FED repeatedly describes a robust alternative listing procedure that relies on a weight of the evidence test. The Policy does not contain such a procedure. Instead sections 3.1.11 and 4.10 of the Policy set forth a procedure that is no less restrictive that the binomial hypothesis statistical test. The procedure excludes qualitative information and other non-quantitative tools instead stating "[t]he measurements can be analyzed using a scientifically defensible procedure that provides an equivalent level of confidence as the listing factors in section 3.1 and tests the null hypothesis that water quality standards are attained." In addition the procedure requires that "[t]he data and information can be compared to applicable water quality objectives, water quality criteria, or numeric guideline." These requirements describe statistical hypothesis testing not a weight of the evidence procedure. Thus, the weight of evidence language in the FED appears to be both inaccurate and misleading.

To the extent these measures are not a binding part of the Policy, a decision of the Board based upon the FED violates CEQA. The FED inaccurately describes the project and its mitigation measures. This is misleading to the public and defeats the central purpose of the statute. Additionally, the failure to incorporate these measures into the policy invalidates the FEDs finding of no significant impact. Moreover, many of these policy provisions constitute mitigation measures, which lessen the policy's impact on the environment. CEQA mandates that such requirements be carried out contemporaneously with the project.

The FED Fails to Include a Statement of Overriding Considerations

As described above adoption of the Policy as written will result in numerous significant and unmitigated adverse environmental impacts. In this circumstance, the agency must balance the economic benefits of the project against its environmental harm to determine if the project should proceed.[139] This "statement of overriding considerations," as the last step in the analysis, provides critical information to the public to fulfill the law's public disclosure requirement - that the [functionally equivalent document] function as "a document of accountability" and "informed self government."[140] However, CEQA requires that the agency first identify the adverse effects of the proposed project before it exercises that power.[141]

No statement of overriding considerations is presented in the FED. Moreover, the FED repeatedly rejects mitigation measures and selects alternatives, which favor economic and cost factors and increase the risk of adverse environmental impacts. The Policy's choices regarding the statistical test, in particular, demonstrate a desire to sacrifice human health and environmental concerns in order to "protect against the unnecessary expenditure of funds" involved in erroneously listing a waterway.[142] These choices are not permissible in the absence of a statement of overriding considerations.

D. The Methodology Is Virtually Impossible to Administer from a Practical Perspective

As noted in the National Research Council report, "water quality standards must be measurable by reasonably obtainable monitoring data."[143] Data-hungry models cannot be the sole method by which water quality is assessed in situation where the state lags in monitoring. The NRC Report agrees, stating that government

> should not advocate detailed mechanistic models for TMDL development in data-poor situations. Either simpler, possibly judgmental, models should be used or, preferably, data needs should be anticipated so that these situations are avoided.[144]

The Draft Policy appears to assume that California has a database of surface water quality information capable of supporting numeric calculation requirements such as those set forth in the Policy. This is not the case. California currently relies upon anarchy as a data management strategy for surface water quality information. Because of this fact, the Draft Policy as written cannot be implemented on a consistent statewide basis.

One step California must take in order to begin to implement numeric requirements associated with a Policy of this type in a defensible fashion is to follow the lead of other states that utilize the U.S. EPA STORET water quality data management system. The Surface Water Ambient Monitoring Program is moving forward to implement STORET compatibility, but this will solve only a portion of the problem; better integration of other available data will be

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[139] Pub. Res. Code § 21081(d); 14 Cal. Code Reg. § 15093.
[140] *Sierra Club, supra,* 7 Cal.4th at 1229 (...the board retains the power to approve a plan that has significant adverse effects upon the environment, so long as it justifies its action in light of "specific economic, social, or other conditions"; Pub. Res. Code § 21002.)
[141] *Id.* at 1233.
[142] FED at 148.
[143] NRC Report at 4.
[144] *Id.* at 10.

necessary before the state can begin to even consider a statistical methodology as data-hungry as the one proposed.

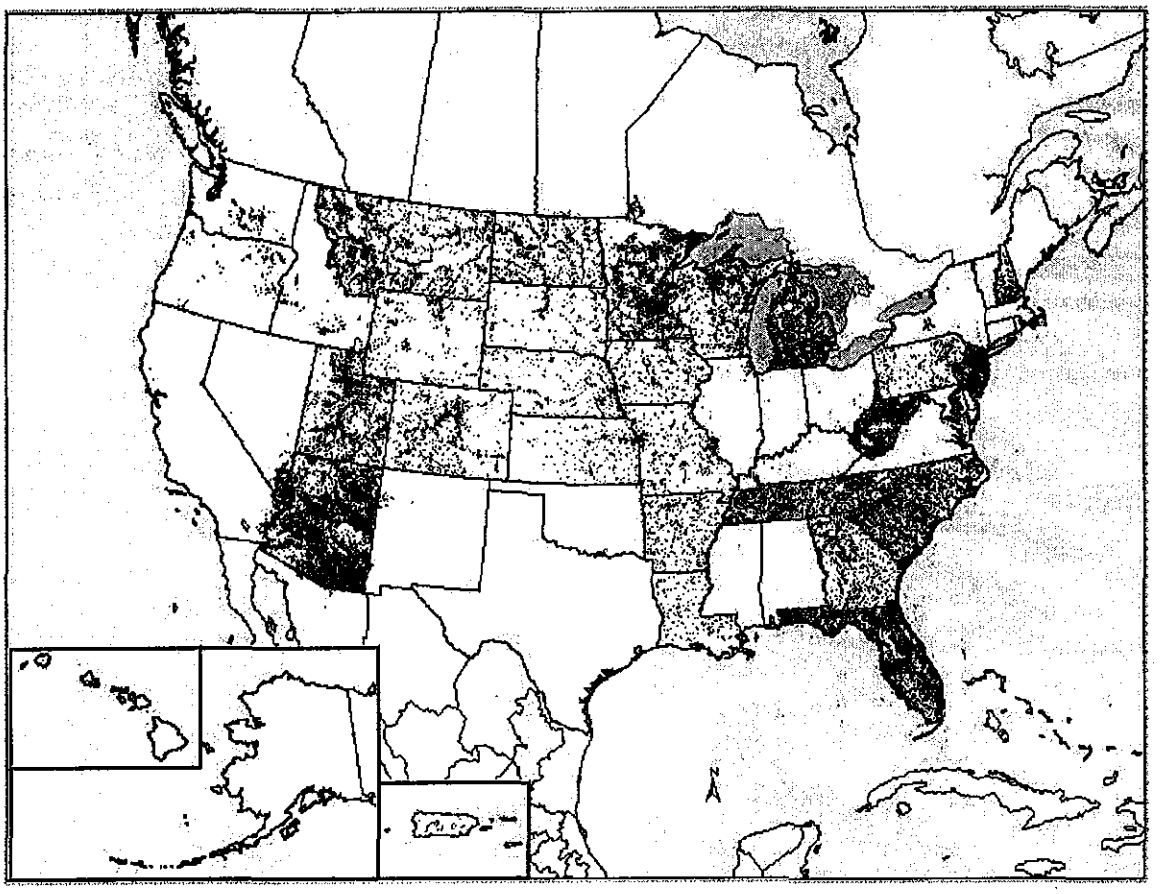

Figure 3: Blue dots represent water quality monitoring stations present in the modernized EPA STORET system. States such as Utah, Montana, West Virginia and Florida are far ahead of California in terms of data availability.

Table 3.1 of the Draft Policy presents an extremely misleading view of the amount of samples available to regional boards. The high sample counts depicted in Table 3.1 are in excess of current resources allocations and are not scientifically necessary to conduct water quality assessments. Monitoring of conventional water quality parameters often takes place on a monthly basis. Monitoring of metals, synthetic organic chemicals, PAH's, bioassessments, and toxicity testing typically take place once or twice a year at a limited number of monitoring sites. The Draft Policy's arbitrary minimum sample count requirement (excerpted from section 3.1)[145] appears to prevent a water body that is out of compliance with standards four months out of twelve from being listed. For numerous conventional water quality parameters this is scientifically indefensible. For example, if surface water nitrate concentrations in a stream exceed the drinking water standard for three months of the year, the water body is most certainly impaired, yet the Policy would not recognize this fact.

For many analytes, the high sample counts depicted in the Policy are unnecessary for making scientifically sound water quality assessments. Since the Surface Water Ambient

[145] "For sample populations less than 20, when 5 or more samples exceed the water quality objective, the segment shall be listed."

Monitoring Program budget is not likely to increase in the near future, the high sample count requirements could have the effect of either placing an unreasonable economic burden on holders of permits and waivers or, if that burden proves economically (or politically) infeasible, will ensure that impaired waters do not get listed.

As an example, a typical sampling strategy conducted in a region often involves sampling conventional water quality analytes monthly and conducts other more costly sampling a few times a year at a limited number of monitoring sites. Table 3.1 depicts sample count requirements for a single monitoring site (or single water body), which range as high as 500 samples. For most sampling types, the sample counts depicted in the table are scientifically unnecessary and economically impossible.

Using estimates of costs based on actual regional board lab pricing and SWAMP Master Contract pricing, we have estimated the costs for 500 samples for various sampling types. If a comprehensive approach were used that involved a full site or water body characterization, which employed all sampling types, 500 samples would cost $5,919,500. Since the entire statewide budget for SWAMP is approximately $4,000,000, and the sample counts in the table refer to a single site or water body, it seems the table is nonsensical. The lowest cost sampling type (Conventional Water Quality Analysis), at $111,000, is similarly ridiculous since numerous regions only receive several hundred thousand dollars per year to sample their entire regions, let alone a single site or water body.

Type of Sampling[146]	Cost/Sample	Cost of 20 Samples	Cost of 500 Samples	Notes
Conventional Water Quality Analytes	$222	**$4,440**	**$111,000**	lab cost only
Water Chemistry (chemicals and metals)	$1,452	**$29,040**	**$726,000**	lab cost only
Sediment Chemistry (chemicals and metals)	$2,918	**$58,360**	**$1,459,000**	collection and lab cost
Bioaccumulation in fish (chemicals and metals)	$4,154	**$83,080**	**$2,077,000**	collection and lab cost
Toxicity Testing	$1,980	**$39,600**	**$990,000**	lab cost only
Rapid Bioassessment	$1,113	**$22,260**	**$556,500**	collection and lab cost
Comprehensive Site Monitoring	$11,839	**$236,780**	**$5,919,500**	

Even at the de facto minimum sample size of 20 samples per site, the costs across the hundreds waters that could be evaluated for listing in any given cycle are greater than currently available budgets.

In summary, with perhaps the exception of monitoring programs based on random sample designs, most monitoring programs in California are not designed to collect data that exhibit the particular characteristics needed to draw valid statistical inferences based on binomial statistical tests (*e.g.*, normal distribution, sample independence, absence of systematic biases, etc.).[147] The costs of collecting the data demanded by this model, as illustrated above, is

[146] Sources are as follows: Regional Board Contract Laboratory Cost (2003) for Conventional Water Quality Analytes, Water Chemistry (chemicals and metals), and Toxicity Testing; and SWAMP Master Contract price list (Oct 2003) for Sediment Chemistry (chemicals and metals), Bioaccumulation in fish (chemicals and metals) and Rapid Bioassessment.

[147] *See* Lin, *et al*, "A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances," Prepared for Florida Department of Environmental Protection (Oct. 2000).

prohibitive. The result, given the limitations of the Alternative Data Evaluation process, will be to not list impaired waters. This result is completely avoidable. Monitoring strategies which do not require these high sample counts are currently deployed and can be effective when combined with a weight of evidence alternative to the statistical constraints present in the binomial approach and the currently unreasonable statistical confidence demands of the proposed alternative data evaluation section of the policy (Section 3.1.11). The Policy should accordingly be modified to require, among other things, full compliance with federal law requiring consideration of all data and compliance with the weight of evidence approach called for by the state Legislature.

E. The Methodology Will Actually Fail to List Impaired Waters and Ensure Delisting of Already-Listed Impaired Waters

For the reasons articulated above, many waters that are actually impaired and that would have been identified under past methodologies would not be identified under the overly-stringent methodology that is proposed here. EPA echoed this conclusion in its comments on the similar Draft Policy last June.[148] In Appendix VI, we spotlight four water bodies – the San Gabriel River, San Antonio Creek, Coyote Creek, and Quail Creek – that are clearly impaired but would not have been listed under the proposed Policy. The relative ease with which we found these waters belies the Draft Policy's assertion that "no issues [in the Draft Policy] were found to have the potential for significant adverse environmental effects,"[149] and illustrates the need for significant modifications to the Policy in order to ensure that similar, yet-unidentified waters are not left behind.

VII. THE PROPOSED ALTERNATIVE DATA EVALUATION PROCESS HANDCUFFS THE STATE TO THE FLAWED STATISTICAL METHODOLOGY AND FAILS TO ALLOW FOR MEANINGFUL ALTERNATIVE ASSESSMENTS

The Alternative Data Evaluation process described in Section 3.1.11, by definition, is supposed to act as an alternative to the statistical procedure when that procedure is inappropriate (such as for biologics, sediment, and toxicity) or when it appears to exclude waters that appear from the weight of the data to be impaired. The Legislature specifically demanded a weight of evidence approach in the 2001 Budget Act Supplemental Report (attached in Appendix IV):

> (e) On or before January 1, 2003, SWRCB shall develop a policy to establish criteria for the listing and delisting of impaired water bodies pursuant to Section 303(d) of the federal Clean Water Act. The policy shall include a "weight of evidence" approach and shall include criteria that ensure that the data and information used for identification and listing of impaired water bodies are accurate and verifiable.

The FED defines components of the weight of evidence approach to "consist of the strength and persuasiveness of each measurement endpoint and concurrence among various endpoints. . . . A scientific conclusion based on weight of evidence is often assembled from multiple sets of data and information or lines of evidence."[150] Weight of evidence is not only a

[148] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003).
[149] FED at 218.
[150] *Id.*

scientific standard, but a legal one as well, and is synonymous with preponderance of evidence.[151] A preponderance of the evidence standard requires one to establish that the existence of a fact is more probable than not.[152] As discussed below, the Draft Policy's Alternative Data Evaluation proposal departs significantly from this legislative and scientific mandate and is calibrated to meet a far more stringent standard, more akin to "beyond a reasonable doubt." Unfortunately, this problem is pervasive throughout the document, as described in the discussion of the individual elements of the Draft Proposal in Section VIII. of these comments.

Although the Draft Policy's Alternate Data Evaluation provisions are intended to embody a weight of evidence approach, under any definition of weight of evidence, they do not. First, the provisions are too closely coupled with the assumptions, null hypothesis and confidence levels of the proposed binomial listing factors, and will consequently fail to consider some important lines of evidence. Furthermore, the assumption of a 10% exceedance rate and a 90% confidence interval amount to a substantially higher standard than "more probable than not." Finally, the provisions do not permit the evaluation of multiple lines of evidence, especially where lines of evidence may conflict.

As discussed elsewhere, the binomial listing factors explicitly fail to consider, or de-emphasize, certain types of evidence. For example, data indicating temporal and spatial variability are erased by the method. Evidence of trends showing decreasing water quality will also be masked by the binomial method. A true weight of evidence approach would take these pieces of evidence into account and make an evaluation based on the totality of the available information. However, by requiring that any alternative approach be as statistically rigorous, apply the same assumptions, and test the same hypothesis as the binomial approach, the Draft Policy ensures that these pieces of evidence will continue to be ignored. This is inconsistent with the definition of weight of evidence, and consequently violates the requirements and guidelines discussed above.

As noted above, a weight of evidence standard requires a demonstration that the existence of a fact is "more likely than not." In stark contrast to this, the binomial listing factors require an exceptionally high degree of confidence in the existence of a fact – that a water segment is impaired – before listing. By requiring the use of a statistic that employs the same assumptions (presumably 10% exceedance rate) and confidence (90%) as the binomial approach, the Draft Policy ensures that the Alternate Data Evaluation will likewise require much more than a demonstration that a water segment is more likely impaired than not. EPA raised this very issue with staff last June, stating that

> [w]e are concerned that the [proposed Alternative Data Evaluation process] currently states that 'the measurements can be analyzed using a scientifically defensible procedure that provides an equivalent level of confidence as the listing factors in section 4.2 [now 3.1].' This seems to require any and all data must have 90% confidence level to be used in assessing impaired waters, which is inconsistent with the concept of weight of evidence approach.[153]

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[151] Chamberlain v. Ventura County Civil Service Com., 69 Cal.App.3d 362, 368 (1977); *see also* 2 McCormick on Evidence (4th ed. 1992) Burdens of Proof and Presumptions, § 339.

[152] In re Michael G., 63 Cal.App.4th 700, 709 fn. 6 (1998).

[153] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

Once again, this requirement is inconsistent with the definition of weight-of-evidence and with the requirements noted above.

Similarly, the listing factors do not permit the consideration of multiple lines of evidence. However, assessment of some parameters may require the evaluation of multiple lines of evidence. For example, nutrient over-enrichment risk involves examining nitrogen compounds, phosphates, chlorophyll a, benthic algae, dissolved oxygen, pH, etc. Determination of impairment often involves the relationships between these parameters as opposed to the level of any single parameter. A true weight of evidence approach would permit the use of all these lines of evidence in reaching a determination regarding impairment. The FED itself highlights this point when it states "[a] *scientific conclusion based on weight of evidence is often assembled* from multiple sets of data and information or lines of evidence."[154] Nevertheless, Section 3.1.11 requires the use of statistical approaches that are incapable of incorporating and considering these differing data types.

Because of the reasons outlined above, and because of other problems with the methodology that apply elsewhere in the Draft Policy (particularly the requirement that the data meet the "extremely stringent"[155] data thresholds in Section 6.2.4), this Policy is inconsistent with its state authorizing legislation and is, for that reason, alone unlawful. Water Code Section 13191.3(a), which requires the SWRCB to prepare this guidance, states that the guidance must be developed pursuant to Clean Water Act Section 303(d); the inconsistencies with the Act here and elsewhere, as raised by both the environmental caucus and EPA, require significant modifications to the Draft Policy before it may meet the mandate in Section 13191.3.

As discussed in more detail below, the Draft Policy should be revised to apply a true weight of evidence approach that is not tied to statistical confidence and hypothesis testing. Such an approach would provide for listing of waters in cases where evidence that was ignored or minimized under the binomial listing factors demonstrates impairment or threatened impairment. Such an approach would also provide for listing where multiple lines of evidence combine to demonstrate water quality standards exceedances, even if a single line of evidence provides insufficient evidence of exceedances.

VIII. RECOMMENDED METHODOLOGY FOR IDENTIFYING IMPAIRED WATERS

A. Preferred Statistical Approach for Conventional Pollutants Other Than Temperature and Dissolved Oxygen: Reverse Null Hypothesis

We recommend that the listing factors in the draft guidance be revised to include the following statistical decision rule for conventional pollutants other than temperature and dissolved oxygen:

> Water segments shall be placed on the section 303(d) list as impaired for conventional pollutants other than temperature and dissolved oxygen unless the numeric water quality objectives for conventional pollutants are exceeded

[154] FED at __.

[155] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

in less than 10% of samples with a confidence level of 90 percent using a binomial distribution (Table 2).

This recommended alternative adopts SWRCB's proposed statistical method in all respects but one: the null hypothesis has been reversed. Under this alternative, the null hypothesis is: "the water segment is impaired" in contrast to the null hypothesis under SWRCB's recommendation: "the water segment is clean." Appendix II illustrates the mathematical basis of this approach.

We believe that this "reverse null" proposal is more consistent with the law and better furthers policy objectives for the following reasons:

- The reverse null approach is consistent with the objectives of the TMDL program. As discussed elsewhere in our letter, Congress assumed that even with regulatory action some waters would remain polluted. So, Congress created the TMDL program as a "safety net" in the event that other measures provided for in the Clean Water Act – specifically National Pollutant Discharge Elimination System permitting – fail to result in attainment of water quality standards. There is no backup to the listing process for a dirty water; if it is missed, it will almost certainly remain dirty. As the last recourse for water quality, it is imperative that the program be as protective as possible and minimize the chances that impaired water segments will be ignored. The reverse null approach proposed here would require a demonstration to a fairly high level of confidence that waters are clean. Consequently, it would be unlikely that impaired water segments would be ignored.
- The reverse null approach is consistent with the precautionary principle. As discussed elsewhere, proper application of the Precautionary Principle would require that in the absence of scientific certainty, waters should be considered to be impaired unless it is demonstrated that they are clean. The application of the Precautionary Principle here would reflect good common sense and a genuine concern for environmental quality and human health. Application of the Precautionary Principle would also create a reasonable incentive structure that would encourage additional monitoring and, by extension, scientific certainty.
- The cost of erroneous listing is insignificant. As discussed elsewhere in this letter, the SWRCB has recently eliminated the commonly cited consequences of mistaken listings that some stakeholders have identified. This approach would recognize that the implications of not listing an impaired water segment are far more severe than the implications of improperly listing a clean segment.[156]
- The reverse null approach would create incentive for additional monitoring. Although there is broad support for California's Surface Water Ambient Monitoring Program, it is widely recognized that existing water quality monitoring activities in California are inadequate. As noted in the "Facts" section above, the majority of California's waters are <u>not</u> monitored, and additional data will likely uncover additional impairments. However, under SWRCB's proposed method, dischargers will be disinclined to improve monitoring coverage because they are better served by the absence of data. By requiring that data be gathered to demonstrate that the water segment is clean, those with the resources and responsibility to collect such data – the dischargers – will be more inclined to do so.

[156] Moreover, because Clean Water Act Section 303(d)(3) requires all waters to have at least estimated TMDLs in any event, the potential for harm for accidental listing of "clean" waters is minimal to none.

For smaller sample sizes, the reverse null hypothesis cannot be overcome to a 90% certainty. For such samples sizes, we recommend that the state apply all "existing and reasily available data" to a meaningful weight of evidence approach, as described in these comments.

Sample size	Place on the section 303(d) list if more than this number of exceedances
22	0
24	0
26	0
28	0
30	0
32	0
34	0
36	0
38	1
40	1
42	1
44	1
46	1
48	1
50	1
52	2
54	2
56	2
58	2
60	2
62	2
64	2

Table 2. Listing thresholds for binomial approach application to reversed null-hypothesis. For smaller sample sizes, the reverse null hypothesis cannot be overcome to a 90% certainty.

B. Alternative Statistical Approach for Conventional Pollutants Other Than Temperature and Dissolved Oxygen: Null Hypothesis with Equalized Errors

Although we strongly advocate adoption of the reverse null approach described above, our technical team has developed a second alternative approach for conventional pollutants other than temperature and dissolved oxygen:

> Water segments shall be placed on the section 303(d) list when numeric water quality objectives for conventional pollutants are exceeded at least twice and

in 5% of samples according to the error-equalized binomial approach." (Table 3).[157]

As discussed elsewhere, the SWRCB's proposed approach is 81 to 362 times more likely to fail to list an impaired water body than it is to list a clean one. We believe that this preference flies in the face of the precautionary principle and does not reflect the water quality priorities of Californians or those expressed in the Clean Water Act. A better policy would err in favor of listing, thereby minimizing the possibility of leaving impaired water bodies off the list and minimizing the attendant risks to human health and aquatic life. The reverse null approach, discussed above, would do this. At a minimum, though, the listing criterion should provide for a more equitable apportionment of these errors. A "fair" listing criterion would be one for which the probability of making each type of error is equal. This equalized-error criterion is derived in Attachment B to Appendix I.

Although this approach is not as precautionary as the reverse null approach, it is both more protective and far more equitable than the approach recommended by SWRCB. Equalizing the probabilities of the two error types recognizes that there is absolutely no justification for minimizing Type I error at the expense of Type II error. Indeed, the overall likelihood of committing error (the sum of probabilities of Type I and Type II error for each sample size) is far lower than the overall likelihood of error under SWRCB's approach. Importantly, EPA guidance and professional literature recommend that Type I and Type 2 error rates be balanced if there is no clear agreement that one form of error is more important than the other, as a policy matter, in that state.[158] Finally, it should be noted that the error-equalized binomial approach can be reduced to simply requiring listing a water body as impaired if the number of observed exceedances is greater than 5% of the total sample size +1. Consequently, application of this rule would not compound one uncertainty-mitigation tool with another.

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[157] As noted above, EPA recommended criteria development approaches based on at least 95% compliance rate for conventional pollutants, rather than the proposed 90%. Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

[158] *See* 2004 Integrated Guidance; U.S. EPA 2001 CALM Guidance; Smith *et al*, "Statistical Assessment of Violations of Water Quality Standards under Section 303(d) of the Clean Water Act," *Environmental Science and Technology*, Vol. 35, No. 3, pp. 606-612 (2001).

Sample Size	Exceedence threshold for 303(d) listing	Probability of listing a clean water body	Probability of failing to list impaired water body	Willingness to Err Ratio
10	2	.0285	.0285	1
12	2	.0196	.0196	1
19	2	.0257	.0257	1
26	2	.0108	.0108	1
33	2	.0143	.0143	1
41	2	.0157	.0157	1
48	2	.0087	.0087	1
56	3	.0099	.0099	1
64	3	.0110	.0110	1
72	4	.0118	.0118	1
80	4	.0125	.0125	1
89	5	.0125	.0125	1
97	5	.0082	.0082	1
105	5	.0088	.0088	1

Table 3: Probabilities of making listing errors under an "equalized error" listing criterion and a 5% exceedance rate. The probabilities and criterion are derived in Attachment B to Appendix I. The error possibilities and willingness to err ratio are calculated from the base criteria as illustrated in the Attachment. The exceedence thresholds listed above have been modified to reflect the policy of not listing a water segment based on a single exceedence.

C. Preferred Approach for Temperature and Dissolved Oxygen

We recommend that the listing factors in the draft guidance be revised to include the following statistical decision rule for temperature and dissolved oxygen:

> Ordinarily, water segments shall be placed on the section 303(d) list when numeric water quality objectives for temperature and dissolved oxygen are exceeded in more than one seven-day average of daily maximum (for temperature) or minimum (for dissolved oxygen) measurements.

Temperature and dissolved oxygen vary on an annual cycle, and cause impairment only when there is too much or too little in the water. Water quality standards are designed to address the highest temperatures of the year and the lowest dissolved oxygen levels of the year, which generally occur during summer months, or sometimes fall months for dissolved oxygen.

Therefore, any assessment decisions should be based on the highest and lowest measurements of these pollutants, respectively. When continuous monitoring data are available, the seven-day average of daily maximum (for temperature) or minimum (for dissolved oxygen) measurements should be assessed. When continuous monitoring data are not available, but data are available from at least seven days in any 30-day period, the average of the highest (for temperature) or lowest (for dissolved oxygen) measurement on seven consecutive days on which measurements were taken should be assessed.

Sometimes, the data available for a water segment will be inadequate to properly evaluate temperature and dissolved oxygen under this approach. When data are available from fewer than seven days in any 30-day period, the highest (for temperature) or lowest (for dissolved oxygen) single measurement within that period should be assessed. A water segment should be placed on the 303(d) list for temperature or dissolved oxygen when these data show a violation of the water quality standard on at least one day in at least three different years.

Under the water quality standards, a measurement of temperature (or other pollutant) in excess of a standard is not a violation of the standard if the exceedance results from natural conditions. In the case of temperature and dissolved oxygen, when natural conditions exceed the standard, listings will be based upon human contributions in excess of natural background. All relevant natural conditions issues relating to temperature and dissolved oxygen for which data or other evidence are available, such as peak hourly temperature increases and extreme air temperatures should be considered. The hottest days or years should not automatically exempt a water segment from consideration for listing based on temperature.

D. Preferred Approach for Toxic Pollutants

As EPA has noted to the SWRCB in the past, "the proposed binomial approach as applied to toxic pollutants in water does not meet federal requirements for assessing impairment associated with aquatic life use."[159] Accordingly, we recommend that the listing factors in the draft guidance be revised to include the following decision rule for toxic pollutants:

> Water segments shall be placed on the section 303(d) list when numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded in two or more tests within a running three year period.

SWRCB's approach to evaluating impairment for toxic pollutants is inconsistent with EPA's guidance and with California's own water quality standards. Moreover, states cannot ignore a water body solely because there are no "translator mechanisms" for toxics. Listing should occur if the uses are impaired, regardless of the availability of such translator mechanisms.[160]

Toxic pollutants can pose substantial threats to human health and aquatic life, often at low concentrations and one-time exposures. Because the risks associated with failure to address impairment by toxics are so great, the decision rule applied to these pollutants should be

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[159] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III); *see also* 2004 Integrated Guidance at 30 ("[u]se of the 10% rule when performing attainment determinations regarding effects of toxics is not appropriate unless the State's WQS regulations or WQS guidance specifically authorizes use of this rule for such pollutants").

[160] Letter from Alexis Strauss, U.S. EPA Region IX to Celeste Cantu, SWRCB (July 25, 2003).

as conservative as possible. The alternative decision rule we propose here is consistent with both EPA's guidance and with the California Toxics Rule, and would provide a necessary level of precaution in making listing decisions.

The alternative rule proposed here is also consistent with the approach taken by several other states. For example, Virginia's listing policy provides that "[f]or toxic pollutant assessment in free-flowing streams, waters where there are 2 or more exceedances of a [water quality standard] acute aquatic life toxic criteria in a running 3-year period are considered impaired for aquatic life use and wildlife use."[161] Utah, New Hampshire and Washington – as well as numerous other states – have adopted similar language to govern listing decisions related to toxics. California should do the same.

E. Preferred Approach for Water/Sediment Toxicity

At its most basic level, the toxicity section of the policy is inconsistent with existing Basin Plan standards, which address toxicity by requiring "no toxics in toxic amounts." The section should be revised to be consistent with the Basin Plans.

More specifically, the Draft Policy should require the use of lower effects level Sediment Quality Guidelines in addition to the 50% median level currently required when analyzing sediment toxicity for causative pollutants.

The Draft Policy specifies that if sediment quality guidelines (SQGs) are used to associate a pollutant or pollutants with observed sediment toxicity, only guidelines that predict toxicity in 50 percent or more of the samples analyzed, such as NOAA's Effects Range Median (ERM), should be used. The justification for using an elevated toxicity rate is because SQGs have limited predictive capacity.

The restriction of using only SQGs that correlate with observing effects in 50% or more of the samples is far too restrictive for evaluation of all contaminated sediments throughout the State. The imprecise predictive capacity of SQGs cited as the reason the policy is restrictive is exactly why it is imperative that the regional boards also considered SQGs that represent lower toxicity probabilities in their analysis of causative pollutants. Lower effects level SQGs indicate that toxicity was observed in numerous species, based on rigorous scientific and statistical analysis. For example, NOAA's "Effects Range Low" (ERL) values were calculated based on observing toxicity in 10% of all test species represented in a nationwide database. According to the researchers who developed the ERL/ERM approach, concentrations above the ERLs indicate possible toxicity.[162] Since exceedances of lower effect SQGs such as ERLs represent statistically significant toxicity observed in a percentage of species, exceedances of lower effect SQGs should be considered as one line of evidence in the analysis of causative pollutants.

There are numerous situations in which restricted analysis of sediment toxicity to only ERM-equivalent SQGs could result in a failure to identify the pollutants causing the toxicity. For example, in situations where the sediment contains many different pollutants (which is often the case for sediment), if multiple pollutants exceed lower effects levels, it is highly likely these pollutants collectively are contributing to the toxicity, even if ERMs are not exceeded. In fact,

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[161] Virginia Department of Environmental Quality, "Water Quality Assessment Guidance Manual for 2004" (November 3, 2003) (Virginia Policy) at 17.

[162] Long, E.R., et.al.,1995, "Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments," *Environmental Management,* Vol. 19, No. 1, pp. 81-97.

the SWRCB acknowledges that SQGs are most predictive of toxicity if several values are exceeded.[163] Lower effect levels should also be considered if the toxicity is being observed in species that are particularly sensitive to benthic contamination, or for water bodies with special species of concern. For example, the proposed ERM-based listing policy would allow sediments toxic to echinoderms (often the most sensitive category of marine organisms) without listing the sediments as impaired, thereby accepting this degraded condition.

We therefore urge the Board to require consideration in Draft Policy Section 6.2.3 of exceedances of lower effects level SQGs, including NOAA's ERLs and Florida's threshold effects level (TELs), in addition to the higher effects-level SQGs, for identification of pollutants causing sediment toxicity, and revise the language in Issue 5C of the FED accordingly.

F. Preferred Approach for Recreational Waters

The Draft Policy should restrict assessment methodology of marine beach recreational water quality to a reference-system approach. Allowing a 10% exceedance rate year-round and a 4% exceedance during the summer months fails water quality standards, is not scientifically defensible and will likely result in beaches not being listed that are unsafe for swimming.

The Draft Policy for evaluating recreational waters should be restricted to a reference-system approach.

We support the Draft Policy's recommendation that a reference system approach should be used to assess marine beach water quality for listing purposes. Comparison to an appropriate reference system is the most scientifically defensible and protective approach to accounting for background levels of bacteria at marine beaches and to prevent further degradation of water quality. This approach is recommended by the State's Beach Water Quality Work Group (BWQWG), which is comprised of microbiologists and scientists from local health agencies, POTWs, stormwater agencies, researchers, and nonprofit groups (Heal the Bay is an active member). Additionally, the reference system approach is used in the Los Angeles RWQCB's bacteria TMDLs for the Santa Monica Bay Beaches, Marina Del Rey, and Malibu Creek, based on the recommendation of a stakeholder technical advisory committee after three years of study and analysis.

However, the Draft Policy also allows the use of a 10 percent exceedance rate with a confidence level of 90 percent using a binomial distribution, a 25% exceedance rate for small sample sets, and a 4% exceedance rate is allowed between the AB 411 months of April and October. As further discussed below, these exceedance rates are arbitrary, not scientifically defensible, and are far too high for protection of REC-1 usage.

The SWRCB offers no justification for allowing any other type of assessment aside from the reference system approach. Based on Heal the Bay's comprehensive database of bacteria monitoring results from County health agencies across the State, it should not be very difficult for the regional boards throughout the State can identify reference beaches for all beaches used for recreational purposes. The Draft Policy should be revised to require a reference-system approach for the evaluation of marine recreational beaches.

[163] FED at 110.

Section 3.1.3 should clearly state that no exceedances of the State's health-based standards are acceptable at marine recreational beaches unless the exceedences are attributable to background levels of bacteria.

As currently drafted, the policy is unclear on the reason that any exceedance rate is tolerated before a water body is listed (see Draft Policy Section 3.1.3). This section should be revised to clearly state that no exceedances of the State's health-based bacteria standards for marine beaches are acceptable unless it can be demonstrated, by comparison to an appropriate reference site, that these exceedances are due to background levels.

It should be noted that discounting background levels of bacteria is not inconsistent with our position, stated elsewhere, that water segments impaired by natural sources should be listed. From a scientific prospective, unlike most other types of pollutants, natural sources of bacteria are ubiquitous in the environment, originating from natural organic materials, wildlife, and soil. Additionally, bacteria are indicators, or surrogate measures, of the presence of human pathogen, the pollutant we actually wish to control. These factors suggest that background levels cannot (and possibly should not) be controlled. From a practical perspective, background bacterial concentrations are typically so low that their exclusion from water quality assessments will not generally change the outcome of listing decisions. This can be clearly demonstrated through analysis of the extensive bacteria database that exists for California beaches, which are some of the most monitored beaches in the country, which shows water quality at many beaches throughout the State rarely exceed the State's health-based standards, particularly during the AB-411 time period.[164]

The 4% exceedance rate allowed in the policy for assessing dry summer season conditions at beaches in lieu of a reference system is arbitrary.

The Draft Policy allows a 4% exceedance rate during the AB 411 monitoring time period (summer dry weather), which is far too high, based on statewide monitoring data. In the Santa Monica Bay Beaches TMDL, the reference site is a popular beach located in northern Santa Monica Bay. Daily monitoring for five years showed no exceedances during summer dry weather at this beach.[165] More significantly, water quality at many beaches in California meet the state's bacteria standards throughout the summer. For example, during the AB 411 time period of 2002, at least 34% of the 420 beaches routinely monitored showed no exceedances of state health standards during the AB 411 timeframe.[166] In fact, most beaches in the South Bay portion of Santa Monica Bay do not exceed the 4% frequency on a year-round basis, let alone for the summer dry weather.[167]

The 4% exceedance rate was derived from a study of Southern California completed by SCCWRP and others as part of the Bight '98 study.[168] This study was not designed to establish

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[164] *Id.*

[165] Los Angeles Regional Water Quality Control Board, Santa Monica Bay Beaches Bacteria Total Maximum Daily Load, Resolution 02-004, January 24, 2002.

[166] Heal the Bay's 12th Annual Beach Report Card, http://www.healthebay.org/brc/annual/default.asp.

[167] *See* Heal the Bay's 10th, 11th, 12th, and 13th Annual Beach Report Cards at http://www.healthebay.org/brc/annual/default.asp. No exceedances of the health standards were observed all beaches that received an A+.

[168] Noble, Rachel T., Dorsey, J., Leecaster, M., Mazur, M., McGee, C., Moore, D., Victoria, O., Reid, D., Schiff, K., Vainik P., Weisberg, S. 1999. Southern California Bight 1998 Regional Monitoring Program, Vol I: Summer Shoreline Microbiology. Southern California Coastal Water Research Project, Westminster, CA.

exceedance rates due to background bacterial concentrations. The study did not consider whether anthropogenic sources other than storm drains were potentially contributing to bacteria at the beach; i.e, the study beaches may have been impacted by a wide variety of sources including septic tanks, boats, anthropogenic-related bird and animal wastes, etc. Additionally, the study is a snapshot study, in which sampling was conducted weekly during a 5-week period of one summer. The results are not temporally-representative of unimpacted beaches during the dry season. The Draft Policy should not rely on snapshot data when there are years of routine monitoring data available for many California beaches. In summary, the use of this data in the context of assessing marine beaches for impairment is scientifically inappropriate.

> *Allowing a 10% exceedance rate plus a confidence level of 90% in a binomial distribution at marine beaches is arbitrary, is not protective of public health, and allows an exceedance rate far higher than the exceedance rates observed at many polluted beaches in California.*

The policy specifies that if the reference system is not used, a marine beach will not be listed unless the observed exceedance rate is 10% or greater with a 90% confidence level using the binomial model. This translates to a 17% exceedance rate at beaches monitored weekly (the most common monitoring plan at California beaches) using Table 3.1 of the Draft Policy. This is an extremely high rate of exceedance of California's health-based standards, which are designed to meet the federal marine beach criteria. Clearly, this policy will result in the failure to list beaches that frequently pose a health risk above the U.S. EPA's recommended health risk rate of 19 swimmers per 1,000 for gastrointestinal illnesses and that are not supporting a REC-1 beneficial use designation.

The recommended 10% threshold is not supported by existing data.[169] For example, data analyses conducted for the bacteria TMDLs for Santa Monica Bay do not support a 10% exceedance rate. Analysis of five years of routine monitoring data at 55 beaches showed that 35 beaches had an average exceedance rate of less than 10% per year. In other words, 61% of the beaches routinely monitored in Santa Monica Bay have an exceedance rate of less than 10%, yet most of these beaches are monitored because they have sources of bacteria nearby such as storm drains. Thus, many beaches with sources of bacteria have a lower exceedance rate than the rate the state is using.

The SWRCB provides no justification for applying the binomial model with a 10% exceedance rate to the assessment of marine beaches for protection of human health. The policy fails to explain how this 10% relates to implementation of the health standard. Instead, this percentage is from an outdated recommendation from EPA for interpreting fecal coliform data.[170] This threshold was not recommended by EPA in their most recent guidelines for interpreting bacteria data for listing purposes in the May 2002 draft Implementation Guidance of Ambient Water Quality Criteria for Bacteria. In fact, none of the U.S. EPA's most recent guidance documents on management of public health protection or assessment of recreational water bodies recommends this high exceedance rate.[171]

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[169] Alamillo, Heal the Bay, 2002 unpublished data.

[170] U.S. EPA, 1997, "Guidelines for Preparation of the Comprehensive State Water Quality Assessments and Electronic Updates."

[171] U.S. EPA, 2002a, "Implementation Guidance for Ambient Water Quality Criteria for Bacteria," Office of Water, Washington D.C., EPA-823-B-02-003; and U.S. EPA, 2002b, "National Beach Guidance and Required Performance Criteria for Grants," Office of Water, Washington D.C., EPA-823-B-02-004.

The policy's exceedance threshold of 25% for small sample sets (less than 20 samples) is arbitrary and is far too high to ensure recreational waters that are monitored infrequently are meeting their beneficial uses. Again, the SWRCB provides no justification for setting this threshold.

The policy does not address the State's health-based geometric mean standards for marine beaches.

The Draft Policy fails to provide guidance on how to assess marine beaches relative to the State's health-based geometric mean standards. It is particularly essential to protection of public health at California beaches to ensure the geometric mean standards are being met. The basis for the federal and State's enterococcus criteria is the geometric mean value, which is directly linked to health risks.[172] The geometric mean integrates several data points and accounts for magnitude. Also, the recent amendment to the Ocean Plan strengthens the State's reliance on the geometric mean standards for fecal bacteria to protect REC-1 waters.[173]

We recommend that the geometric mean standards are strictly applied at marine beaches. This is consistent with Region IV's bacteria TMDLs and the proposed amendments to the California Ocean Plan. We recommend that two or more exceedances of the geometric mean should be the threshold for listing recreational beaches.

Beach closures due to sewage spills should be used in the listing decision.

Contrary to Section 3.1 of the Draft Policy, beaches that are closed often due to reoccurring sewage spills should be listed as impaired since the beneficial use is lost. The listing process does not take rain advisories, which result in the direct loss of a beneficial use, into account for beaches that are not routinely monitored during wet weather or during the non-AB 411 season.

Extensive data demonstrates that many AB 411 beaches have poor water quality during wet weather.[174] Many routine beach monitoring programs suspend monitoring during rain events. At these beaches, the local health officer is relying on rain advisories in lieu of monitoring data to protect public health and, therefore, the only information available to the public about the quality of water at these beaches is the rain advisories. Thus, the rain advisories become a de facto measure of the loss of beneficial use at these beaches. Regional boards that do not use rain advisories in the listing process for beaches that are not routinely monitored during wet weather or during the non-AB 411 season provide an incentive for monitoring agencies to suspend monitoring during these time periods and instead rely on rain advisories, thus avoiding 303(d) listing of beaches that are polluted during the wet season. Until wet weather monitoring is conducted at a beach and actual monitoring data is available to assess these conditions, rain advisories must be used in the listing process in some manner to account for the loss of the beneficial use of recreating at marine beaches during wet weather.

We urge the SWRCB to revise Section 3.1 to allow for listing in the face of wet weather advisories and to craft this listing policy in a manner that provides incentives for monitoring

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[172] Cabelli, V.J., 1983 "Health-effects criteria for marine recreational waters." Research Triangle Park, U.S. EPA, EPA-600/1-80-031.

[173] State Water Resources Control Board, "Ocean Plan Informational Document 12-03" (2003).

[174] *See* Heal the Bay's 10th, 11th, 12th, and 13th Annual Beach Report Cards at http://www.healthebay.org/brc/annual/default.asp.

during wet weather, as opposed to the current Draft Policy, which provides a disincentive. Wet weather is a peak recreational use period for surfers, which are currently not protected by the 303(d) listing process.

In summary, we recommend the following modifications for the listing of recreational waters:

- Require the use of a reference beach for the assessment of all marine beaches.
- Remove the alternative assessment methodologies from the Draft Policy
- Clarify Draft Policy Section 3.1.3 with language that clearly states exceedances of the health-based standards are not allowed unless these exceedances are due to background bacterial concentrations as demonstrated by comparison to a reference site.
- Require listing if two or more exceedances of the geometric mean standards are observed.
- Require the listing of beaches that fail to meet the listing criteria because of reoccurring sewage spills.
- Require consideration of rain advisories in the listing process if the beach is not routinely monitored during wet weather.

G. Preferred Approach for Addressing Spatial/Temporal Variability

Spatially and temporally variable data, as discussed above, are not amenable to the cut-and-paste binomial methodology, which masks such variability. Accordingly, we recommend that such datasets be evaluated under a meaningful weight of evidence approach. Under such a methodology, Regional Board staff would be able to detect "hotspots," trends and periodicity in data and evaluate whether these are evidence of real water quality problems.

To reiterate our recommendations from Section V. above, the Policy should be revised to:

- remove the requirement related to seven days averaging and the requirement of a predetermined timeframe to determine the temporal independence of samples, and replace it with language that states the data evaluation should consider the temporal representation of the samples, particularly with regard to site-specific characteristics including climate conditions at the time of sampling;
- remove the language related to 200 meters and replace it with language that states the data evaluation should consider the spatial representation of the samples, particularly for samples collected in close geographic proximity relative to site-specific characteristics and the location of potential sources;
- remove the language that provides the general definition that temporal representation can be obtained by collected data in two seasons or two events;
- apply the discussion in the FED on spatial and temporal representation to the Draft Policy, including discussion of the general factors that should be considered to evaluate data representation (*e.g.* variability in weather, seasonal influences, sources, critical condition, land use, flow rates, depth, current, temperature, sunlight, geology, etc.).

H. Preferred Approach for Nutrients

The Board should remove the requirement that listing for impairments related to algae and excessive levels of nutrients must be based on the use of numeric guidelines. Numeric guidelines for algae and nutrients that meet the requirements of section 6.2.3 and can be used per section 3.1.1 do not exist.

We agree with the overall approach of Alternative 3 in Issue 4G of the FED, "Interpreting Nutrient Data." In particular, we support the following "....RWQCBs should use models, scientific literature, data comparisons, to historical values or to similar but unimpacted streams, Basin Plan objectives, or other scientifically defensible methods to demonstrate that nutrients are to blame for the observed impacts." However, the Draft Policy seems to contradict this recommendation by strictly requiring the use of numeric guidelines that meet the requirements of Section 6.2.3 in conjunction with the binomial model. Section 3.1.7.1 of the Draft Policy states that "[f]or excessive algae growth, unnatural foam, odor, and taste, acceptable nutrient-related evaluation guidelines are exceeded as described in section 3.1.1." Section 3.1.1. specifies listing requirements when numeric water quality objectives are exceeded (specifically, the use of the binomial model), and Section 6.2.3 requires the use of numeric guidelines for narrative objectives.

As the FED seems to acknowledge (contrary to the Draft Policy), there are no universally accepted guidelines for bio-stimulatory impacts caused by nitrogen or phosphate. In addition, there are no accepted numeric limits for algae. Thus, Section 3.1.1 does not apply to nutrients or algae. As discussed herein, strictly requiring the use of numerical guidelines to interpret narrative standards (and then applying the binomial model) is inappropriate for many impacts, including nutrients, because (again) no universal numerical guidelines exists. Nutrient and algae impairment assessment needs to be based on a reference system approach that accounts for site-specific or region-specific conditions. Additionally, there are other, more technically-desirable and scientifically-defensible methods for quantitatively evaluating narrative objectives than applying general numeric guidelines, such as the reference system approach.

As currently drafted, the policy will effectively eliminate the listing of all impairments related to nutrients and algae, because no universal numeric guidelines exists that meet the requirements in Section 6.2.3, and because the policy does not allow for the use of other scientifically-valid, quantitative approaches like the reference system approach.

To assess nutrient-related impairments, use of a reference system approach is a quantitative method that is scientifically sound and technically defensible. This approach is consistent with Alternative 3 in the FED. Therefore, we urge the Board to:

- Remove the language in Section 3.1.7.1of the Draft Policy that is nutrient-related and add in language from the FED Alternative 3, including the following: "RWQCBs should use models, scientific literature, data comparisons to historical values or to similar but unimpacted streams, Basin Plan objectives, or other scientifically defensible methods to demonstrate that nutrients are to blame for the observed impacts."

- Emphasize the use of a reference system approach for identifying impairments related to nutrients and algae as a defensible and technically-sound approach.

- Delete the language in the FED Issue 4G regarding the use of nutrient ratios, since there is no scientific bases for determine nutrient limitation in freshwater systems based on nutrient ratios alone.

With respect to the last bullet, the FED states "If listing for nitrogen or phosphorous specifically, RWQCBs should examine the ratio of these two nutrients to determine the limiting agent." Nutrient ratios alone cannot be used as an indication of which nutrient is actually causing impairment.[175] In freshwater, nutrient limitation can only be determined experimentally, for example by *in situ* experiments with nutrient diffusing substrates. Further, the results of these experiments may be highly site-specific. For example, the Los Angeles Regional Board has done studies like this with SCCWRP, and the results showed that one nutrient was limiting in some creek segments, while the other nutrient was limiting in other segments.[176] Finally, this approach is also flawed because very high algal cover can exist at sites where one nutrient is extremely low, if the other nutrient is above background concentrations for that creek. For example, in Malibu Creek, where nitrate is consistently <0.05 mg/l and phosphate is consistently above 0.15 mg/l, algal cover consistently exceeds the 30% cover defined as nuisance by the USEPA (in the Malibu Creek algae TMDL). In this case, nitrate would be the limiting nutrient, but it would be impossible to get the nitrate any lower. Instead, lowering the phosphate concentrations in the water to reference condition concentrations would likely result in decreased algal cover, as seen at reference sites.[177]

Therefore, we urge the Board to remove the language related to the use of nutrient ratios from the FED.[178]

I. Preferred Approach for Nuisance

Many of the pollutants characterized as "nuisances" may pose serious threats to aquatic habitat, recreation, fishing, and other important beneficial uses. The FED recommended a nuisance rule that would use both quantitative and qualitative information. The policy should contain a procedure that allows both quantitative and qualitative data and information in the evaluation of nuisance.[179] According to the FED: "When qualitative information is combined with quantitative data related to pollutants, such as excessive nutrients, multiple lines of evidence provide strong support for placement on the section 303(d) list."[180]

In light of this hearty endorsement of the value of quantitative and qualitative information in combination, it was surprising to us that section 3.1.7 of the Draft Policy ("Nuisance") provides that nutrient-related nuisance conditions and other types of nuisance conditions, in general, should be assessed using the binomial listing factors. There is no justification for requiring the use of the 10% binomial approach in these circumstances, particularly when many of the Basin Plans contain water quality objectives that do not appear to authorize such high exceedance frequencies. This is particularly troublesome in light of the fact that impairment by

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[175] Dodds, W.K. 2003. "Misuse of inorganic N and soluble reactive P concentrations to indicate nutrient status of surface waters." *J. N. Am. Benthol. Soc.* 22(2):171-181.
[176] Busse, L. *et al.* 2003. "A survey of algae and nutrients in the Malibu Creek watershed. Southern California," Coastal Water Research Project Technical Report #412.
[177] Luce, S., 2003, "Urbanization and Aquatic Ecosystem Health in Malibu Creek, California: Impacts on Periphyton, Benthic Macroinvertebrates, and Environmental Policy," UCLA dissertation, Environmental Science and Engineering, School of Public Health.
[178] FED at 83.
[179] FED at 100-101.
[180] FED at 100.

nutrients is often best demonstrated using multiple lines of evidence – a demonstration that is not possible under the binomial listing factors. As discussed elsewhere in this letter, we urge the SWRCB to adopt a reference-based approach for nuisance conditions related to nutrients.

Other types of nuisance conditions, including taste, color, oil, sheen, turbidity, litter, trash and odor – when they are not related to nutrients – may be listed when "there is a significant nuisance condition when compared to reference conditions." We support the use of reference condition approaches in evaluation of these parameters, and we request that this provision be expanded to include nutrients and nutrient-related nuisance conditions. However, other qualitative approaches may be useful in assessing nuisance conditions as well, which the Draft Policy does not appear to provide for the use of. The Draft Policy should be modified to explicitly provide for the use of other scientifically-based, qualitative approaches.

J. Preferred Approach for Sedimentation, Adverse Biological Response, and Degradation of Biological Populations and Communities

Data used to assess impairment related to biological impacts from sedimentation, adverse biological response, and degradation of biological populations and communities often does not lend itself to the narrowly allowed data analysis methodologies of the draft policy. For example, the draft policy states sedimentation and degradation of biological populations and communities should be evaluated using the binomial model (Sections 3.1.8 and 3.1.9). Even if an alternative evaluation method was allowed by the policy for these impacts (the Policy is unclear on this issue), the requirements for this alternative evaluation are severely limited by statistical requirements (Section 6.2.3).

Evaluation of impacts related to sedimentation, adverse biological response, and degradation of biological populations and communities requires multiple lines of evidence (as noted in the FED). Currently, the Draft Policy does not appear to allow a weight of evidence approach for these impairments. Furthermore, the Draft Policy appears to eliminate the use of many, scientifically-accepted and recommended approaches to evaluating biological impacts.[181] For example, the policy seems to not allow the use of the California Department of Fish and Game's Index of Biological Integrity.[182] By doing so, the draft policy effectively blocks the use of many types of biological datasets and bioassessment studies from consideration in the listing process, and effectively blocks most listing related to biological impacts.

The policy does allow the use of a reference system approach for evaluation of adverse biological response (Section 3.1.8). This type of approach, along with other scientifically-accepted methodologies should be allowed by the draft policy for consideration of listing related to sedimentation and degradation of biological populations and communities, in addition to adverse biological response.

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[181] For example, see Davis and Simon, 1994, *Biological Assessment and Criteria Tools for Water Resources Planning and Decision Making*, Lewis Publishers; Schmitt and Osenberg, 1996, *Detecting Ecological Impacts, Concepts and Applicatons in Coastal Habitats*, Academic Press; and Quinn and Keough, 2002, *Experimental Design and Data Analysis for Biologists*, Cambridge University Press.

[182] Harrington, J. , Born, M. 1999. *Measuring the health of California stream and rivers: A methods manual for water resource professionals, citizen monitors, and natural resources students*, 2nd Edition. Sustainable Land Stewardship Institute, Box 161585, Sacramento CA 95816.

In addition, the policy regarding bioassessment should be revised to allow for other entities, aside from the Regional Boards, to establish and collect data from reference sites for the purposes to identifying and quantifying water quality impairment.

As currently drafted the Draft Policy appears to block the use of bioassessment studies that are not completed by the Regional Boards. The SWRCB's chosen alternative for assessing degradation of biological populations or communities repeatedly contains language requiring the regional boards to "clearly document how reference sites are selected and used" and "describe the habitat they are sampling and why it was chosen." This language appears to imply that only data collected from bioassessment studies conducted by the regional boards can be used in the assessment of biological communities for the purposes of listing. In practicality, bioassessment studies are completed by other State and federal agencies (resource agencies), research groups, academia, the regulated community, and non-profits.

We therefore urge the Board to revise the language in the FED that all readily available bioassessment data will be considered for listing purposes, and add this language to appropriate sections of the Draft Policy. In addition, the Draft Policy should explicitly state that assessment for biologically-related impacts often requires the use of multiple lines of evidence, in a weight of evidence approach. The next section of this letter discusses our comments regarding specific requirements for using a weight of evidence approach in the listing process.

Finally, as discussed elsewhere in these comments, the Policy should allow listing based solely on adverse biological response and degradation of biological populations and communities without requiring identification of the causative pollutants. Specifically, in section 3.1.8 and 3.1.9, the following sentence should be included (as it was in section 3.1.6 on toxicity) "Waters may be placed on the section 303(d) list for adverse biological response (or degradation of biological populations and communities)."

K. Alternative Data Evaluation

As discussed in Section VII. above, the binomial approach proposed by SWRCB is rife with deficiencies. For example, the binomial method cannot and does not account for the magnitude of the exceedance, temporal or spatial variability in data, the existence of trends, whether past exceedances are likely to recur, or how various lines of evidence might "fit" together to support a listing or delisting decision. Additionally, many types of data do not always lend themselves to the binomial model approach such as data used to assessment impairments related to biological impacts, nuisance, sedimentation, nutrients, and narrative objectives. The purpose of providing an alternative to the primary listing factors should be to mitigate the shortcomings of the statistical approach.

The proposed "Alternate Data Evaluation" process does not provide a robust and comprehensive alternative to the binomial because, among other things:

- it requires an excessively rigid statistical approach;
- it does not provide for consideration of multiple lines of evidence; and
- its provisions requiring comparison with numeric standards are too restrictive.

With respect to the first bullet, the Alternative Data Evaluation process as proposed requires a statistical approach so rigid as to make it essentially unworkable. The Alternative

Data Evaluation section establishes six strict criteria that must be met in order to justify a listing. The most troubling of these criteria is the requirement that the evaluation be made using a statistical method with a confidence level equivalent to the SWRCB's binomial approach and that tests a null hypothesis that water quality standards are attained. As discussed elsewhere in this letter, other statistical approaches are just as likely as the binomial approach to fail to consider exceedance magnitude, temporal and spatial variability, and trend information. The requirement that any alternative approach be equally statistically rigid severely hamstrings the Regional Boards and prevents the application of a true weight-of-evidence approach in circumstances where the binomial evaluation "masks" critical water quality information. This may not have been Staff's intent. According to the FED, the intent of this section was to allow the use of a weight-of-evidence approach in situations where multiple lines of evidence exist, conflicting lines of evidence exist, or additional data is available that suggest the water body may be impaired.[183] Unfortunately, the Appendix is inconsistent with this intent.

With respect to the second bullet, the Alternative Data Evaluation provisions do not provide for the consideration of multiple lines of evidence. Under SWRCB's proposal, an alternative data evaluation approach can be used for data "not otherwise addressed" in the listing guidance or "where an individual line of evidence would not support placement of the list."[184] However, an individual line of evidence will often be insufficient for a comprehensive assessment of water quality in a water segment. Specifically, assessments for human health, toxicity, nuisance condition, adverse biological responses, degradation of biological populations or communities, and trends in water quality often require multiple lines of evidence to determine if standards are attained.[185] SWRCB's proposed language appears to inappropriately limit the use of a weight of evidence approach and does not allow the use of this approach when considering listing factors that require multiple lines of evidence for listing. In addition, section 3.1.11 does not clearly allow use of the Alternative Data Evaluation approach when "available lines of evidence may conflict," or when "there may be circumstances when additional or conflicting lines of evidence may compel RWQCBs to place water bodies on the section 303(d) list."[186]

Finally, with respect to the third bullet, the Alternative Data Evaluation provisions requiring comparison with numeric standards are far too restrictive. The SWRCB's proposed policy requires that the data used in an alternative evaluation can be compared to numeric objectives, criteria or guidelines. This provision will effectively curtail the use of numerous types of data: data from academic special studies; data that do not lend themselves to statistical evaluation like fish kill data; data that cannot be compared to numeric guidelines; and several scientifically-valid types of analysis including reference system approaches like California Department of Fish and Game's IBI methodology.

We recommend that California's listing policy should instead include an Alternate Data Evaluation section that considers the critical data and information that the binomial method filters out. Specifically, the SWRCB should adopt a true weight-of-evidence approach as required by the Legislative Analyst's Office in its Supplemental Report on the 2001 Budget Act, of which relevant sections are included in Appendix IV.[187] Such an approach would be used

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[183] FED at Issue 3, chosen alternative 1, page 45.
[184] Appendix at 3.1.11.
[185] FED at 91, *et seq.*
[186] FED at 46.
[187] Legislative Analyst's Office, "Supplemental Report of the 2001 Budget Act - 2001-02 Fiscal Year" (July 30, 2001) ("The [303(d) listing] policy shall include a 'weight of evidence' approach . . ..") (*see* Appendix IV).

when the binomial method or other recommended listing approaches do not result in the listing of a water body, and there is evidence or additional information that indicates that water quality criteria may be exceeded. Water segments shall be placed on the section 303(d) list if the weight of evidence demonstrates that water quality impairment exists. When recommending listing based on the weight of evidence, the RWQCB should justify its recommendation to list by:

- providing any data or information supporting the listing;
- describing the methodology for making the listing decision;
- describing how the data or information are relevant to the water quality standard; and,
- demonstrating that the weight of evidence of the data and information indicate that water quality impairment exists.

Data and information used in the weight of evidence evaluation may include, if available:

- magnitude of standards exceedances or impairments;
- frequency of standards exceedances or impairments;
- comparisons to reference conditions in similar waters;
- adverse biological responses, such as reduction in growth, reduction in reproductive capacity, abnormal development, histopathological abnormalities, and other adverse conditions;
- degradation of biological communities, including but not limited to diminished numbers of species or individuals of a single species;
- nuisance conditions such as odor, taste, excessive algae growth, foam, turbidity, oil, litter or trash, and color;
- photographic evidence of standards non-attainment;
- pollution events;
- specific water body or watershed characteristics;
- calibrated and validated modeling results; or
- potential impacts to humans or wildlife from consumption fish or shellfish.

In addition, the SWRCB should remove the following language from requirements on alternative guidelines or methods used to interpret narrative objectives: "Previously used or specifically developed to assess water quality conditions of similar hydrographic units." This requirement is nonsensical because it has no bearing on the quality and appropriateness of the guideline in question. For example, a new numeric guideline may be developed as a result of extensive studies to evaluate a specific water quality problem. According to the draft policy, this guideline could not be used in the listing process if is has never been used before or if the developer did not specifically state it's use for certain hydrographic units.

Furthermore, the SWRCB should remove the following language from requirements on alternative guidelines or methods used to interpret narrative objectives: "For non-threshold chemicals, risk levels shall be consistent with comparable water quality objectives or water quality criteria. Risk levels are rarely determined by many scientifically-acceptable methods for evaluating biological and ecological impacts. This is because, in many cases, risk levels can not be conclusively calculated without the use of multiple assumptions that can be easily manipulated. Thus, this requirement could significantly limit the use of data and analysis from peer-reviewed, scientifically-defensible efforts or could force the completion of uncertain, and largely useless, risk assessments.

L. Preferred Approach for Interpretation of Narrative Water Quality Objectives

Federal regulations explicitly require that attainment of narrative water quality standards should be assessed in developing the Section 303(d) list. Although "[t]he SWRCB and RWQCBs have used a variety of guidelines or scientifically derived values to interpret narrative water quality objectives,"[188] other narrative objectives defy such interpretation. Consequently, a state's policy for interpretation of these objectives must be flexible enough to provide for interpretation of such objectives.

The proposed policy does not provide a flexible comprehensive policy for interpretation of narrative water quality standards. Rather, it unlawfully undercuts the basic requirement of Section 303(d), which does not limit TMDL preparation or listing to violations of narrative objectives *only when they can be translated under certain rules*. By imposing these rules, the policy departs not only from the weight-of evidence approach required by state law, but also from the most basic mandates in Section 303(d).

The only discussion of interpretation of these standards comes in the Alternate Data Evaluation section of the Appendix, which contains the following requirements relevant to narrative water quality objectives:

- The data and information can be compared to applicable water quality objectives, water quality criteria, or numeric guidelines;
- Corroborating evidence from independent lines of evidence show narrative water quality standards are not attained.[189]

As noted above, there are several types of impairment that cannot be adequately assessed by available numeric guidelines. Most significantly, there are no universal numeric guidelines for impairments such as those associated with nutrients, algae, turbidity, trash, color and oil. Moreover, there are several reliable quantitative methods that assess narrative objectives that do not rely on available numeric guidelines, most notably reference system based approaches and use of translators of all types, as recommended by EPA. The Draft Policy does allow for the use of evaluation guidelines other than those specifically named in the policy.[190] However, the provisions of the Alternate Data Evaluation section so narrowly circumscribe the use of these guidelines that many available numeric guidelines – particularly the reference-system based approaches and translators – would be unusable. Consequently, these restrictions eliminate much of the practical value of narrative water quality objectives.

Moreover, these restrictions are inconsistent with the EPA's recommended approach of using different types of translators for evaluating narrative objectives. According to the EPA, "[a] 'translator' identifies a *process*, *methodology*, or guidance to quantitatively interpret narrative criteria statements. Translators may consist of biological assessment methods (e.g., field measures of the biological community), biological monitoring methods (e.g., laboratory toxicity tests), models or formulae that use input of site-specific information/data, or other scientifically defensible methods."[191] In other words, EPA's interpretation of the term translator

[188] FED at 65.
[189] Appendix section 3.1.11.
[190] FED at 69 –70.
[191] FED at 68 (emphasis added).

evinces a much broader understanding of what tools may be used to interpret narrative objectives.

In particular, the Draft Policy does not allow the use of a reference system to evaluate compliance with narrative standards. This is problematic for several reasons. First, such a policy is inconsistent with EPA's policy on translators, which would clearly permit the use of a reference system approach to quantitative evaluation of narrative objectives. Second, from a technical perspective, a reference system approach or an indices approach are scientifically better accepted for evaluating compliance with narrative standards because they can account for site-specific characteristics.[192] Consequently, it is the approach most academic studies use to quantify biological and ecological impacts and the factors contributing to those impacts. For example, the California Department of Fish and Game's IBI methodology is a reference-based approached developed specifically to evaluate the health of California's freshwater systems.[193] Data from this peer-reviewed method does not meet the narrow requirements in the Draft Policy for narrative objective evaluation and could not be used.

We recommend that the Draft Policy be revised to avoid restricting interpretation of narrative objectives to numeric guidelines. The Policy should allow for the use of other scientifically defensible methods, including EPA's recommended use of translators and reference system-based methods. A weight-of-evidence approach should be allowed for evaluation of narrative objectives.

The intent of the SWRCB appears to be to allow the use of a weight-of-evidence approach in some circumstances.[194] The weight-of-evidence approach is for the interpretation of narrative objectives because of the nature of the data and analytical methods necessary to evaluate narrative objectives. Such an approach should be outlined in a new Draft Policy section "Evaluation of Narrative Criteria." In this section, use of interpretative tools other than the numeric guidelines – including biological assessment methods, biological monitoring methods, models or formulae that use input of site-specific information/data, reference-based systems, and other scientifically defensible methods – should be explicitly permitted.

In addition, the Draft Policy should not require that methods used to interpret narrative objectives be "[p]reviously used or specifically developed to assess water quality conditions of similar hydrographic units."[195] This requirement is inappropriate because it has no bearing on the quality and appropriateness of the guideline in question. Finally, the Draft Policy should not require that "[f]or non-threshold chemicals, risk levels [] be consistent with comparable water quality objectives or water quality criteria."[196] Risk levels are rarely determined under many scientifically defensible methods because, in many cases, it would be impossible to do so without making multiple assumptions that can be easily manipulated. Consequently, this requirement could significantly limit the use of data and analysis from peer-reviewed, scientifically defensible efforts.

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[192] FED at 104.
[193] FED at 105.
[194] FED at 46.
[195] FED at 70.
[196] *Id.*

IX. RECOMMENDED METHODOLOGY FOR IDENTIFYING "CLEAN" WATERS ("DELISTING")

We have a number of comments on the Draft Policy's delisting proposal. Most significantly, it suffers from the same problems inherent in the Draft Policy's other sections (such as the appropriate use of the binomial model, use of available data, and proper interpretation of water quality standards provisions). These issues were all put to the state's attention by EPA last June; unfortunately, the problems remain. Specifically, EPA states that the assumptions behind the proposed delisting provisions "will need to be re-visited to be consistent with EPA's expectations . . . since [the underlying assumptions] may not be consistent with applicable water quality standards."[197]

Delisting requirements should include specific requirements on data representation.

First, delisting requirements should include specific requirements on data representation. The Draft Policy currently requires a minimum of 22 samples before a water body can be evaluated for delisting. However, the policy contains no specific data representation requirements for these 22 samples, such as the minimum timeframe in which these samples can be collected and specific conditions that should be captured.

Unlike listing, delisting decisions will often be made based on data collected in studies and monitoring efforts specifically designed and implemented to support delisting decisions. These data collection efforts will come through TMDL-related activities, enforcement-related actions, and stakeholder-driven studies efforts. The delisting policy should include specific data representation requirements for these studies and monitoring activities. Moreover, given the significant ramifications of delisting a water body, it is imperative that the SWRCB ensures that delisting decisions are based on data that comprehensively characterizes water quality. Finally, and importantly, establishing specific data requirements will greatly enhance the certainty that studies conducted by the regulated community and stakeholder groups provide the appropriate data for delisting evaluation.

Accordingly, the Draft Policy currently does not provide for the "margin of safety" called for in the Clean Water Act. For instance, a fixed time period will not be sufficient for many circumstances. As an example, if a harbor is listed for synthetic chemicals that adhere to fine sediment particles, it will need to be monitored for a sufficient period of time to include rainy seasons that drive the fate and transport of the substances. A Draft Policy that had an appropriate delisting margin of safety would include guidance establishing a minimum (rather than fixed) sampling time period, as well as a minimum sample count.

Therefore, in addition to requiring a minimum sample size of 22, the delisting policy should clearly require that data meet the following specific representation requirements for all delisting evaluations:

- **A minimum timeframe for data collection must be established.** We recommend that the data represent a minimum of three years. It is imperative that a minimum time period be represented in the data to account for temporal variability, which can

[197] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

be significantly related to a host of factors including climate and seasons. In particularly, rainfall conditions greatly influence water quality in most water bodies. In California, drought conditions have lasted for more than six years at a time. So, a three-year requirement should be viewed as an absolute minimum.

- **Critical conditions must be represented sufficiently within the dataset or study.** Critical conditions must be identified, including a detailed explanation on how the critical conditions were determined. Since the critical condition is the condition in which pollutant loads or impacts are expected to be greatest, sufficient representation of this condition within the dataset requires that a significant portion of the total dataset was collected under this condition.

The policy should clearly state that delisting evaluations will be conducted only when new data meet the policy's minimum requirements, and that re-evaluations of existing data should not occur unless it can be demonstrated that the listing was based on faulty data (as defined) or if objectives and standards have been revised.

The policy should also clearly state that delisting evaluations will be conducted only when new data meet the policy's minimum requirements, including sample size, data representation, and data quality requirements. The Draft Policy is unclear on the data requirements that must be met before a delisting evaluation will be conducted. Section 4 of the Draft Policy does state that re-evaluation shall occur if the listing was based on faulty data. However, it is unclear whether delisting evaluations can be requested using existing and previously evaluated data because application of the new listing policy guidelines may result in a delisting. As currently drafted, it appears possible that delisting requests could occur for virtually every listed water body, based solely on the potential that a different outcome in data evaluation could be obtained from the original listing process because of the new guidance policy. For example, delisting requests could be made for listings made for failure to meet narrative objectives if the listing data analysis did not use numeric guidelines to interpret the narrative objectives.[198]

Accordingly, two clarifying items should be added to Section 4 of the Draft Policy:

- Delisting evaluations will only be conducted when new data (data not evaluated for listing) meet the policy's minimum requirements for data, including sample size, data representation, and data quality requirements.
- Re-evaluation of existing data should not be conducted unless it can be demonstrated by the questioning party that the listing was based on faulty data or if objectives and standards have been revised.

The delisting policy fails to ensure that delisting thresholds for listings based on an alternative evaluation methodology are more rigorous than the listing policy.

There are several types of impairments that do not lend themselves to evaluation through the binomial model approach, including those impairments in which no general numeric

[198] As discussed herein, interpretations of narrative objectives should not be restricted to use of numeric guidelines. Other scientifically defensible approaches including reference system-based methods should be allowed.

standards or thresholds are available, such as failure to meet certain types of narrative objectives, degradation of biological populations and communities, sedimentation, nutrient-stimulatory impacts, and trash. For these impairments, a listing should be made based on alternative evaluation analyses using other scientifically-acceptable, quantitative methods in a weight-of-evidence framework.

As currently drafted, the delisting policy fails to ensure that delisting is based on an evaluation approach that is comparable, and more rigorous than the listing evaluation approach. For example, a water body could be listed because a study conducted based on California's IBI approach for assessing freshwater showed impairment of a biological population. However, the policy would allow delisting of this water body if water numeric pollutant-specific evaluation guidelines are exceeded in fewer than 10% of the samples with a 90% confidence level using the binomial model. Since a general numeric guideline comparison approach can be used to delist the water body, it is possible that the delisting threshold could be lower than the listing threshold, which was based on a site-specific study. Inconsistency between listing and delisting thresholds is particularly problematic for recreational beaches, for which the policy recommends a reference-system approach for listing and the binomial model for delisting.

Accordingly, we recommend that the delisting policy be revised to require the demonstration that the delisting threshold is more rigorous that the listing threshold. In most situations, the listing and delisting evaluation methodologies should be consistent to ensure that the delisting threshold is more rigorous.

> *The delisting policy for marine recreational waters should require the use of a reference system approach to ensure consistency between the listing and delisting decisions regarding these water bodies.*

The listing policy for marine recreational waters recommends the use of a reference site to account for exceedances of health-based bacteria standards that occur due to natural sources. The delisting policy for recreational beaches uses an exceedance threshold of 10% using the binomial distribution for a confidence level of 90%. These two approaches are inconsistent, and could result is a delisting threshold that is less rigorous than the listing requirements, depending on reference beach used to list. For example, a beach could be listed because it has an exceedance rate greater than its associated reference beach, but if the reference beach has an exceedance rate lower than those listed in Table 4.1 (the binomial model for delisting), the beach could then be eligible for delisting – not because water quality at the beach has improved, but because the delisting threshold is lower than the listing threshold.

More importantly, as already discussed, the reference-system approach is the most scientifically-defensible method currently available, is the method recommended by the State's BWQWG, and has been used in all of the Los Angeles Regional Board's bacteria TMDLs. The reference-system approach should be used for evaluating a beach for delisting, instead of an arbitrary 10% threshold. We recommend that the delisting policy for marine recreational beaches be revised to require the use of the reference system approach.

> *The delisting policy for water bodies listed for narrative objectives should not allow delisting solely because numeric guidelines are not available to interpret the narrative objectives. A reference system-based study should be conducted for delisting evaluation.*

The re-evaluation policy for water bodies listed for impairments due to violation of narrative objectives is unclear. The Draft Policy could be interpreted to allow the delisting of these water bodies if numeric guidelines are not available to evaluate the quality of the water relative to the narrative objectives; this is unacceptable. There are other, scientifically-accepted, quantitative approaches to evaluating compliance with narrative objectives, aside from comparison to numeric guidelines, including the widely-used and accepted reference system-based approach. As discussed above, the Draft Policy seems to block the use of these methods because they will likely not meet the overly stringent requirements of the Draft Policy's Alternative Data Evaluation method (Section 6.2.3).

Importantly, when evaluating compliance with a narrative objective, comparison to reference conditions is a scientifically-preferred approach to comparison to a general numeric guideline because the reference system approach accounts for local and regional-specific conditions and characteristics. General numeric guidelines are typically based on a population of case studies that may be applicable in general, but result in uncertainty when applied to a single site.

Based on these comments, we recommend that the Draft Policy be revised to specifically require the use of a reference-system approach to delist water bodies impaired due to violations of narrative objectives.

X. CONCERNS OF OTHER AGENCIES AND INCONSISTENCIES WITH FEDERAL LAW AND GUIDANCE ILLUSTRATE THAT THE PROPOSED LISTING/DELISTING PROCESS WILL BE UNWORKABLE

A significant problem with the proposed Draft Policy is the fact that the agencies charged with implementing it, and approving its implementation, are strongly opposed to a number of its elements. In a practical sense, this will make the policy unworkable and will further delay identification and cleanup of impaired waters. What is more disturbing is that many of these comments have been raised repeatedly for months and have generally been ignored, as the Draft Policy attests. It is unclear who the Draft Policy is directed at, but it is clearly not those agencies that have to make sure it works in the real world.

A. U.S. EPA Region IX Remains Opposed to Key Elements of the Draft Policy

As described throughout these comments, U.S. EPA raised examples of its numerous significant problems with the Draft Policy in oral testimony before the SWRCB on January 28, 2004. Unfortunately, many of these had been raised with staff eight months ago but remain unaddressed.[199] Concerns raised by EPA in public testimony include the following:

- Toxics – the Draft Policy is inconsistent with CTR and Basin Plan objectives and allows far too many exceedances
    - Toxicity – the Draft Policy is inconsistent with Basin Plans that allow "no toxics in toxic amounts" or "no toxicity"
- Conventionals/other parameters – the Draft Policy is inconsistent with Basin Plans that rarely allow a 10% exceedance frequency.
- Natural source exclusions – these are not provided in existing water quality standards

[199] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003).

- Minimum sample sizes – there is no basis for the Draft Policy's requirement of high sample sizes or excursion frequencies if minimum sample sizes are not met
- Data quality requirements – federal regulations require consideration of all data and information; the Draft Policy could completely exclude some useful data
- The Draft Policy does not make clear whether and how weight of evidence approaches would be applied
- The nuisance and nutrient assessment methods are too vague
- There are no clean sediment guidelines/metrics
- The Draft Policy contains unclear priority setting and scheduling

EPA concluded in its public testimony that the Draft Policy "would likely yield state listing decisions that are inconsistent with state water quality standards and federal listing requirements," which "would trigger list disapprovals by EPA Region 9 and significant additions to" the 303(d) list developed pursuant to the Draft Policy.

EPA recommended in its testimony that the Draft Policy be revised to:

- be consistent with state water quality standards and federal listing requirements,
- improve the weight of evidence approach to define analysis procedures and clarify use, and
- clarify procedures for assessing nutrients, sediment and nuisance conditions.

As found in Appendix III, virtually all of these same issues had been raised months ago; telling excerpts of these written comments include the following:

- "Several provisions of the draft listing policy appear to conflict with federal listing requirements. The methodology would set extremely stringent thresholds for listing based on data quality, data quantity and standards interpretations requirements. As a result, the Section 303(d) assessment may improperly exclude useful data and information from consideration . . . and as a result, miss a significant number of impaired and threatened waters."
- "Provisions for excluding from consideration data and information which do not meet the State's preferred tests of data quality and representativeness. These elements appear to conflict with 40 CFR 130.7(b)."
- "Procedures for assessing exceedances of numeric standards for many pollutants conflict with existing water quality standards, most notably toxics."
- "Provisions for alternate data evaluations are unclear. The policy does not define assessment methods for evaluating or weighing multiple lines of evidence."
- "No provisions for listing threatened waters. Federal regulations at 40 CFR 130.7(b) and 130.2(j) require the identification of waters which do not or are not expected to meet applicable water quality standards. " (Emphasis in original.)

EPA's comments are entitled to significant deference, far more than they have received to date. *See Arkansas v. Oklahoma*, 503 U.S. 91, 105-06 (1992) (EPA is entitled to discretion to interpret its own regulations and those regulations are entitled to considerable deference); NationsBank of *North Carolina, N.A. v. Variable Annuity Life Ins. Co.*, 513 U.S. 251, 256 (1995) (quoting *Clarke v. Securities Industry Assn.*, 479 U.S. 388, 403-04, 759 (1987) ("It is well settled that courts should give great weight to any reasonable construction of a regulatory statute adopted by the agency charged with the enforcement of that statute"). Courts have consistently

given deference to EPA's construction of the Clean Water Act. *See, e.g., Arkansas*, 503 U.S. at 105. Importantly, an agency's long-standing interpretation of law or its own power is due heightened deference. *International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America v. Daniel,* 439 U.S. 551, 566 n.20 (1979) ("It is commonplace in our jurisprudence that an administrative agency's consistent, longstanding interpretation of the statute under which it operates is entitled to considerable weight"); *Blackfeet Tribe of Indians v. Groff*, 729 F.2d 1185, 1190, 1191 (9th Cir. 1982); *National Wildlife Federation v. Gorsuch*, 693 F.2d 156, 167 n.31 (D.C. Cir. 1982) (giving great deference to EPA in interpreting NPDES program under the Clean Water Act because consistent and contemporaneous application). We strongly urge the SWRCB to address fully EPA's concerns with regard to consistency with water quality standards, data inclusion, the weight of evidence approach, nuisance/nutrient/sediment guidelines, priority setting and scheduling, and other concerns, through modifications to the Draft Policy as described above.

B. The RWQCBs Remain Opposed to Key Elements of the Draft Policy

In oral testimony before the SWRCB on January 28, 2004 and elsewhere, including written comments projected to be submitted to the SWRCB by February 18, 2004, the Regional Boards' representative listed a number of concerns with the Draft Policy, many of which had been raised previously in numerous communications. These include the following concerns:

- Primary reliance on the binomial method would lead to a redefinition of almost all state and federal water quality standards. As currently described, the Draft Policy would allow those standards not to be attained, but would not require listing.
- This deficiency of the binomial method necessitates the description of an effective "weight of evidence" methodology. The current "Alternative Data Evaluation" section does not provide an appropriately robust and comprehensive alternative to the binomial model. Along these lines, the number of samples for a "weight of evidence" approach should not be restricted, as called for in the Draft Policy, since multiple lines of evidence can be used to support a listing or delisting decision.
- The purpose of the Policy needs to be stated as the attainment of standards in surface waters. The Policy should not be limited to attainment of pollutant-based standards, since Section 303(d)(1)(A) of the Clean Water Act requires the state to identify waters not attaining <u>any</u> standard and to account for the severity of pollution (not just "pollutants") in priority ranking.
- The analysis in the FED does not provide apparent rationale for the choice of alternatives, and so does not appear to be consistent with CEQA requirements.

The Regional Boards are the entities that will have to implement this policy. Simply put, the concerns they raise indicate strongly that the Draft Policy will be unworkable in practice. Significant revisions must be made if the Policy is to be credible and implementable.

XI. THE STATE MUST MOVE FORWARD EXPEDITIOUSLY TO PREVENT FURTHER DEGRADATION OF THE STATE'S WATERS AND CLEAN UP THE WATERS THAT ARE DIRTY

As discussed elsewhere in this letter, the Clean Water Act's TMDL program is a safety net that is designed to induce action on water segments in which water quality objectives are not

being met. As such, water segments should be identified and TMDLs should be developed as swiftly as possible. The EPA Integrated Guidance states that "TMDLs should be established 8 to 13 years from the date of the original water/pollutant combination listing."[200] This is hardly an expedited schedule; but the Draft Policy's provisions are even more relaxed, stating in Section 5 that low priority TMDLs: "will be completed in more than 5 years."

The 2002 303(d) list tables indicate that approximately 800 TMDLs are required in California water segments. However, according to the 2002 305(b) report, only 18 have been adopted by the SWRCB to date, and only nine completed TMDLs currently await adoption by the SWRCB, OAL or EPA. The lack of adequate monitoring also contributes substantially to the delay in TMDL implementation. As discussed elsewhere in this letter, monitoring efforts in the state of California often do not produce adequate data to comply with the minimum sample size requirements the Draft Policy, let alone provide for review of already listed segments and development of TMDLs. This delay in implementation of our water quality safety net is unjustified and threatens further degradation in the quality of California's waters. We agree with EPA that "the description of medium priority in 5 years and low priority after 5 years needs to be rectified,"[201] and that the state's schedule, which lags far behind what is recommended in the EPA Integrated Guidance, and should be revised to be at a minimum consistent with the Guidance.

According to Section 5 of the Draft Policy, "[w]aters on the section 303(d) list shall be ranked into high, medium, and low categories in order to set priority for development of TMDLs." Such ranking is to be based on, among other factors, the severity of the pollution and the threat to beneficial uses . The Draft Policy does not provide guidance on which pollution sources merit high and medium priority, and states only that waters in the enforceable programs category shall be assigned a low priority. We believe that the Draft Policy should be more explicit about the priority assigned to certain categories of pollution. In particular, impairments by toxic pollutants should receive elevated priority for TMDL development because toxicity is often directly linked to ecological and human health risks. We recommend that the Draft Policy be revised to ensure the timely development of toxicity TMDLs, by requiring that these TMDLs be assigned at least a medium priority for development.

We also recommend that the Draft Policy be revised to consider the recommendations of the Legislature on this issue. In the Supplemental Report of the 2001 Budget Act (*see* Appendix IV), the Legislature directed that:

> (c) The SWRCB and the regional boards shall consider, but are not limited to, all the following criteria in setting priorities and developing schedules for the long-term strategy described in paragraph (a):
>
> - Water body significance.
> - Degree of impairment.
> - Potential threat to human health and the environment.
> - Water quality benefits of activities ongoing in the watersheds.
> - Potential for beneficial use protection and recovery.
> - Degree of public concern.

[200] 2004 Integrated Guidance at 8.

[201] Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003) (found in Appendix III).

- Available data and information.
- Available resources.
- Watershed priority or task schedule on the boards' Watershed Management Initiative three-year and five-year work plans.
- Any new or existing court orders and statutory requirements.

The state should incorporate these elements into its revised Draft Policy in order to comply with EPA's recommendation that the state "provide more thoroughly the decision parameters relevant to making prioritizing decisions."[202]

Finally, we appreciate the fact that the Draft Policy no longer calls for an automatic review of all of the currently-listed waters. A comprehensive review of every water body on the 2002 303(d) list would be costly, would not result in a substantial improvement in the accuracy of the list, and would cause inordinate additional delay in California's already dilatory implementation of the TMDL program. Time is of the essence if we are to reverse the further degradation of our limited and dwindling supply of clean water.

[202] *Id.*

Appendix I: Support for Binomial Method Critique and Equalized Error Approach

The binomial model, as implemented in the FED, is framed in the following way: "given that the true exceedance rate is 0.1, 90% of samples of size N will contain k or fewer exceedances; thus, if we observe k+1 or more exceedances, we have cause for concern." The problem with this framing is that it assumes that the true exceedance rate is both knowable and known, and fixes it at 0.1. Since the exceedance rate is what we would like to know, this framing puts the cart before the horse. In fact, we don't actually know what the exceedance rate is.

Under the proposed statistical methodology, the null hypothesis is: "the water body has an exceedance rate of 0.1, and is not impaired." The Draft Policy proposes to test this hypothesis by asking: "assuming that the water body is clean (i.e. that the exceedance rate is 0.1), how many dirty samples would I have to see before I could reject the hypothesis that it is clean." A more precautionary hypothesis would be: "given that the water body is dirty (i.e. that the exceedance rate is greater than 0.1), how many clean samples would I need to see before I would be 90% certain that it wasn't."

Consequently, the binomial model listing guidance is exceedingly biased in favor of not listing or de-listing water bodies. The criterion seems to have been chosen so as to minimize the probability of erroneously listing a clean water body as impaired. While this may be a reasonable goal, it results in an unreasonably high probability of failing to list water bodies that are actually impaired. (This is the old "Type 1-Type 2 error trade-off" from introductory statistics class). Fortunately, under the binomial model, both of these probabilities can be calculated explicitly (*see* Attachment A).

The first step is to acknowledge that the true exceedance rate is unknown, and that it could take any value between 0 and 1. Figure 1 illustrates the binomial model for all possible exceedance rates. For each possible exceedance rate (that is, along a horizontal line), the contours represent the likelihood of observing a specific number of exceedances (out of 100). Looking at it a different way, for each vertical line, i.e. observed number of exceedances, the contours show the likelihood of the true underlying exceedance rate. In the past, EPA guidance has suggested that water bodies with an observed exceedance rate of 0.1 should be listed as impaired. Accordingly, above the horizontal line at r=0.1, the water body should be listed, while below that line the water body is considered clean. The vertical line at k=15 is California's exceedance threshold for a sample size of 100. This pair of lines divide the figure into four regions corresponding to water body status and listing decisions. The orange region represents the set of values of k and r that would result in a correct listing of the water body as impaired. Similarly, the green region corresponds to correctly identifying a water body as clean. The pink region represents the set of values of k and r that will result in a failure to list an impaired water body, and the yellow region represents the incorrect listing of a clean water body.

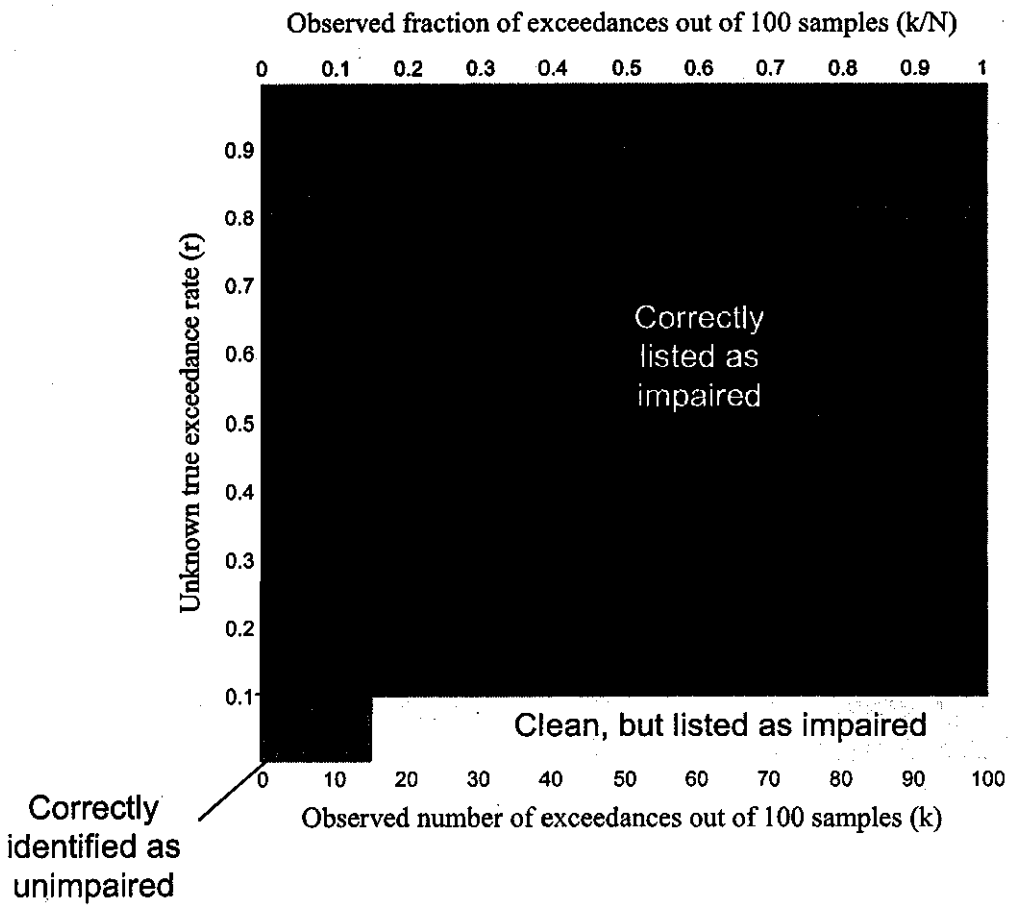

Figure 1. Probability contours for the binomial model and the 303(d) listing criteria. Contours start from the center at a probability density of 0.1 and decrease outward by orders of magnitude (*i.e.* 0.01, 0.001, etc. (This figure is an approximation, since the observed number of samples must be integer values.)

As mentioned above, under the binomial model, it is possible to calculate the probabilities of both types of errors. This amounts to summing the probabilities under each shaded region. This calculation is derived in Attachment A, and the probabilities associated with each of the FED listing thresholds are set forth in Table 1. The table shows that the probability of failing to list an impaired water body using the binomial criterion is typically around 80 - but sometimes as much as 362 - times the probability of listing a clean water body.

Sample Size	Place on 303(d) list if at least this number of exceedances	Probability of listing a clean water body	Probability of failing to list impaired water body	Willingness to Err Ratio
10	3	0.002	0.175	89
12	4	0.001	0.208	362
19	5	0.001	0.151	213
26	6	0.001	0.123	169
33	7	0.001	0.107	153
41	8	0.001	0.091	122
48	9	0.001	0.084	124
56	10	0.001	0.076	111
64	11	0.001	0.070	102
72	12	0.001	0.065	97
80	13	0.001	0.061	93
89	14	0.001	0.056	81
97	15	0.001	0.054	81
105	16	0.001	0.052	81

Table 1. Probabilities of making listing errors under the proposed statistical methodology. The probabilities are derived in Attachment A.

An alternative would be a methodology for which the probability of making each type of error is equal. This methodology, derived in Attachment B, would simply require listing a water body as impaired if the number of observed exceedances is greater than 0.05 (1+N).[203]

[203] EPA currently recommends a 0.05 exceedence rate for conventional pollutants. [cite.]

Attachment A: Error Probabilities Under the Binomial Model

The binomial model gives the probability of observing k exceedances given that there are N total samples and the true exceedance rate is r. In slightly more formal notation, the binomial model gives:

$$P(k \mid r, N) = \binom{N}{k} r^k (1-r)^{N-k}$$

$$\text{where} \binom{N}{k} = \frac{N!}{k!(N-k)!}.$$

To obtain Figure 1, we need the probability that the true exceedance rate is r and that we have observed k exceedances given N samples, or P(k, r | N). If we know, *a priori* that the probability density for r is p(r), then from standard rules for conditional probabilities, P(k, r | N) = P(k | r,N)p(r). Of course, we do not know p(r). For our purposes, we assume that in the absence of any information to the contrary that all possible values of r in the interval [0, 1] are equally likely (i.e. p(r) = 1).

To find the probability of failing to list a water body when the true exceedance rate is greater than 0.1, we need to integrate P(k, r | N) over the red region in Figure 1. That is, using k_{list} as the cutoff value given in the FED, we want:

$$P(k < klist, r > 0.1 \mid N) = \sum_{k=0}^{k_{list}-1} \int_{0.1}^{1} \binom{N}{k} r^k (1-r)^{N-k} dr \qquad \text{(A1)}$$

The integral with respect to r can be evaluated analytically using the Beta and Incomplete Beta functions[204] where:

$$B(k+1, N-k+1) = \int_0^1 r^k (1-r)^{N-k} dr$$

and (A2)

$$IB(z, k+1, N-k+1) = B(k+1, N-k+1)^{-1} \int_0^z r^k (1-r)^{N-k} dr$$

So the probability of failing to list an impaired water body is given by:

$$P(k < klist, r > 0.1 \mid N) = \sum_{k=0}^{k_{list}-1} \binom{N}{k} B(k+1, N-k+1)\left(1 - IB(0.1, k+1, N-k+1)\right) \qquad \text{(A3)}$$

In a similar way, we can calculate the probability of incorrectly listing a clean water body as impaired, which is formally given by:

[204] Milton Abramowitz and Irene A. Stegun, Handbook of Mathematical Functions (1972) at 258, 263.

$$P(k \geq klist, r \leq 0.1 \mid N) = \sum_{k=k_{list}}^{N} \int_{0}^{0.1} \binom{N}{k} r^k (1-r)^{N-k} \, dr \qquad \text{(A4)}$$

These probabilities have been evaluated for several of the sample sizes in the FED, and listed in Table 1.

Attachment B: An "Equalized Error" Listing Criterion.

Having derived the probability of incorrectly listing a clean water body as impaired and the probability of failing to list a clean water body in Appendix 1, here we derive a listing criterion for which the probability of making each error is equal. It should be noted that the assumed exceedance rate for this criterion is 0.05, while the assumed exceedance rate for the listing factors and the error probability calculation above was 0.1. Although EPA formerly recommended the use of a 0.1 exceedance rate "rule of thumb," it currently recommends the use of a 0.05 exceedance rate for conventional pollutants. To obtain the equal error listing criterion, we set $P(k < k_{list}, r > 0.05 \mid N) = P(k \geq k_{list}, r \leq 0.05 \mid N)$. Substituting Equations A1 and A4 this criterion is:

$$\sum_{k=0}^{k_{list}-1} \int_{0.05}^{1} \binom{N}{k} r^k (1-r)^{N-k}\, dr = \sum_{k=k_{list}}^{N} \int_{0}^{0.05} \binom{N}{k} r^k (1-r)^{N-k}\, dr$$

Using the fact that the left hand integral from 0.05 to 1 is equal to the difference between an integral from 0 to 1 and from 0 to 0.05, we have:

$$\sum_{k=0}^{k_{list}-1} \binom{N}{k} \left[\int_{0}^{1} r^k (1-r)^{N-k}\, dr - \int_{0}^{0.05} r^k (1-r)^{N-k}\, dr \right] = \sum_{k=k_{list}}^{N} \int_{0}^{0.05} \binom{N}{k} r^k (1-r)^{N-k}\, dr$$

Moving the second integral on the left to the right hand side gives:

$$\sum_{k=0}^{k_{list}-1} \binom{N}{k} \left[\int_{0}^{1} r^k (1-r)^{N-k}\, dr \right] = \sum_{k=k_{list}}^{N} \int_{0}^{0.05} \binom{N}{k} r^k (1-r)^{N-k}\, dr + \sum_{k=0}^{k_{list}} \binom{N}{k} \int_{0}^{0.05} r^k (1-r)^{N-k}\, dr$$

Note that both integrals on the right hand side are over the same interval of r. Consequently the sums on the right may be combined to give:

$$\sum_{k=0}^{k_{list}-1} \binom{N}{k} \left[\int_{0}^{1} r^k (1-r)^{N-k}\, dr \right] = \sum_{k=0}^{N} \int_{0}^{0.05} \binom{N}{k} r^k (1-r)^{N-k}\, dr$$

The next step involves changing the order of integration and summation. We can then observe that the term in the sum is just the binomial distribution. Since the binomial distribution must sum to 1, we have a constant integral with respect to r:

$$\sum_{k=0}^{k_{list}-1} \binom{N}{k} \left[\int_{0}^{1} r^k (1-r)^{N-k}\, dr \right] = \int_{0}^{0.05} \sum_{k=0}^{N} \binom{N}{k} r^k (1-r)^{N-k}\, dr = \int_{0}^{0.05} 1\, dr = 0.05$$

Simplifying the left hand side, note that the integral is the Beta function. So we have:

$$\sum_{k=0}^{k_{list}-1} \binom{N}{k} \left[B(k+1, N-k+1) \right] = 0.05$$

A pair of identities are helpful here. The first is a relation between the Beta function and the Gamma[205]:

$$B(k+1, N-k+1) = \frac{\Gamma(k+1)\Gamma(N+1)}{\Gamma(k+1+N+1)}$$

and the second is that between the Gamma function and factorials for integer arguments[206]:

$$\Gamma(k+1) = k!$$

Using these identities, we can eliminate the Beta function above to get:

$$\sum_{k=0}^{k_{list}-1}\left(\frac{N!}{k!(N-k)!}\right)\left(\frac{k!(N-k)!}{(N+1)!}\right) = 0.05$$

which, after canceling the factorials, reduces to:

$$\sum_{k=0}^{k_{list}-1}\left(\frac{1}{(N+1)}\right) = 0.05$$

Note that the N+1 is constant and can be factored out of the sum, so that:

$$\sum_{k=0}^{k_{list}-1}(1) = 0.05(N+1)$$

The sum of 1 from 0 to k_{list}-1 is equal to k_{list}, so that we arrive finally at the equal error listing criterion:

$$k_{list} = 0.05(N+1)$$

That is, in order to have equal probability of making either type of error, the water body should be listed as impaired if the observed number of exceedances is greater than or equal to 5% of the total sample size plus 1.

If the EPA guidance were to recommend some other exceedance rule-of-thumb, say α, the derivation would remain valid and the equal error listing criterion would be:

$$k_{list} = \alpha\,(N+1)$$

[205] *See* Abramowitz and Stegun at 258.
[206] *Id.* at 255.

Appendix II: Support for Reverse Null Approach

For the reverse null hypothesis, we calculated the critical number (k_{crit})of clean samples out of a total of N samples needed to reject the hypothesis that the clean sample rate was 0.9 with 90% confidence (i.e the exceedance rate was 0.1) .

$$\sum_{c=0}^{k_{crit}} \frac{N!}{c!(N-c)!} 0.9^{c}(1-0.9)^{N-c} = 0.9$$

Clean rate= 1-0.1

Confidence level

We used the methodology applied in the FED to obtain the de-listing criteria, *i.e.* $k_{delist}=k_{crit}+1$. Consequently, we must observe N-k_{delist} or fewer exceedances to reject the hypothesis that the water body is impaired.

Appendix III: Letter from David Smith and Peter Kozelka, U.S. EPA Region IX to Craig J. Wilson, SWRCB (June 24, 2003)

Email sent June 24, 2003

Dear Craig J. Wilson

We have received and reviewed the draft Water Quality Control Policy regarding guidance for assessing surface waters in California. EPA is responsible for reviewing and acting upon State 303(d) listing decisions, which will be based on an assessment methodology. In anticipation of the next listing submission in 2004, we have conducted an evaluation to determine whether the draft listing policy is likely to result in listing decisions, which are consistent with the Clean Water Act and associated federal regulatory requirements.

SWRCB has clearly devoted substantial effort in developing the draft listing policy and we understand that it is difficult to produce language that addressed both the requirements of California Water Code and the federal Clean Water Act. We support your objective of improving the quality of data supporting listing decisions and believe you have identified several effective mechanisms for obtaining this objective. We recognize the State's efforts to evaluate all data types (water, sediment, tissue, bioassessment, etc.). We also advocate the State's desires for interpretation of narrative WQOs via some numeric guideline during the assessment process. We appreciate your staff's effort to solicit input from EPA during the initial phase of policy development.

Several provisions of the draft listing policy appear to conflict with federal listing requirements. The methodology would set extremely stringent thresholds for listing based on data quality, data quantity and standards interpretation requirements. As a result, the Section 303(d) listing assessment may improperly exclude useful data and information from consideration by RWQCB and SWRCB staff, and as a result, miss a significant number of impaired and threatened waters.

Whereas, EPA does not explicitly approve or disapprove state listing methodologies under currently applicable federal regulations, we are required to approve or disapprove the state list submissions based on the State's selected assessment methodology.

This letter identifies the draft policy provisions that conflict with federal listing requirements and other provisions that appear inconsistent with sound environmental science practices or are unclear. Where possible this letter also identifies potential approaches to reconcile inconsistencies between the draft listing policy and the Clean Water Act requirements and associated federal regulations.

Key Concerns about the draft Listing Policy

Several listing provisions either appear to conflict with federal listing requirements, are too vague to enable us to adequately evaluate their consistency with federal requirements, or have not been supported by an adequate technical rationale. EPA is most concerned about these aspects of the draft listing policy, which are discussed in greater detail in the following sections:

--data quality and representativeness requirements,
--statistical methods for analyzing data sets for certain pollutant types,
--procedures for assessing exceedances of numeric water quality objectives,
--alternate data evaluation provisions,
--sections providing exemptions and exclusions from listing, including natural sources

--provisions for assessing and listing threatened waters,
--de-listing provisions

Inconsistencies With Federal Requirements

We have attempted to clearly identify elements of the policy that conflict with federal statutory or regulatory requirements. As discussed above, it is somewhat difficult to provide a definitive list of these elements because it is not clear how certain policy elements will actually be interpreted and applied by SWRCB and RWQCB staff. Based on our review of the policy, the elements that appear to be inconsistent with federal requirements include:

1. Provisions for excluding from consideration data and information that do not meet the State's preferred tests of data quality and representativeness. These elements appear to conflict with 40 CFR 130.7(b), which requires the state to gather and consider all existing and readily available data and information in the listing process. Moreover, the rule and accompanying preamble do not provide a sufficient rationale for a decision to exclude data and information from consideration, as required by 40 CFR 130.7(b)(6).

2. Procedures for assessing exceedances of numeric standards for many pollutants conflict with existing water quality standards, most notably toxics. Some procedures, such as a 10% allowable exceedance rate for many pollutant types, appear to be less stringent than existing state standards and federal regulatory requirements without providing a sufficient technical or legal rationale for their inclusion.

3. Provisions for alternate data evaluations are unclear. The policy does not define assessment methods for evaluating or weighing multiple lines of evidence.

4. No provisions for listing threatened waters. Federal regulations at 40 CFR 130.7(b) and 130.2(j) require the identification of waters which do not or are not expected to meet applicable water quality standards. As described in EPA's August, 1997 listing guidance, States are expected to assess potentially threatened waters and to list waters which are expected to exceed applicable standards during the following 2-year period. The proposed listing policy appears to make a provision for assessment of water quality trends or other data and information and it could be construed this trends analysis could support a finding that a water body is threatened; however the policy is not clear.

5. No description of technical rationales for statistical assessment methods. Although there are snippets of discussion regarding the binomial approach, primarily provided via footnotes, the draft policy does not provide a complete description of the scientific or legal rationales supporting many proposed listing criteria. Federal regulations at 40 CFR 130.7(b)(6) require the state to submit its listing methodology with its list and to provide good cause for decisions not to list individual water bodies.

Data Quality, Quantity and Representativeness

The draft listing policy states a QAPP is required for "high quality" data to be considered for listing impaired waters. Other data will be considered only in combination with "high quality data"; however other data cannot be used by itself. This is simply too restrictive and does not fit with federal regulations stating that States will consider all readily available information. The policy needs to be modified to explain how all relevant data sets will be included in the

assessment process. For example, we see no legal rationale to exclude data generated by academic or citizen monitoring groups, who have adequate training in sample collection and utilized reliable laboratories with sufficient QA/QC and yet they have not completed a QAPP.

These provisions do not provide a "good cause" rationale for excluding data and information from consideration (see 40 CFR 130.7(b)). These regulatory provisions create a rebuttable presumption that all readily available data and information will be used in the assessment process. A great deal of useful data from STORET, academic and agency reports, and volunteer monitoring groups would appear to be excluded from consideration under the proposed rule, an outcome which appears inconsistent with the federal requirements.

The policy has listed major monitoring programs in California considered to be of high quality. We recommend the State include all EPA monitoring data (not just EMAP) as well as these federal agencies as part of the listed high quality sampling programs: US Fish and Wildlife Service, US Department of Agriculture, US Army Corps of Engineers, and National Oceanic and Atmospheric Administration.

The draft listing policy seems to have established a minimum sample size (water = 20 samples; tissue and sediments = 10) and while small data sets may be assessed, in general these smaller data must reach higher exceedances than the binomial approach defines for smaller data sets. The policy appears to allow assessments of smaller data sets on case-by-case basis, but this is not clear, nor explicitly stated. The policy must include some science-based rationale for the suggested minimum number of samples and sampling events needed to carry out an assessment.

In section 7.2.5, the draft policy states "information that is estimated, modeled or projected shall not be used for listing or de-listing decisions." There is no technical rationale provided for this exclusion, and as stated, we find it inconsistent with federal guidance that water quality modeling is a viable method of listing or de-listing. Moreover, federal regulations require the consideration of information from dilution or predictive models in the assessment process (40 CFR 130.7(b)(5)(ii)). From a practical standpoint, this type of information is often useful. If we read the draft policy correctly, the State's decision not to list Santa Clara and San Gabriel Rivers for ammonia based on estimates of the future effectiveness of treatment plant upgrades would not be consistent with the new policy.

Statistical methods

We are concerned the proposed approach to assessing numeric water quality standards or objectives may be unreasonably stringent and will likely result in missing too many waters which are very likely to be impaired or threatened.

The listing policy relies on the binomial approach to guide the state's assessment methodologies. There is no comprehensive explanation of the binomial approach and the underlying decisions utilized by the state to determine relevance with current water quality standards. Instead the policy uses footnotes to provide some background information and relies on the notion that other states have already adopted the binomial parameters and therefore they are acceptable. For example, the policy discusses the null hypothesis yet it does not clearly define the state's definition of the null hypothesis for listing waters. This is especially critical for the de-listing section of the policy.

For many pollutant types (toxics, conventionals, bacteria, tissues, etc), the policy proposes the State will list waters in cases where there was greater than 90% statistical confidence that a numeric standard has been exceeded at least 10% of the time (i.e., the binomial approach). The policy refers to EPA guidance to defend its decision criteria, most specifically a 10% allowable exceedance level, and yet this is based on an incorrect reading of EPA guidance concerning allowable water quality exceedance rates. The assertion that EPA endorses the use of a 10% standards exceedance rate is incorrect. The EPA 305(b) guidance (1997) refers to the 10% exceedance rate as a method for assessing data sample sets-- not as an acceptable exceedance rate in the "population". The use of this exceedance rate in a binomial assessment method has not been shown to be protective of water quality nor consistent with water quality standards requirements. It is likely that use of this exceedance rate will increase the number of water bodies that do not meet water quality standards that are missed in the listing decision. Moreover, use of a 10% exceedance rate test has never been acceptable for toxic pollutants where aquatic life uses are at issue.

The proposed policy applies the binomial approach to certain sized data sets, and then for smaller data sets it defines arbitrary number of required exceedance frequencies. For example, some water parameters are evaluated via the binomial approach for $n > 20$ and refers to Table 4.2 for the maximum allowable number of exceedances. For smaller sample sets, $n<20$, only if 5 or more exceedances have been observed will the water body be deemed impaired. Again there is no technical rationale for this decision. Moreover it does not follow with the binomial approach for smaller data sets. As stated above, we recommend the State evaluate smaller data sets and if the State opts to use the binomial approach with 90% confidence and 10% allowable exceedances then extend the decision procedures to include those presented in the table below.

Sample Size	At least this # of exceedances
4 – 5	2
6 – 11	3
12 – 18	4
19 – 25	5

We agree that when applying a binomial statistical approach, the State should analyze data sets to ensure that key assumptions concerning the data set are met with respect to the shape and normality of the distribution, the representativeness of the data set of underlying water quality, and the presence of bias, serial correlation, or autocorrelation in the data sets. We expect that the State will document its analysis that shows these assumptions are met to a reasonable degree. Not all data sets must meet every assumption completely, but the State should discuss potential errors associated with application of binomial analysis methods to data sets that do not meet one or more key assumptions. We want to stress that the data should be assessed through another assessment method if the assumptions necessary to carry out a binomial assessment are not met.

EPA expects the next version of the policy to provide a more complete discussion in the preamble or appendix. This discussion should outline the State's assumptions and defense for using the binomial approach and each of the critical decisions regarding how the exceedance and confidence levels correspond to the existing water quality standards or objectives. EPA recommends criteria development approaches to assess a 95% compliance rate for conventional pollutants and a more stringent compliance rate for toxic pollutants of at least 99%, in the context of a binomial assessment method.

Toxics

Foremost, the proposed binomial approach as applied to toxic pollutants in water does not meet federal requirements for assessing impairment associated with aquatic life use. The policy refers to the California Toxics Rule (CTR) as the applicable water quality standard and we concur. However, we need to emphasize that CTR contains explicit recurrence intervals for these numeric standards for protection of aquatic life, namely not to be exceeded more than once in every three year period (CTR rule). The proposed policy must be modified to be consistent with EPA water standards that apply in California. Once modified then the policy will be consistent with EPA guidance (1997) for protection of aquatic life use (for toxics) where greater than 1 exceedance in 3 yrs, regardless of sample size. We recommend use of a simpler decision criterion for toxic pollutants to protect aquatic life that would result in listing waters where 2 or more samples exceed the WQS in any 3 year period.

Conventionals

For conventional pollutants, the proposed policy discusses EPA's 305(b) guidance as part of its rationale for using an allowable 10% exceedance rate. We want to clarify that EPA's guidance has suggested the use of a 10% sample exceedance rate only to assess sample sets to characterize the underlying water quality conditions with respect to conventional pollutants, only if it remains consistent with descriptions provided in the applicable water quality standard or objective (emphasis added). EPA's 305(b) and CALM guidance suggested an impairment finding in cases where 10% of data points exceed the standards for conventional pollutants, in part to reflect the expected recovery time associated with aquatic exposures to conventional pollutants as well as the expected sampling error issues and prospects for type 1 error. Because the binomial approach already accounts for and directly manages uncertainty associated with assessments based on small sample sizes, including type 1 error in particular, it would be inappropriate to apply the 10% exceedance rate directly within the context of a binomial assessment approach. To use a 10% test in a binomial assessment context would, in essence, result in "double counting" of allowances intended to limit type 1 error.

EPA's guidance are intended to provide guidance concerning the assessment of limited sample sets for purposes of making assessment determinations—they are not intended to provide EPA's interpretation of the actual acceptable rate of WQS exceedances in receiving waters. Further EPA has not approved of any State's assessment methodology of using 10% exceedance cutoffs within a binomial assessment context as acceptable interpretation of the state's water quality standards or objectives unless it is expressed clearly within the applicable standard (e.g., in cases where the underlying WQS is expressed as a 90th percentile or where the standards state that the values are not to be exceeded more than 10% of the time.

Bacteria

There is no discussion as to why this 10% allowable exceedance rate applies to bacteria in. Such an explanation is needed, especially since it appears to conflict with the State's current two-number water quality standards or objectives which have both an instantaneous maximum as well as specific data requirements and time-averaged evaluation.

Health Advisories

The policy should clearly state that issuance of public health advisory (based on local data) will automatically get the water body listed for the appropriate pollutant(s); this is a federal requirement. If the policy continues to define using MTRLs for protecting human health consumption, then we suggest more clear language to define which data value (individual sample, arithmetic mean or geometric mean) will be used in the part of the assessment process. The current description of using MTRL value via the 10% exceedance with 90% confidence does not make sense. EPA guidance recommends use of harmonic mean values to implement human health protection standards.

Additional responses to specific parts of section 4.2

- *Bacteria* For bacteria measurements collected only during the dry weather season and 4% exceedance level, we recognize this has been agreed within the Beach Water Quality Workgroup and applied to southern California beaches, however it should be clearly stated if this applies elsewhere.

- *Tissue bioaccumulation* We concur with added information that tissues results from muscle or whole body will be used but kidney or liver tissue alone is not suitable measure.

- *Toxicity* We concur a water segment maybe listed for toxicity alone although we prefer to ID pollutant(s).

- *Nuisance* Clarify reference to 4.2.1 for toxics, when discussing nutrient-related impairment. We suspect it should be 4.2.2 for conventional pollutants, whereby we recommend modifications consistent with conventionals above.

- We find an apparent disconnect in sections 4.2.4, 4.2.5, 4.2.6 of the policy where it neglects to interpret sample sizes between 10 and 20.

- *Degraded populations and communities* confusing language, why is author using "stations" when all previous discussion is related to "samples"

Alternate data evaluations

The listing policy includes provisions for listing waters based on alternate data evaluation and we support this general concept of multiple lines of evidence to determine impairment. While it is not clear, we presume this applies to all data types, water, sediment, tissue, toxicity, biological response, etc. We are concerned that the draft policy currently states "the measurements can be analyzed using a scientifically defensible procedure that provides an equivalent level of confidence as the listing factors in section 4.2." This seems to require any and all data must have 90% confidence level to be used in assessing impaired waters, which is inconsistent with the concept of a weight of evidence approach. Also, it is unclear if sample magnitude can be sufficiently influential to cause listing the water body based on sediment and/or tissue results. More clear language is requested.

Exemptions and exclusions

As previously stated, several sections of the proposed rule appear to exclude particular kinds of data and information from consideration in the assessment process. The State would be required

to show good cause why any existing and readily available data and information is excluded from consideration. In addition, as discussed above, we are concerned that data that does not meet every quality assurance or representativeness test and information concerning narrative standards exceedances appears to be excluded from consideration.

The draft policy makes several references that water body impairment due to natural sources will be exempt from inclusion on the 303(d) list. We request more comprehensive discussion as to which water quality standards have included this provision of exclusion due to natural sources. If no such exclusion is explicitly stated in the specific water quality standard then federal requirements will require the water segment to be included on the 303(d) list. If the State finds exclusion is implied in the specific standard then we urge the State to present its interpretation of the standard and include it into the listing policy. EPA will review this on a case-by-case basis for each standard.

Listing of threatened waters

The proposed policy provides no clear provisions for assessing and listing threatened waters. Pursuant to the requirements of 40 CFR 130.7, as interpreted in our 1991 and 1997 guidance documents, EPA expects each state to describe how it will assess whether waters which currently attain standards will likely fall out of attainment during the next listing cycle. The proposed policy makes reference to the use of certain types of data for trend analysis purposes, but does not actually describe how or if such data analysis will interpreted as threatened. We expect the listing policy to clearly show how the requirement to consider threatened waters was addressed.

De-listing provisions

For de-listing waters from the 303(d) list, the proposed policy appears to utilize the same statistical approach and underlying assumptions (fewer than 10% exceedances with 90% confidence level) as described in the listing methodology. We expect the state to provide more thorough description of the binomial approach as it applies to de-listing which has a different null hypothesis and therefore it requires larger sample sets with fewer exceedances. Such an explanation is required to adequately define how Table 5.1 applies to already listed water bodies. Also, these assumptions will need to be re-visited to be consistent with EPA's expectations. That is, we may not agree with the underlying assumptions within each data type since it may not be consistent with the applicable water quality standards (see data type sub-sections in comments on Statistical Methods).

Need to show good cause for state decisions for removals/de-listings……..

Other Questions and Concerns

Temperature based listings

Regarding historic stream temperatures, EPA encourages the State to please clarify that comparisons to one-time hand-held measurements would rarely be considered sufficient evidence to list. (We want to avoid the public from wasting time on this type of information.) Other modifications could include additional narrative discussion on what may be considered "natural conditions" by Regional Board staff. This emphasis may possibly assist RWQCB staff

with little experience on temperature monitoring and modeling in evaluating temperature monitoring data.

EPA also encourages the State to consider defining cold water "adverse" temperatures more specifically, given the large amount of background information available synthesizing the literature from Oregon and EPA R10. The State should also consider doing this in the context of expected "natural stream temperatures." It is hoped that greater specificity in this area would, possibly, avoid unnecessary listings.

For example, EPA R10 Guidance for Temperature water quality standards suggests the following:

1. Salmon and trout "core" juvenile rearing (of the 7 day average of the maximum daily temperature, for areas that are mid- to upper reaches....
2. Salmon & trout migration plus "non-core" juvenile rearing
3. The R10 numbers may not be entirely relevant for California, given our different methods of calculating the relevant MWAT
4. Salmon & Trout migration with refugia

Scheduling considerations

The draft policy currently has some information pertinent to the State's proposed process for prioritizing and scheduling TMDLs. We concur with the policy that high priority TMDLs will be developed within two years; however the description of medium priority in 5 years and low priority after 5 years needs to be rectified. EPA's 1997 guidance calls for states to provide schedules for completing all TMDLs within 8-13 years of their initial listing date, or the 1998 listing date, whichever is later.

The State could provide more thoroughly the decision parameters relevant to making prioritizing decisions. Some of the more pertinent factors might be: degree of threat to human health, aquatic life or wildlife, timeframe for NPDES permit revisions, unique water bodies, presence of threatened and endangered species, significant public interest and support of TMDL, important recreation and economic significance of water body, number of water quality standards exceedances per water body or number of unmet designated beneficial uses.

Clarification of Integrated Report language

The draft policy describes California's Integrated Report and makes several references to EPA's Integrated Report. At least two revisions should be made. First, the policy should provide some correlation between the State's categories and how they relate to EPA's five categories. Perhaps this is best provided in an appendix, however, this information should be readily apparent to all readers. Second and more important, the policy currently has an inaccurate statement at the bottom of page 1. Per EPA policy (Sutfin memo 2001), the Integrated Water Quality Report is an assessment of all waters in the states, not "only the most serious water quality standard exceedances."

Quantitation of Chemical concentrations

The proposed policy presently states if the quantitation limit QL is above WQS then the datum is disregarded. We hope the State will take into consideration as to how this could reward people who supply bad data, i.e., results with higher than desirable MDLs. Some consideration should be included to promote better laboratory methods or enhance analytical techniques to ensure MDLs are below the applicable water quality standard or objective to facilitate SWRCB and RWQCB staff assessment of water body condition.

Data Records Retention

Based on the current language in the policy, it is unclear as to who, RWQCB or SWRCB, is responsible for retaining data records and related information supporting the fact sheets that are summary of assessment decisions?

IX. Conclusion

EPA has identified several policy provisions that are inconsistent with federal listing requirements. The provisions dealing with data quality expectations, use of a binomial method and 10% cutoff both for toxics and conventional pollutants, use of minimum sample sizes, and unclear provisions for using unconventional data and implementing narrative standards all have the potential to result in list disapprovals. We look forward to discussing these initial rough comments in greater detail. Please call us to set up some time to discuss. Thanks again for the opportunity to comment.

Sincerely,

David Smith
Peter Kozelka

References:

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USEPA 2001. Consolidated Assessment and Listing Methodology (CALM Guidance), Appendix B. Draft, April, 2001.

USEPA 1997. Guidance for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports and Electronic Updates) EPA 841-B-97-002A. U.S. Environmental Protection Agency, Office of Water, Washington DC.

Appendix IV: SUPPLEMENTAL REPORT OF THE 2001 BUDGET ACT
2001-02 FISCAL YEAR[207]

CONTAINING STATEMENTS OF INTENT OR REQUESTS FOR STUDIES ADOPTED BY THE LEGISLATURE

Compiled by the Legislative Analyst's Office

REVISED--July 30, 2001

Item 3940-001-0001--State Water Resources Control Board

1. ***Total Maximum Daily Load Program.***

(a) On or before January 10, 2002, the State Water Resources Control Board (SWRCB) shall prepare and submit to the Legislature a long-term strategy to achieve water quality standards in impaired water bodies, consistent with the Total Maximum Daily Load (TMDL) program pursuant to Section 303(d) of the federal Clean Water Act. The strategy should address the completion, prior to the 2013 date for completion, of all currently required TMDL analyses and implementation plans. Completion of TMDLs shall include their incorporation into basin plans. This strategy shall include, but is not limited to, all of the following:

(i) A five-year schedule that identifies specific TMDLs to be completed and their expected completion dates, and major activities to be completed.

(ii) A long-term schedule, not to extend beyond the 2013 date for completion, which schedules the completion of all TMDLs on the 1998 list pursuant to Section 303(d) of the federal Clean Water Act.

(iii) A description of the existing resources used to address TMDL requirements, organized by fund source and department.

(iv) An estimate of the resources needed to adhere to the long-term schedule and achieve the 2013 date for completion.

(v) Identification of any shortfalls between existing resources and estimated resource needs to achieve the 2013 date for completion.

(vi) Proposed fund sources to address identified shortfalls.

(vii) Identification of technical assistance needs of the regional boards and a strategy for addressing these needs.

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[207] http://www.lao.ca.gov/2001/supp_report/073001_supp_rpt.htm.

(viii) A schedule to develop policies to guide the regional boards in developing and implementing TMDLs including, but not limited to, cost estimates to develop the policies. The schedule for policy development shall include consideration of a methodology to allocate responsibility for reducing pollution among the various sources that contribute to the impairment of a water body.

(b) The report required on or before November 30, 2002 by Section 13191 of the Water Code shall include information on the progress of SWRCB in adhering to the long-term schedule for TMDL completion described in paragraph (a). The annual reports required by Section 13191 shall also include information on the status of implementing the organizational improvements recommended by the public advisory group formed pursuant to Section 13191.

(c) The SWRCB and the regional boards shall consider, but are not limited to, all the following criteria in setting priorities and developing schedules for the long-term strategy described in paragraph (a):

- Water body significance.
- Degree of impairment.
- Potential threat to human health and the environment.
- Water quality benefits of activities ongoing in the watersheds.
- Potential for beneficial use protection and recovery.
- Degree of public concern.
- Available data and information.
- Available resources.
- Watershed priority or task schedule on the boards' Watershed Management Initiative three-year and five-year work plans.
- Any new or existing court orders and statutory requirements.

(d) A regional board shall consider the criteria listed in paragraph (c) when revising the Watershed Management Initiative work plans, and the state board shall incorporate the criteria into a guidance document for the regional boards regarding TMDL work plan development. Each criterion shall be given the appropriate weight warranted by the specific conditions of the impaired water in question, as determined by SWRCB or a regional board, as appropriate.

(e) On or before January 1, 2003, SWRCB shall develop a policy to establish criteria for the listing and delisting of impaired water bodies pursuant to Section 303(d) of the federal Clean Water Act. The policy shall include a "weight of evidence" approach and shall include criteria that ensure that the data and information used for identification and listing of impaired water bodies are accurate and verifiable.

(f) The SWRCB shall develop a master contract or contracts for work related to the development and implementation of the TMDL program and TMDLs. The master contract or contracts shall address the regional boards' need for technical expertise necessary to complete TMDLs in an effective and timely manner.

Appendix V: Curriculum Vitae of Technical Team

Dr. Marc Mangel

Complete Curriculum Vitae available at:
http://www.soe.ucsc.edu/~msmangel/cv.htm

Marc Mangel was educated at the University of Illinois (BS in Physics 1971 with High Honors, MS in Biophysics 1972), where he was an EJ James Scholar, NIH Trainee in biophysics and elected to Phi Kappa Phi and Phi Beta Kappa, and the University of British Columbia (PhD in Applied Mathematics and Statistics, with a focus on Mathematical Biology, 1978). He worked for the Center for Naval Analyses (CNA, the research and development center for the US Navy) from Nov 1977-Aug 1980, including service as the Operations Evaluation Group Representative to the Commander, Medium Attack Wing, US Pacific Fleet (Whidbey Island, Washington). Work done for CNA lead to the Koopman Paper Prize from the Operations Research Society of America (1982) and the JASA Applications Paper from the American Statistical Association (1983).

In 1980, Mangel moved to the University of California Davis, where he served as Assistant, Associate and Full Professor for eight years in the Department of Mathematics and eight years in the Department of Zoology/Section of Evolution and Ecology; he also chaired the Department of Mathematics (1984-1989) and was founding Director of the Center for Population biology. In 1996, Mangel moved to the University of California Santa Cruz, where he is Professor in the Department of Applied Mathematics and Statistics and Fellow of Stevenson College; he has also directed the Geographic Information Systems Laboratory (1996-1999) and served as Associate Vice Chancellor, Planning and Programs (1997-1999). In the latter capacity, he co-chaired the UCSC strategic planning effort. In 2002, he was appointed as Director, Center for Stock Assessment Research, which is a partnership between the UCSC and the Santa Cruz Laboratory of the National Marine Fisheries Service.

Mangel has held visiting positions as Scheinbrun Professor of Botany, Hebrew University of Jerusalem, Fall 1987; Wolfson College, University of Oxford, Hilary and Trinity terms, 1988; Rose and Max Varon Professor, Weizmann Institute of Science, 1994; Mote Eminent Scholar, Florida State University, 2000; and Dozor Professor, Ben Gurion University, 2000. His awards include the Joseph Myerhoff Fellowship, Weizmann Institute of Science, 1987; John Simon Guggenheim Memorial Fellowship, 1987; Fulbright Senior Research Fellowship, Oxford University, 1988; George Gund Foundation Distinguished Environmental Scholar,1992; Distinguished Statistical Ecologist, International Association for Ecology, 1998; and Fellow, California Academy of Sciences, 2000

His service to federal and international panels includes the Scientific Committee for the Conservation of Antarctic Living Marine Resources, the Bellman Prize Committee, Mathematical Biosciences; the SIAM-AMS Committee on Mathematics in the Life Sciences, the Pitelka Award Committee, International Society for Behavioral Ecology; the National Marine Fisheries Service Ecosystems Advisory Panel; the Council of the American Institute of Biological Sciences; International Academic Advisory Board, The Arava Institute of Environmental Studies; Board of Science, Resilience Alliance 2000, and the Science Advisory Board of the National Center for Ecological Analysis and Synthesis.

His editorial appointments include the editorial boards of *Natural Resources Modeling*, *Operations Research*, *Bulletin of Mathematical Biology*, *Ecological Applications*, *Theoretical Population Biology*, *SIAM Journal on Applied Mathematics*, *Journal of Mathematical Biology*,

Mathematical Biosciences, Evolutionary Ecology/Evolutionary Ecology Research, Environmental and Ecological Statistics, and *Oecologia.* He was co-editor of *Behavioral Ecology* 1994-1999.

He has served as external examiner or opponent of PhD students in North America, Europe, Africa and Australia.

His research program in mathematical and theoretical biology, focuses on ecology, evolution and behavior and the broad goal of combining first-rate basic science with important applied questions. Work in the group includes the evolutionary ecology of growth, aging and longevity, quantitative issues in fisheries management, and the mathematical population biology of disease.

Mangel has numerous journal publications and books that include **Decision and Control in Uncertain Resource Systems** (1985, Academic), **Dynamic Modeling in Behavioral Ecology** (with Colin Clark, 1988, Princeton), **The Ecological Detective. Confronting models with data** (with Ray Hilborn, 1997, Princeton) and **Dynamic State Variable Models in Ecology: Methods and Applications** (with Colin Clark, 2000, Oxford). He has edited **Classics of Theoretical Biology** (A Special Issue of the Bulletin of Mathematical Biology. Part I: Volume 52 Numbers 1,2. Part II: Volume 53, Numbers 1,2), **Sex Allocation and Sex Change: Experiments and Models** (Lectures on Mathematics in the Life Sciences, Volume 22) and **Proceedings of the Second International Symposium on Krill** (Canadian Journal of Fisheries and Aquatic Sciences 57 (Supplement 3).

He has supervised more than 50 undergraduate research projects or senior theses, a dozen PhD students and more than 15 post-doctoral colleagues; he has served on more than 25 Ph.D. Committees. His students and post-docs work at a diversity of organizations, including universities (UC Berkeley, Penn State, Toronto, Ben-Gurion, Minnesota, Wisconsin, Montana, Washington University, Duke, Wesleyan, Massachusetts, Utah, UCLA, Eastern Illinois), private concerns (Bank of America, Brooklyn Zoo), and governmental agencies (National Marine Fisheries Service, Portuguese Government, Livermore National Laboratory, CNRS Lyon).

Dr. Stephan B. Munch

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University of California, Santa Cruz
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Education:

1993 B.S. Biology and B.A. Art Studio, magna cum laude, State University of New York at Binghamton

1997 M.S. Marine Sciences, State University of New York at Stony Brook
Thesis: Recruitment dynamics of bluefish, *Pomatomus saltatrix* on the continental shelf from Cape Hatteras to Cape Cod, 1973-1995.

2002 Ph.D. Coastal Oceanography, State University of New York at Stony Brook
Dissertation: Evolution of growth rate in *Menidia menidia*: bioenergetics, life history theory, and implications for management.

Honors and Awards:

1998 New York Sea Grant Scholar
1993 Phi Beta Kappa

Employment:

2002-present Post-doctoral research fellow, Center for Stock Assessment Research, UC Santa Cruz, Ca.

1999-2001 Consultant in fisheries risk assessment. Applied Biomathematics, Setauket, NY

1993-1994 Field and laboratory technician, California Department of Fish and Game, Stockton, Ca.

1992 Laboratory technician, State University of New York at Binghamton

Publications:

Conover, D.O. and S.B. Munch 2002. Sustaining fisheries yields over evolutionary time scales. Science. 297:94-96.

Munch, S.B. and D.O. Conover 2002. Accounting for local physiological adaptation in bioenergetic models: testing hypotheses for growth rate evolution by virtual transplant experiments. Can.J.Fish.Aquat.Sci. 59:393-403.

Dunning, D., Q. Ross, S.B. Munch, and L.R. Ginzburg 2002. Measurement error affects risk estimates for recruitment to the Hudson river stock of striped bass. The Scientific World. 2(S1):238-253.

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Conover, D.O., S.B. Munch, T.E. Lankford, and W.F. Loftus 2000. Current status of the Key silverside, *Menidia conchorum,* in southern Florida. Tech. Report. U.S.G.S

In press

Conover, D.O., T. Gilmore, S.B.Munch Estimating the relative contribution of spring and summer-spawned cohorts to the Atlantic coast bluefish stock. Trans.Am.Fish.Soc.

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Munch, S.B. and D.O. Conover. Rapid growth results in increased susceptibility to predation in *Menidia menidia.* Evolution

X. Public presentations

Munch, S.B., M. Walsh and D.O. Conover 2002. Darwinian fishery science: Trade-offs in yield on evolutionary time scales. Fourth William R. and Lenore Mote International Symposium in Fisheries Ecology. Sarasota, Fl.

Rochet, M.J. and S.B. Munch 2002 Simulating the evolution of the age-length at maturity reaction norm in North Sea cod. ICES Annual Science Conference and ICES Centenary. Copenhagen, Denmark.

Munch, S.B. and D.O. Conover 2002. The relation between Bergmann's rule and countergradient variation: interplay of time constraints and seasonal mortality. Annual meeting of the American Society of Naturalists, Banff, Canada.

L.R. Ginzburg and S.B. Munch 2000. Population risk estimates for key species entrained through cooling water intake structures. Electric Power Research Institute symposium on cooling water intake structures. Jackson Hole, Wy.

L.R. Ginzburg and S.B. Munch 2000. Hudson River striped bass: Effects of measurement error on estimated risk. Electric Power Research Institute symposium on cooling water intake structures. Jackson Hole, Wy.

S.B. Munch and L.R. Ginzburg 2000. Ecological risk endpoints for the management of aquatic species. Electric Power Research Institute symposium on cooling water intake structures. Jackson Hole, Wy.

Munch, S.B., T.P. Hurst, and D.O. Conover. 2000. Darwinian fishery science: evaluating the evolutionary consequences of harvest regime on stock demography and dynamics. Third William R. and Lenore Mote International Symposium in Fisheries Ecology. Sarasota, Fl.

Munch, S.B.and D.O. Conover. 2000. Local adaptation in physiology: using bioenergetic models to examine constraints on the evolution of growth rate. Annual meeting American Society of Ichthyologists and Herpetologists, La Paz, Mexico.

Munch, S.B., and D.O. Conover. 1999. Bioenergetics of locally adapted populations (poster) 129th Annual meeting of the American Fisheries Society. Charlotte, North Carolina. August 29-September 2, 1999.

Munch, S.B. and R.M. Cerrato. 1998. Estimating the number of age classes from size frequency data. 118th Annual meeting American Fisheries Society, Hartford, Connecticut

Munch, S.B. and D.O. Conover. 1997. Factors influencing the year-class strength of bluefish, *Pomatomus saltatrix*, on the U.S. Atlantic coast. ICES International symposium: Recruitment dynamics of exploited marine populations: Physical-biological interactions, Baltimore, Md.

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Conover, D.O., F. Juanes, R. McBride, J. Buckel, S. Munch, F. Scharf 1997. Advection, piscivory and estuarine dependency: The role of early juvenile stages in recruitment of the bluefish, *Pomatomus saltatrix.* Annual meeting American Society of Ichthyologists and Herpetologists, Seattle, Washington.

Munch, S.B. and D.O. Conover. 1996. Interannual variation in distribution and abundance of juvenile bluefish in the Middle Atlantic Bight. Annual meeting American Society of Ichthyologists and Herpetologists, New Orleans, Louisiana.

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Shelley Lynne Luce

EXPERIENCE

2001– present Heal the Bay Santa Monica, CA

Staff Scientist

- Developing a watershed assessment program and Stream Health Index for the Malibu Creek watershed, including land use effects, impervious surfaces analysis and long-term trend monitoring.
- Directing an extensive research and monitoring program in Malibu Creek watershed, including:
- monthly water chemistry and algae assessments;
- semi-annual surveys of freshwater periphyton and benthic macroinvertebrates to determine impacts of nutrients, riparian vegetation and sediment depositions on aquatic biota;
- statistical and GIS-based data analysis and report writing.
- Prepared and submitted data for 303d listing and reviewed and commented on California's 303d listing policies.
- Analysed and commented on TMDLs for Malibu Creek (nutrients and algae), LA River (nitrogen), Santa Clara River (nitrogen) and others.
- Administered grants and wrote grant reports and new grant applications.
- Supervised staff and eight part-time contractors in field and office work.
- Advised stakeholder groups and other entities conducting studies on aquatic systems for scientific or regulatory purposes.
- Presented technical information at public hearings before the LA Regional Water Quality Control Board, the California Coastal Commission, Ventura County Supervisors, the LA City Council and others.
- Published articles for technical and non-technical audiences. Provided technical, legal and policy-related comments on TMDLs, NPDES permits, EIRs and other documents, and provided technical expertise to the press and public on controversial water-related environmental issues.

200-2001 LA Regional Water Quality Control Board Los Angeles, CA

Environmental Specialist

- Developed key water quality regulations (Total Maximum Daily Loads).
- Compiled water quality data for Los Angeles and Ventura regions.
- Reviewed and commented on CEQA documents related to aquatic ecosystems.

1996-1998 Environment Canada Burlington, ON

Habitat Biologist – Permitting Section

- Analyzed construction plans, determined environmental impacts of projects on aquatic ecosystems, negotiated mitigation and compensation works, developed monitoring plans and authorized projects.

EDUCATION

2003 University of California Los Angeles, CA

- Doctorate of Environmental Science and Engineering
- Dissertation title: *Urbanization and Aquatic Ecosystem Health in Malibu Creek, California: Impacts on Periphyton, Benthic Macroinvertebrates, and Environmental Policy*

1996 University of New Brunswick Fredericton, NB

- Master's of Science, Biology
- Thesis title: *Impacts of Metal Mine Drainage on Parasite Loads of Juvenile Atlantic Salmon* (Salmo salar).

RESEARCH AND TEACHING

1999-2001 University of California Los Angeles, CA

- Research assistant for EMAP data collection in Calleguas and Sespe Creeks.
- Lead researcher studying impacts of ambient pesticides on acetylcholinesterase activity in *Gila orcutti* in Calleguas Creek, including study design, fish collection and laboratory analyses.

1994-1996 University of New Brunswick Fredericton, NB

- Research assistant: freshwater and marine fish collection, laboratory studies of zinc toxicity to fish, lab-rearing of invertebrates.
- Teaching assistant for Biology, Invertebrate Zoology, Parasitology.

PRESENTATIONS

- Southern California Chapter of the Society of Environmental Toxicology and Chemistry Annual Meeting, July 2003. "Periphyton, Nutrients and Canopy in Malibu Creek, California."
- Society of Environmental Toxicology and Chemistry Annual Meeting poster presentation, November 2002. "Watershed Management Through Citizen Monitoring: A New 303(d) Listing and TMDL Requirement for Malibu Creek, California."
- American Fisheries Society California-Nevada Chapter, April 2002. "Bioassessment in Malibu Creek Using Benthic Macroinvertebrates."
- Southern California Chapter of the Society of Environmental Toxicology and Chemistry Annual Meeting, Invited Speaker, July 2001. "Technical and Policy Issues of the 303d Listing Process."
- Municipal Water District Annual Student Forum, Keynote Speech, April 2002.
- Society of Environmental Toxicology and Chemistry Annual Meeting poster presentation, November 2000. "Acetylcholinesterase Inhibition in Arroyo Chub (*Gila orcutti*) from Calleguas Creek, California."

MITZY TAGGART

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EDUCATION

D. Env., Environmental Science and Engineering, UCLA, Los Angeles. 2003
M.S., Environmental Engineering, USC, Los Angeles. 1993
B.S., Fluid and Thermal Engineering, Case Western Reserve University, Cleveland OH. 1989

EXPERIENCE

Staff Scientist **(1998 – Present)**
Heal the Bay, Santa Monica, California

Staff scientist at regional non-profit advocacy group representing over 10,000 members.

Advocate local, regional, state and federal agencies on water quality issues by developing technical analysis, written comments and testimony on:

- Proposed local and state water quality and pollution control regulations, plans, policies,
- Major NPDES permits (Individual, Stormwater, and General)
- EIS/EIRs for large coastal projects

Key Projects:

- Advocate for Recreational Beach Water Quality: active participate in the State's Beach Water Quality Work Group, various EPA-lead technical stakeholder groups, and ad hoc SWCCRP-facilitated rapid indicator working group. Review and comment on Clean Beach Initiative projects, EPA guidance documents, and bacteria TMDLs.
- Analyze and evaluate TMDLs developed for Region IV
- Directed research for the Fecal Bacteria Storm Drain Plume Dispersion Study in partnership with SWCRRP and the Los Angeles RWQCB
- Advocate for Contaminated Sediments: active participate in the Los Angeles Region's Contaminated Sediment Task Force, review and comment on Port and ACE dredging projects including extent determination, monitoring, and disposal.
- Active participate on various technical stakeholder groups
- Present technical information at public hearings before the LA Regional Water Quality Control Board, the California Coastal Commission, Ventura County Supervisors, the LA City Council and others.

Graduate Researcher **(1997-1998)**
Environmental Science and Engineering, School of Public Health
University of California, Los Angeles

Investigated the uncertainty associated with the hazard quotient methodology used in screening-level ecological risk assessments completed for contaminated sites in California for the Department of Toxic Substances Control and the various branches of the U.S. military.

Environmental Engineer **(1992-1997)**
Estate of Albert Levinson, El Segundo, California

Engineer for a team responsible for the operation and long-term liquidation of multi-million dollar industrial facilities estate.

Key Responsibility

- Daily Regulatory Compliance for an independent Oil Exploration Company and a Grey-Iron Foundry
  Responsible for all aspects of environment regulation compliance including federal, state, and local air, wastewater, stormwater, and hazardous waste requirements.
- Directed Industrial Site Remediation at multiple industrial facilities for real estate transactions.
  - Investigation of seven former aerospace and three oil and gas facilities
  - Phase II site assessment of a former organic iodide facility
  - Facility closure and remediation of a grey-iron foundry.
  - Bioremediation and vapor extraction at 80-acre oil field

Project Engineer
RMT, Inc., Santa Monica, California **(1990-1992)**

Specialized in industrial facility regulatory compliance including federal, state and local air quality and hazardous waste disposal regulations, industrial stormwater program development and monitoring, wastewater discharge requirements, and OSHA regulations.

Key Projects

- On-site Compliance Engineer for Aerospace Manufacturer during Facility Closure and Remediation
- Developed for over 15 Industrial facilities:
  AB-2588 Air Toxic Plans and Reports, Stormwater Pollution Prevention Plans, and SCAQMD Permit Applications
- Compliance Audits for over 20 Industrial Facilities

Environmental Scientist **(1989-1990)**
Roy F. Weston, Cleveland, Ohio

Contract-member of the U.S. EPA Superfund Technical Assistance Team for emergency response to uncontrolled releases of hazardous substances. Coordinated on-site response including monitoring, source identification and extent of contamination studies, OSHA and CERLA compliance. Developed site cleanup and remediation plans including cost analysis.

Key Projects

- Emergency Response to the Mitigation of Landfill Gas into Residential Homes – Landfill Gas Extraction Operation
- Extent of Contamination Study and Removal Action Plan for a PCB-Contaminated Waste Oil Facility

- Member of the U.S. EPA Region V Chemical Safety Audit Team – Environmental Compliance Audits at Major Manufacturing Facilities

Publications and Presentations

"Variability of Shoreline Fecal Bacteria Densities due to Storm Drain Discharge in the Dry Season: Implications for Routine Monitoring Programs, October, 2002, California and the World Oceans, Santa Barbara, California.

"Beach Monitoring and Public Notification in S. California: Translating Science into Public Policy", June 2001, American Association for Advancement of Science, Irvine California.

"Temporal Variability of Shoreline Bacteria Densities resulting from Dry-weather Urban Runoff Discharge", September 2001, International Environmetrics Society, Portland, Oregon.

Duke, L.D. and Taggart, M., Uncertainty Factors in Screening Ecological Risk Assessment, 2000, Environmental Toxicology and Chemistry, (19) 1668-1680.

"Urban Runoff: Largest Source of Pollution to Coastal Waters", June 2000, California Water Environment Association, Newport Beach, California.

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EXPERIENCE

Executive Director at Heal the Bay (6-94 to present)
Oversee advocacy, legislative, research, and education programs for the successful environmental group. Set priorities and help create strategic plan and implementation strategies for the organization on issues, programs, communications, development, education and finance. Chief administrator for the organization. Develop and oversee annual budget of $3 million. Primary spokesperson for the organization to the media, agencies, elected officials and at conferences. Responsible for meeting yearly fundraising goals of $3 million. Manage a staff of 30. Responsible for the acquisition of the Santa Monica Pier Aquarium (formerly the UCLA Ocean Discovery Center. Maintain responsibilities as the organization's Issues and Programs Director (see below). Principle negotiator for the organization on a wide variety of issues including the Los Angeles County's Municipal Storm Water Permit, contaminated sediment issues, and California and National Bathing Water Standards issues. Helped author state legislation including AB 411, AB 538, AB 2019, AB 1548, SB 72 and AB 1186. Chaired statewide workshop on contaminated sediments in 1997 and conference on Urban Storm Water Best Management Practices for the South-West United States in 1998.

Professor at UCLA (11/97 – 3/98)(12/01 to 4/02)
Visiting Professor at the School of Public Health. The graduate level class focused on coastal pollution problems and their potential solutions. Course material covered the regulatory acts (the Clean Water Act, National Environmental Protection Act, the Porter-Cologne Act, California Environmental Quality Act, and the California Coastal Act), regulatory agencies associated with those Acts, and water quality problems facing California's coast from point and non-point sources, oil, and development.

Issues and Programs Director (9/88 - 6/94)
Provide technical support for the environmental public interest group. Responsibilities include: Analyze EIRs/EISs, discharge permit applications, consistency determinations, and local, state and federal regulations; complete field research and supervise the preparation of the organization's technical reports; manage technical and programmatic staff; write and present testimony for public hearings at the State and Regional Water Boards, California Coastal Commission, City Councils, the State Legislature and in front of other agencies; technical review of all of the organization's publications, educational materials, and press releases; provide technical support to Heal the Bay and other environmental groups on source reduction, water quality treatment management strategies and technologies, watershed management strategies, water quality regulatory compliance issues, and the toxicological and ecological impacts of water pollution on humans and aquatic life; decide on and implement issues agenda; review grants; create educational programs for the organization; serve as a spokesperson for the organization to the media; co-author, comment and testify on proposed water quality and

natural resources legislation; research and write position papers; exchange information and work cooperatively with elected officials, engineers, scientists and agencies that work on coastal issues. Developed Heal the Bay's Beach Report Card.

Environmental Consultant at Engineering Science Inc. (10/86 – 3/88)
Involved in the preparation of EIRs and environmental assessments. Primarily involved in writing the biological and water quality sections. Projects included: Development at Ballona Lagoon and Ormond Beach wetlands and the L.A. city urban runoff characterization study.

EDUCATION

UCLA - D. Env., Environmental Science and Engineering: June, 1994

UCLA - M.A., Biology: June, 1986

UCLA - B.S., Biology: June, 1984

RESEARCH PROJECTS

Principal Investigator on a study of the PCB and DDT contaminant levels in commercially sold white croaker. Included in the study was a cancer risk assessment, an analysis of the current regulatory framework on contaminated fish, and numerous recommendations to reduce the cancer risks to the population consuming white croaker.

Investigator on an epidemiological study of the possible adverse health effects of swimming in the urban runoff contaminated waters of Santa Monica Bay. The study was completed under the auspices of the Santa Monica Bay Restoration Project. 6-94 to 5-96. In Epidemiology 1999. Haile, R., Witte, J., Gold, M. et al.,

Coauthor of a 1998 paper in Marine Science Bulletin on developing a fish contamination monitoring program for Santa Monica Bay.

Principle investigator on a series of storm drain and surf zone pathogen studies completed under the auspices of the Santa Monica Bay Restoration Project. 6-88 to 6-92.

Co-author of a comprehensive study on the use of oxidants for drinking water treatment for the Journal of the American Water Works Association. Summer 1988.

Co-author of a comprehensive study for the State Water Resources Control Board on the sources, fate, transport, aquatic toxicity and possible biological impacts of exposures to six chlorinated organics in the environment. Fall 1987 - Spring 1988.

Co-author of a paper entitled, "Current and Prospective Quality of California's Ground Water" presented at the 16th Biennial Conference on Ground Water. Summer, 1987.

MEMBERSHIPS

Member of the California Oceans Science Trust; Vice Chair of the Santa Monica Bay Restoration Commission (SMBRC), member of the SMBRC Watershed Council and Technical Advisory Committee (TAC); member of UCLA School of Public Health Hall of Fame; member of USC Sea Grant Advisory Board; member of the Palos Verdes Superfund Site Technical Advisory Committee; Member of the NOAA Natural Resources Damages Technical Advisory Committee for the Palos Verdes shelf. Chair of the City of Santa Monica's Environmental Task Force; Member of the City of Malibu's Environmental Review Board; Member of the Los Angeles Regional Contaminated Sediment Management Committee and Technical Advisory Committee; Member of California's Beach Water Quality Task Force and the Clean Beach Advisory Group; Member of the Advisory Board for the Environmental Media Association; Member of the Malibu Creek Watershed Advisory Committee. Prior member of the of the Environmental Protection Agency's Urban Wet Weather Federal Advisory Committee and Beach Advisory Group, the Regional Water Board's Groundwater Technical Advisory Committee and the Technical Review Committee for Surface Water.

Craig S. Shuman

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EDUCATION

- 1999- Doctorate Candidate in Environmental Science and Engineering, University of California, Los Angeles (UCLA)
- 1995-1998 MA in Biology, University of California, Santa Barbara (UCSB)
- 1991-1995 BA with Honors in Environmental Science with an emphasis in Ecology, University of California, Santa Barbara

EXPERIENCE

- 2001- Research Scientist. Reef Check/UCLA. Performed coral reef monitoring and education in Indonesia, Madagascar, the Maldives, and the Philippines
- 2000-2001 Graduate Student Researcher. Institute of the Environment, UCLA. Performed wetland restoration monitoring at the Naval Air Base, Ventura County, CA.
- 2000 Scientific consultant for IMAX film "Coral Reef Adventure", French Polynesia.
- 1998-1999 Field Research Assistant. Marine Science Institute (MSI), UCSB. Duties encompassed all aspects of a field marine ecology project conducted in Moorea, French Polynesia including supervision of staff.
- 1995-1998 Graduate Student Researcher. MSI, UCSB. Administered laboratory and field research activities at UCSB, the California Channel Islands, and Moorea, French Polynesia.
- 1993-1995 Research Assistant. MSI, UCSB Performed laboratory activities including sorting of marine bio-core samples.
- 1989-1992 Electrician's Apprentice. Romanak Electric, Los Angeles, CA.

SKILLS

12 years SCUBA experience (University of California research certified, 1000+ logged research dives). Marine navigation and boating. Red Cross Certified in first aid, CPR, basic life support, advanced water safety and lifeguarding. Repair of research equipment in field situations including outboard motors. Water quality testing (marine and freshwater). Computer skilled in database (MS Access), GIS (ArcView), remote sensing (ENVI), and statistics (Systat, SPSS, SigmaPlot).

PROFESSIONAL AFFILIATIONS

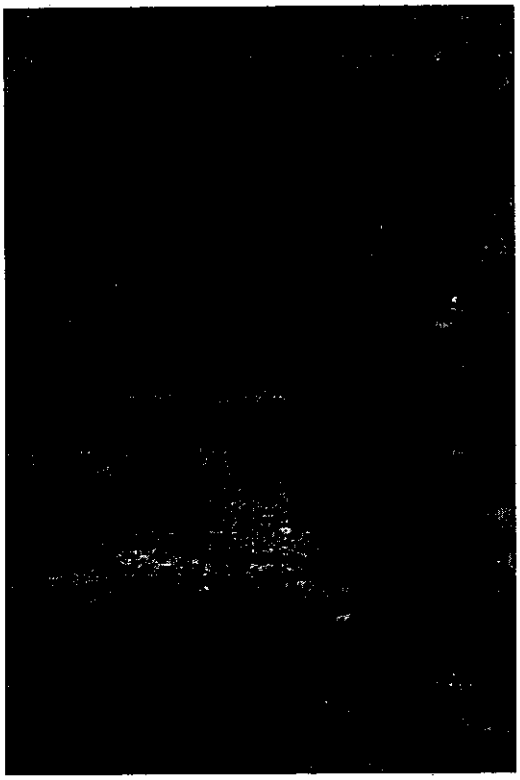
Founding officer Isla Vista chapter of Surfrider Foundation. Implemented ocean water quality testing through Surfrider Foundation in Santa Barbara County. Member board of directors Reef Check/UCLA.

AWARDS/FELLOWSHIPS

- 2002-2003 Dissertation Year Fellowship. UCLA
- 2001-2002 Malcolm R. Stacey Memorial Award. UCLA
- 2001-2002 Graduate Student Fellowship. University of California Toxic Substances Research and Teaching Program (UC TSR&TP)
- 1996-1998 Graduate Student Fellowship. (UC TSR&TP)
- 1995 Research and Training Grant. National Science Foundation

Appendix VI:
Snapshots of Potential Impacts of Proposed Methodology

San Gabriel River



Running through the heart of East Los Angeles County, the San Gabriel River is one of the few major largely soft-bottomed waterways remaining in Southern California. Originating in the San Gabriel Mountains, the river flows south to the Pacific Ocean at Seal Beach and provides a rare natural refuge in the middle of this highly urbanized region.

The site of the historical San Gabriel Mission, the San Gabriel River witnessed the last stand of the Mexican Army in the Mexican-American war and once hosted a healthy migration of steelhead trout. Today a wild population of brown trout is found in a section of the west fork and in a region with ten times less green space as is needed to maintain a healthy environment, several equestrian trails and pocket parks line the waterway and provide an essential escape to residents.

Despite the importance of the San Gabriel River to the community, the waterway faces several challenges. The Los Angeles Regional Water Quality Control Board oversees 865 National Pollutant Elimination Discharge System (NPDES) permits in the San Gabriel River watershed. Runoff contamination carries trash and many dangerous metals such as zinc into its waters, threatening the health of the river's wildlife, while several invasive species threaten the health of the riparian ecosystem.

In recognition of its vital contribution to the history and contemporary culture of the region, numerous government agencies and community organizations are engaged in a regional effort to revitalize the waterway. The ultimate goal of these efforts is to improve the San Gabriel's water quality and establish a greenbelt along the banks of the river from its headwaters in the mountains to its outlet in the Pacific Ocean.

As part of this initiative, local organizations such as the Friends of the San Gabriel River organize yearly water-monitoring events that recruit hundreds of community volunteers to test the quality of the waterway. The Los Angeles and San Gabriel Watershed Council facilitates stakeholder coordination around the waterway and Los Angeles County Proposition A funds allocated by Supervisor Gloria Molina support the development of local pocket parks. Recent federal legislation authored by Congresswoman Hilda Solis

also commits federal funding to study the possibility of designating portions of the waterway as a national park.

The proposed 303 (d) listing policy will leave waterways such as the San Gabriel River that are in desperate need of the protections that the TMDL program provides off its list. In 2002, the Los Angeles Regional Water Quality Control Board placed Reach 2 of the San Gabriel River on the 303 (d) list after 4 out of 26 samples (15%) of samples demonstrated an exceedence of water quality standards for zinc. **Under the binomial approached included in the proposed listing policy, this level of contamination would have been insufficient to list the San Gabriel River.** Such an omission would have removed the TMDL program as a tool for revitalizing the river and severely hampered community efforts to revitalize the waterway. Should the proposed 303(d) listing policy be implemented, communities will be unable to use the TMDL process as a tool to revitalize similar waterways.

San Antonio Creek

Part of the Ventura River Watershed, the San Antonio Creek flows through the city of Ojai in Ventura County from the Transverse Ranges south to the Ventura River.

The creek flows through the center of the small city of 8,000, and provides the scenic backdrop to the world-famous Ojai Valley Tennis Tournament, the largest amateur tennis tournament in the country. After leaving the city, the creek flows past lush avocado and orange orchards to join the Ventura River. .

In addition to its contribution to the cultural life of Ojai and Southern Ventura County, San Antonio Creek plays a critical role in the region's ecosystem. The endangered unarmored threespine sickleback, a small fish that once populated waterways throughout Southern California and now found only in a handful of waterways, calls San Antonio Creek home.

Despite its importance to the community and ecology of Ojai and Southern Ventura County, the water quality of San Antonio Creek faces several challenges. Runoff from agricultural sources, for example, leads to high levels of eutrophication that threaten the oxygen supplies of fish species such as the threespine sickleback.

Recognizing the importance of San Antonio Creek to the region, local community volunteers mobilized a 'Stream Team' to test the waterway for contamination and provide the data to local water quality boards. With 4 out of 23 (17%) of samples exceeding water quality standards, the results of the testing indicated elevated levels of nitrates, which can lead to eutrophication. In response to this finding, the Los Angeles Regional Water Quality Control Board placed San Antonio Creek on the 303 (d) list for nitrates. This designation will allow the Board to develop a TMDL for the waterway and ensure that nitrate contamination into the waterway is curtailed.

The proposed 303(d) listing/delisting policy will ensure that waterways such as San Antonio Creek are never listed and consequently, problems such as nitrate contamination never addressed. The binomial approach requires that 5 out of 23 toxicity samples exceed water quality standards in order to list a waterway. Thus, under the

proposed policy San Antonio Creek would never have been listed on the 303(d) list for nitrates, and a major water quality issue ignored.

Coyote Creek

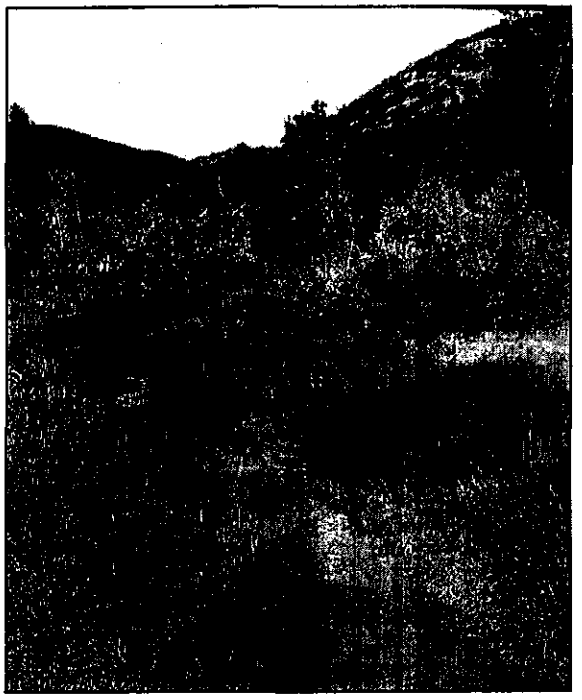
Flowing through Northern Orange County, Coyote Creek runs from Riverside County to the San Gabriel River. On its way to the River, Coyote Creek provides the aesthetic backdrop to Coyote Creek Golf Club, a cornerstone of the local economy.

Despite its importance to the local economy, Coyote Creek faces a series of water quality challenges that threaten its beneficial uses. These include poor water quality, lost aquatic species, lost and degraded wetlands, in-stream and terrestrial habitats, channel degradation and erosion, reduced natural recharge, infestation of invasive species, flood damage, and devalued recreation experience.

In 2002, the Santa Ana Regional Water Quality Control Board listed Coyote Creek on the 303(d) impaired waters list after toxicity resting revealed levels of selenium in the waterway that exceeded water quality standards. Selenium is a heavy metal that is extremely toxic to aquatic wildlife at very low concentrations. Out of 26 samples taken, 5 (19%) exceeded water quality standard for the toxin.

Under the proposed listing/de-listing policy, Coyote Creek would not have been included on the 303(d) list, despite the high incidence of selenium contamination. Using the binomial approach, at least 6 samples out of 26 must exceed water quality standards for inclusion of the waterway. Thus, waterways such as Coyote Creek with significant impairment that are essential to local economies may be overlooked and ignored in regional cleanup efforts.

Quail Creek



Flowing into the Salinas River, Quail Creek is part of a major watershed that flows into the Monterey Bay National Marine Sanctuary. The primary land use around the creek is agriculture and grazing. High nitrate levels are commonly found in the surface waters of this watershed. Other issues include siltation, water diversions, migration barriers for salmonids, and high water temperatures.

The proposed listing/delisting policy as written requires that for toxicity sample counts fewer than 20, 5 samples must exceed standards. Quail Creek has 4 samples for nitrate contamination that exceed standards set by the state drinking water maximum contaminant level for nitrates of 45 mg/L. Despite the fact that many of the detected exceedances reached levels that would poison cattle, under the proposed policy Quail Creek would not have been included on the 303 (d) list by the Central Coast Regional Water Quality Control Board.

The potential for such an omission is particularly alarming when considering the possible impact of nitrates on the health of cattle grazing by the creek. Nitrate poisoning can be extremely hazardous to cattle populations. Acute poisoning occurs within 30 minutes to 4 hours after ingestion of plants or water high in nitrates. Thus, the problem occurs very quickly and often the cattle are observed to be normal one day and dead the next day. A very early sign is salivation followed by frequent urination. Soon after, the cattle exhibit difficult breathing, increased respiratory rate, and dark brown or "chocolate" colored blood and mucous membranes. The animals then become weak, reluctant to move, and have convulsions before they die. It is common to simply find some of the cattle dead. If pregnant cattle receive a dose that is not quite deadly, they may abort soon after recovering.

The adoption of the proposed delisting/listing policy would thus allow waterways such as Quail Creek to be omitted from the 303(d) Impaired Waters List and thus ignore a major potential threat to local grazing economies.

Appendix VII: Letter from Alexis Strauss, U.S. EPA Region IX to Arthur Baggett, SWRCB (Feb. 18, 2004)

February 18, 2004

Mr. Arthur Baggett
Chairman
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 94912-0100

Dear Mr. Baggett:

Thank you for the opportunity to review California's draft Water Quality Control Policy for developing the State's Clean Water Act Section 303(d) list. Because EPA is responsible for acting upon the State's Section 303(d) listing decisions that will be based on the assessment methodology contained in the Policy, we carefully evaluated the draft policy to determine whether it is consistent with applicable water quality standards, the Clean Water Act and associated federal regulatory requirements. EPA does not take formal action on the assessment methodology itself.

EPA is concerned that many provisions of the draft policy appear to conflict with applicable water quality standards and federal listing requirements. This letter summarizes these concerns; an enclosure provides more detailed comments and recommendations. We urge the State Board to make substantial revisions to the policy to ensure that it is fully consistent with water quality standards and Section 303(d) listing requirements.

Although the policy needs to be revised, we believe the draft policy represents a step in the right direction. We recognize that the State Board has devoted substantial effort in developing the draft listing policy and we understand that it is difficult to define policies that account for the full range of water quality assessment challenges that face California. We support the State's objectives to improve the quality of data supporting listing decisions, the clarity of assessment criteria, and the consistency with which assessment criteria are applied. We appreciate that the policy provides for the evaluation of all data and information types and the application of all numeric and narrative water quality standards in the assessment process. We also appreciate your staff's effort to solicit input from EPA during the initial phases of policy development.

It is difficult to identify elements of the proposed policy that would result in listing decisions that are inconsistent with applicable water quality standards and federal listing requirements for two reasons. First, it is unclear how many policy elements will actually be interpreted and applied by State and Regional Board staff because they are not explained clearly in the draft policy. The policy is inconsistent in its description of

assessment methods as requirements or as discretionary guidelines. Second, the policy authorizes but does not require the State to consider listing waters under Section 303(d) that do not meet the explicit listing criteria through the subsequent application of professional judgment and "weight of evidence" analysis. It is unclear whether and how the State will actually apply these additional provisions. When the State develops its 2004 Section 303(d) list based on the adopted policy, EPA will carefully scrutinize the proposed listing decisions and associated assessment rationales. If the actual listing decisions are consistent with applicable water quality standards and federal listing requirements, the list will be approvable.

Inconsistencies With Federal Requirements

Based on our review of the policy, these provisions appear to be inconsistent with federal requirements:

- The policy includes provisions for excluding from consideration data and information that do not meet all of the State's preferred tests of data quality and representativeness. These provisions appear to conflict with 40 CFR 130.7(b), which requires the state to gather and consider all existing and readily available data and information in the listing process. This requirement creates a strong presumption that data and information will be used in the assessment process unless it is completely unreliable. The data limitations and preconditions also seem substantially more stringent than the principles governing evidence admissibility and opportunity for public participation typically used in California administrative proceedings. The proposed policy and supporting documentation do not contain sufficient rationale for a decision to exclude available data and information from consideration, as required by 40 CFR 130.7(b)(6). Data and information are often useful within a "weight-of-evidence" assessment context even if they do not meet every quality assurance expectation.

- The proposed procedures for assessing exceedances of numeric water quality standards for many pollutants conflict with existing water quality standards provisions. Most procedures rely on a 10% allowable exceedance rate applied through a nonparametric binomial statistical test for most pollutant types and therefore appear to be much less stringent than existing state water quality standards, in conflict with federal listing requirements. For example, the proposed assessment procedure for toxic pollutants neglects the explicit recurrence intervals defined in the California Toxics Rule, which states that acute or chronic standards are not to be exceeded more than once in every three consecutive year period (see 40 CFR 131.38 (c)(2)(iii)).

- The policy does not describe clear provisions for identifying and listing threatened waters. Federal regulations at 40 CFR 130.7(b) and 130.2(j) require the identification of waters which do not or are not expected to meet applicable water quality standards. As described in EPA's national listing guidance (EPA, 1997a

and EPA, 2003), States are expected to assess potentially threatened waters and to list waters which are expected to exceed applicable standards during the following 2-year period. The policy mentions but does not require the assessment of water quality trends that could identify threatened waters; moreover, it is not clear that the policy provides for evaluation of dilution calculations or modeling results to support potential listing determinations as required by federal regulations (see 40 CFR 130.7(b)(5)(ii)).

- The policy contains provisions that would exclude from listing waters impaired due to pollutant discharges from naturally occurring sources and these provisions conflict with applicable state water quality standards, which do not contain such an exemption. Moreover, the policy would appear to exclude from listing impaired waters that receive pollutant discharges from anthropogenic sources if naturally occurring sources alone were sufficient to cause water quality standards exceedances, a provision that also conflicts with state water quality standards. The draft listing policy conflicts with the State's draft S.B. 469 TMDL Guidance document, which correctly observes that water quality standards would need to be revised in order to avoid listing or developing TMDLs for waters whose natural background pollutant levels exceed water quality standards (SWRCB, 2003, section 6). Finally, the provision that encourages application of a reference watershed approach to assessment of bacteria standards exceedances is inconsistent with state water quality standards except in Region 4, the only Region in which a reference watershed approach to bacteria standards implementation has been adopted as a component of its water quality standards. The state would need to adopt and receive EPA approval of water quality standards changes pursuant to Section 303(c) in order to apply natural source exclusions or the reference watershed approach to implementing bacteria standards as part of the Section 303(d) listing methodology.

- For toxicity assessments, it is uncertain if the policy would require listing a water body with evidence of toxicity but the pollutant is unknown. Recent EPA listing guidance clarifies states must list impaired or threatened waters based on biological assessments, or toxicity testing that demonstrate violations of narrative or numeric criteria adopted to protect designated uses even if the specific pollutant is not known (see EPA, 2003.)

- The policy provides that impaired waters need not be listed if other enforceable programs are available to address the impairment causes. This provision is generally consistent with the requirements of 40 CFR 130.7(b). However, in order for this provision to apply, the policy states that the discharge source subject to the enforceable program need only comprise the majority of the pollutant load causing the impairment. This provision is potentially inconsistent with federal regulations because minority sources not covered by the enforceable program may be sufficient to cause water quality standards violations even if the majority source is controlled. This part of the enforceable programs provision should be revised to require that enforceable programs that address impairments sources must be sufficient to result

in full attainment of water quality standards, taking into account all pollutant sources in addition to the regulated source(s).

Other Key Concerns About the Draft Listing Policy

Several other listing provisions either appear to conflict with federal listing requirements, are too vague to enable us to adequately evaluate their consistency with federal requirements, or have not been supported by adequate technical rationales. EPA is concerned about the following aspects of the policy, most of which are also discussed in greater detail in the enclosure to this letter:

- The policy does not require verification that data sets are suitable for analysis through the proposed binomial statistics method. Unless evaluated data exhibit particular characteristics (e.g. normal distribution, sample independence, absence of systematic biases) it may be invalid to draw valid statistical inferences based on binomial statistical tests (see Lin, *et al.*, 2000). With the exception of monitoring programs based on random sample designs, most monitoring programs in California are not designed to collect data that exhibit these characteristics.

- The policy is unclear as to whether and how alternative data evaluation and weight of evidence analysis procedures will be applied in the assessment process. The policy should include a firm commitment to apply a weight of evidence approach that would provide for listing of waters in cases where multiple lines of evidence combine to demonstrate water quality standards exceedances even if a single line of evidence provides insufficient evidence of exceedances. The policy should explain more clearly the procedures to be followed to conduct weight of evidence analysis. As proposed, the policy takes too narrow a view of weight of evidence analysis and thereby creates the potential that standards exceedances and associated listings will be missed in the assessment process.

- The policy is unclear about how priority ranking and scheduling decisions will be made. Moreover, scheduling provisions should be modified to be consistent with EPA's national policy that TMDLs are to be completed within approximately 8-13 years of the date of initial listing or 1998, whichever is later (see EPA, 1997b).

Conclusion

EPA expressed these concerns in comments to State Board staff dated June 2003 on the previous draft of the proposed policy. We are concerned that most of the inconsistencies with federal listing requirement identified in our previous comments remain in the December 2003 draft policy. Unless the policy is modified to address our remaining concerns, it appears likely that the State will develop Section 303(d) listing decisions that do not comply with federal listing requirements. EPA would be compelled

to disapprove any listing decision that conflicts with these requirements. EPA partially disapproved and added waters and pollutants to the California Section 303(d) lists submitted in 1992, 1996, 1998, and 2003—an outcome we want to avoid in future listing decisions. We would greatly prefer to work with the State Board and your staff to identify policy modifications that comply with state water quality standards and federal listing requirements. We do appreciate your efforts to develop this policy and look forward to working with you in the coming months to help strengthen the policy. If you have questions concerning these comments, please call me at (415) 972-3752 or David Smith at (415) 972-3416.

Sincerely,

Alexis Strauss
Water Division Director

Enclosure

Enclosure: Specific Concerns About California's Proposed Section 303(d) Listing Policy

Data Quality, Quantity and Representativeness

The draft listing policy proposes to use minimum sample sizes for assessing certain pollutants (e.g., n>20 for water samples and n>10 for tissue or sediment samples). EPA's recent listing guidance states "EPA does not recommend the use of rigid, across the board, minimum sample size requirements in the assessment process. Small sample sets often provide sufficient information to support decisions to list waters because the frequency and/or magnitude of observed excursions and digressions are high enough to support a reliable impairment determination." (EPA 2003, pp. 25-26). The policy appears to allow assessments of smaller data sets on case-by-case basis, but the policy should more clearly require assessment of data sets with fewer than the suggested "minimum" sample sizes.

The policy also requires only "high quality" data to be considered for listing impaired waters; i.e., monitoring data associated with a Quality Assurance Project Plan or equivalent. Other data will be considered only in combination with "high quality data"; however other data cannot be used by itself. EPA agrees that "high quality" data should be accorded the greatest weight to support listing and de-listing decisions. However, all data and information must be considered (see EPA, 1997a and EPA, 2003). We encourage the State to define the basic QA/QC components that correspond to the "equivalent" of a QAPP. For example, if a monitoring group were to provide documentation of study objectives, rational for selection of sampling sites, sampling frequency, field techniques, analytical methods, and personnel training, then we see no legal rationale to exclude the analytical results and monitoring data from the assessment.

The policy lists major monitoring programs in California considered to be of high quality. We recommend the State include all EPA monitoring data (not just EMAP) as well as other agencies that operate high quality sampling programs (e.g., US Fish and Wildlife Service, US Department of Agriculture, US Army Corps of Engineers, and National Oceanic and Atmospheric Administration).

The policy's minimum sample size and high quality data provisions and supporting rationale do not provide a "good cause" rationale for excluding data and information from consideration (see 40 CFR 130.7(b)). These regulatory provisions create a rebuttable presumption that all readily available data and information will be used in the assessment process. A great deal of useful data from STORET, academic and agency reports, and volunteer monitoring groups would appear to be excluded from consideration under the proposed rule, an outcome which appears inconsistent with the federal requirements.

Moreover, these requirements appear to be more stringent that the principles governing the admissibility of evidence and opportunities for public participation typically used in California administrative proceedings. See, e.g., *Gaytan v. Workers' Compensation Appeals Board*, 134 Cal.Rptr.2d 516, 529-530 (2003) (discussing party's opportunity to present evidence

and have it considered); *McBail & Co. v. Solano County Local Agency Formation Comm.*, 72 Cal .Rptr.2d 923, 926-28 (1998) (discussing agencies' obligation to adequately consider "all relevant factors", and disapproving agency's effort to require a party to make a factual showing beyond that required by statute); *Mohilef v. Janovici,* 58 Cal.Rptr.2d 721, 736 (1996) ("it is well established that a 'presentation to an administrative agency may properly include evidence that would not be admissible in a court of law'"); *Desmond v. County of Contra Costa,* 25 Cal.Rptr. 840, 846-847 (1993) (approving use of non-expert opinion testimony in agency proceeding); *County of San Diego v. Assessment Appeal Board,* 195 Cal.Rptr. 895, 900-901 (1983) (setting aside Board's decision because "it chose to disregard competent evidence"; *Calif. Hotel and Motel Assn.*, 157 Cal.Rptr. 840 (1979) (discussing public participation objectives of California's Administrative Procedures Act); see also *California Optometric Assn.* 131 Cal.Rptr. 744 (1976) and *Carmel Valley View, Ltd.*, 130 Cal.Rptr. 249 (1976).

We are also concerned that the proposed policy appears to set a higher burden of proof than typically used in California's administrative proceedings. We understand that "preponderance of the evidence" is the burden of proof typically used in the State's administrative proceedings. See, e.g., *Mann v. Dept. of Motor Vehicles,* 90 Cal.Rptr. 2d 277, 282-283 (1999) ("Evidence Code section 115 provides in part that '[e]xcept as otherwise provided by law, the burden of proof requires proof by a preponderance of the evidence", rejecting argument that department "had the burden of producing 'clear and convincing [proof] to a reasonable certainty" in administrative proceeding); *San Benito Foods v. Veneman,* 58 Cal.Rptr.2d 571 (1996) (rejecting argument that agency's hearing officer was required to apply a "clear and convincing evidence" standard of proof in administrative proceeding); *In the Matter of Permits 19259 and 19260*, State Water Resources Control Board, 1987 WL 54550 (1987) ("Permittee asserts that the standard of proof in this case should be that of clear and convincing proof to a reasonable certainty." "Generally, the proper standard of proof in cases where no fundamental vested right is involved is the preponderance of the evidence standard....We conclude that changes in water right permits likewise are subject to the preponderance standard and substantial evidence review."); *Rosas v. Workers' Compensation Appeals Board,* 20 Cal.Rptr.2d 778, 783-87 (1993) (the burden of proof in a workers' compensation proceeding "manifestly does not require the applicant to prove causation by scientific certainty"); and *Western Oil and Gas Assoc. V. Air Resources Board,* 208 Cal.Rptr. 850, 858 (1984) ("The Board therefore should not be required to wait until substantial adverse effects are scientifically verified before adopting appropriate standards."}

In section 6.2.5, the draft policy states "information that is descriptive, estimated, modeled or projected may be used as ancillary lines of evidence for listing or de-listing decisions." We request the State modify this to remove the notion that such information will be treated only as supplementary information for assessment decisions. We find it inconsistent with federal guidance that water quality modeling results by themselves are sufficient means of assessing water quality conditions. Federal regulations require the consideration of information from dilution calculations or predictive models in the assessment process (40 CFR 130.7(b)(5)(ii)).

Statistical Methods

As discussed in our letter, it is important that data sets exhibit certain characteristics in order to validly apply statistical analysis procedures such as nonparametric binomial methods to describe potential sources of analytical error. In order for these statistical tests to yield reliable results, evaluated data should be independent, normally distributed, and without bias (e.g., serial correlation or autocorrelation). The policy should be modified to provide for the verification that available data sets exhibit these characteristics prior to applying the binomial approach. We expect that the State will document its analysis which shows these assumptions are met to a reasonable degree. Not all data sets must meet every assumption completely, but the State should discuss potential errors associated with application of binomial analysis methods to data sets that do not meet one or more key assumptions. We want to stress that the data should be assessed through another assessment method if the assumptions necessary to carry out a binomial assessment are not met.

The listing policy relies heavily on the binomial approach, its limitations, or the policy choices reflected in its design with respect to management of type 1 and type 2 decision error. Instead the policy uses footnotes to provide some background information and relies on the notion that other states have already adopted the binomial parameters and therefore they are acceptable. For example, the policy discusses the null hypothesis yet it does not clearly define the state's definition of the null hypothesis for listing waters (which is buried in the FED). This is especially critical for the de-listing section of the policy. Moreover, the proposed approach to applying binomial statistics infers a policy choice by the state to minimize type 1 error (the likelihood of incorrectly assessing a water as impaired) at the cost of maximizing type 2 error (the likelihood of incorrectly concluding that an impaired water is attaining standards). EPA guidance and professional literature recommend that type 1 and type 2 error rates should be balanced if there is no clear agreement that one form of error is more important than the other, as a policy matter, in that state (see EPA, 2001, EPA 2003, and Smith, *et al* ., 2001).

For many pollutant types (toxics, conventional, bacteria, tissues, etc), the policy proposes the State will list waters in cases where there was greater than 90% statistical confidence that a numeric standard has been exceeded at least 10% of the time (i.e., the binomial approach). The policy refers to EPA guidance to defend its decision criteria, most specifically a 10% allowable exceedance level, and yet this is based on an incorrect reading of EPA guidance concerning allowable water quality exceedance rates. The assertion that EPA endorses the use of a 10% standards exceedance rate is incorrect. The EPA 305(b) guidance (EPA, 1997a, as clarified in EPA, 2003) refers to the 10% exceedance rate as a method for assessing data sample sets-- not as an acceptable exceedance rate in the "population". The use of this exceedance rate in a binomial assessment method has not been shown to be protective of water quality nor consistent with water quality standards requirements. With a few exceptions, California water quality standards do not authorize a 10% exceedance frequency as proposed in this policy. It is likely that use of this exceedance rate would increase the number of water bodies that do not meet water quality standards that are missed in the listing assessments. The 10% binomial analysis approach must be changed in order for the policy to be consistent with state water quality standards and federal listing requirements.

The proposed policy applies the binomial approach to certain sized data sets, and then for smaller data sets it defines arbitrary required exceedance frequencies in order to support listing determinations. For example, some water parameters are evaluated via the binomial approach for n > 20 and refers to Table 4.2 for the maximum allowable number of exceedances. For smaller sample sets, n<20, only if 5 or more exceedances have been observed will the water body be deemed impaired. The policy and supporting documentation do not demonstrate that this approach is consistent with State water quality standards or technically defensible.

Toxic Pollutants

The proposed binomial approach as applied to toxic pollutants in water does not meet federal requirements for assessing water bodies designated with the aquatic life beneficial use. EPA's guidance for the 2004 cycle states, "Use of the 10% rule when performing attainment determinations regarding effects of toxics is not appropriate unless the State's WQS regulations specifically authorizes use of this rule for such pollutants" (EPA 2003, pg. 30). The State needs to modify this approach to be consistent with the allowable exceedance frequency explicitly stated in California Toxics Rule (which includes most of the toxic pollutant standards in effect in California) and which served as the analytical basis for most other toxic pollutant objectives in the Basin Plans. The California Toxics Rule (EPA, 2000a) states that numeric standards designated for aquatic life uses are not to be exceeded more than once every three years, regardless of sample size. In order to ensure consistency with this provision, the listing policy should be modified to provide for listing in cases where 2 or more independent samples exceed the acute or chronic water quality standards in any 3 consecutive year period. An allowable 1 in 3 year exceedance rate would correspond to approximately 0.1% of the days in any 3-year period. If the State wants to apply a binomial assessment method to identify toxic pollutant impairments, then a 0.1% allowable exceedance rate would be consistent with the requirements of the California Toxics Rule.

Conventional Pollutants

For conventional pollutants, the proposed policy cites EPA's 305(b) guidance as part of its rationale for using an allowable 10% water quality standards exceedance rate as part of its binomial assessment methodology. The policy misinterprets this EPA guidance. EPA's 1997 guidance recommends methods for evaluating relatively small-sized sample sets to assess compliance with the applicable water quality standards, which specify allowable exceedance rates in the entire water body. The guidance does not directly identify allowable water quality standards exceedance rates. Excursion rates used to evaluate small sample sets are not directly comparable to allowable water quality standards exceedance frequencies in the underlying "population". Most of California's water quality standards for conventional pollutants do not authorize 10% exceedance frequencies.

Because the binomial approach already accounts for and directly manages uncertainty associated with assessments based on small sample sizes, including type 1 error in particular, it would be inappropriate to apply the 10% exceedance rate directly within the context of a

binomial assessment approach unless the underlying water quality standards authorize a 10% exceedance frequency.

In order for California to apply a 10% exceedance frequency within a binomial analysis framework, the State would need to document that the applicable water quality standards for each pollutant authorize a 10% exceedance rate. Some Regional Basin Plans include water quality objectives that provide for 10% (or other specified percentage) exceedance frequencies. It would be appropriate to apply the proposed 10% (or other specified percentage) exceedance frequency within a binomial analysis framework in these cases. However, most Basin Plan objectives for conventional pollutants are expressed as values not to be exceeded. The 10% binomial approach is much less stringent than these objectives provide in these cases. In cases in which the Basin Plans are silent with respect to allowable exceedance frequencies, the State would need to provide a stronger rationale for its selected method. As discussed above, it is inappropriate to cite EPA guidance as a rationale for the proposed 10% exceedance frequency. Nor is it appropriate to cite other state methodologies as a basis for the proposed approach because other state water quality standards often are expressed in terms that authorize use of an underlying 10% exceedance rate for particular conventional pollutants.

Some California standards (e.g., for bacterial indicators) are expressed both in terms of 10% exceedance frequencies and as instantaneous maximum values not to be exceeded. It is invalid to ignore the "not be exceeded" element of the standards in the assessment process, and the State should revise the policy to explain how these two-part standards will be assessed.

"Nuisance" Pollutants

The policy should be modified to clarify that many of the pollutants characterized as "nuisances" may pose serious threats to aquatic habitat, recreation, fishing, and other important beneficial uses. The proposed assessment criteria for the impairment types covered in this section lack sufficient detail to guide consistent application of assessment methods. As discussed in the preceding section, the policy would need to provide a more persuasive rationale to support application of the 10% binomial approach to assessment of these pollutants. Many of the Basin Plans contain water quality objectives that do not appear to authorize such high exceedance frequencies.

Bacteria

The policy provisions for assessing bacterial standards exceedances should be revised because the proposed criteria appear to conflict with the State's current two-number water quality standards or objectives which have both an instantaneous maximum as well as specific data requirements and 30-day evaluation periods. The 10% binomial aspect would potentially be consistent with the numeric standard using the 30-day geometric mean averaging period. The policy should more clearly explain how 30-day geometric mean objectives are to be interpreted. Several potential interpretations are possible:

- monthly geometric means for each month would be calculated then compared with this component of the objective through the binomial method,
- rolling 30-day geometric means would be calculated and applied through the binomial method,
- the geometric mean of all samples would be calculated and compared directly to the numeric objective.

The policy should more clearly explain how data would be evaluated in cases in which fewer than 4-5 samples are available in any particular month. We are concerned that exclusion of data from further consideration simply because the minimum monthly sample sizes are not available could result in incorrect conclusions that the objectives are attained. We recommend the data should be evaluated through a weight of evidence approach that considers the frequency, duration, and magnitude of bacterial standards excursions along with information about potential bacteria discharge sources.

Bioaccumulative Toxins

The policy should provide a more robust rationale supporting the proposed use of the 10% binomial approach for assessment of bioaccumulative toxins. We are concerned that the proposed approach is probably not sufficient protective of aquatic life uses and appears to be inconsistent with the language in Basin Plan narrative objectives applicable to bioaccumulative pollutants. The minimum data size (n=10) should be lowered since this sample media is most likely to represent water quality conditions over long term. Fewer fish tissue measurements are required to make a more accurate analysis, especially if composite results are provided. In essence, an assessment based on as few as 3 composite fish sample results can be completed with sufficient confidence and it is probably more accurate than assessments made using 10 individual samples. (Composites generally consist of 3 or more individuals of the same species, where the smallest is 75% in length of the largest.) We encourage the State to include more explicit language about interpretation of individual versus composite results, and to include guidelines on evaluating magnitude of tissue results. We concur that tissue results from muscle or whole body should be used in the assessment and that kidney or liver tissue alone are not suitable measures. Finally, the State should rectify Table 3 and use the most appropriate screening value for arsenic in fish tissue—1.2 mg/kg ww for inorganic arsenic (see EPA 2000b. pg. 5-11 and discussion in Newport Bay Toxic Pollutant TMDLs pp. 69-70).

Toxicity

The toxicity section of the policy is also inconsistent with existing Basin Plan standards. Each Basin Plan has standards that address toxicity by authorizing, in essence, "no toxics in toxic amounts". The policy should be revised to incorporate more protective assessment criteria for evaluating toxicity data that are consistent with Basin Plan requirements. The proposed toxicity evaluation method also needs to be revised to better account for the complexities of assessing the presence and magnitude of acute and chronic toxicity in multiple species tests. We

will provide additional technical recommendations for improving the toxicity assessment methodology in the next week.

Alternate Data Evaluations

The listing policy includes provisions for listing waters based on alternate data evaluation and we support this general concept of multiple lines of evidence to determine impairment. However, the proposed policy is too vague both in terms of the scope of data and information to be considered and the specific methods to be applied to consider multiple lines of evidence. These provisions should more clearly apply to all data types including sediment, tissue, toxicity, and biological response data. The policy should more clearly explain how alternate data sources would be evaluated. We are concerned that the draft policy currently states "the measurements can be analyzed using a scientifically defensible procedure that provides an equivalent level of confidence as the listing factors in section 3.1." This seems to require any and all data must have 90% confidence level to be used in assessing impaired waters, which may be inconsistent with the concept of a weight of evidence approach. Also, it is unclear if sample magnitude can be sufficiently influential to cause listing the water body based on sediment and/or tissue results.

The State should consider adopting weight of evidence approaches that more clearly explain how different lines of evidence will be evaluated in conducting individual assessments. There are available analytical options between the purely qualitative method proposed in the policy and the option of reducing all lines of evidence to a single quantitative measure, as discussed in the FED. For example, EPA developed and applied a semi-quantitative method of evaluating water column, sediment, and fish tissue data for toxic pollutants in the process of developing several TMDLs for Newport Bay, CA. We recommend that the State consider the use of this type of approach as part of the listing policy.

Natural Source Exemptions

The proposed policy states that water body impairment due to natural sources will be exempt from inclusion on the 303(d) list. In order for waters impaired due to natural sources to be excluded, the adopted water quality standards must clearly contain such exclusions. Our review of the Basin Plans found no such exclusions. The State's draft TMDL guidance properly notes that standards would need to be changed in order to avoid listing waters impaired by natural sources, and approach that was taken by the Lahontan RWQCB. If appropriate, the State may consider adoption of a natural sources exclusion and submit it for EPA approval pursuant to Section 303(c). However, until the standards are modified, this provision should be deleted from the policy. Impaired waters should be listed and may appropriately be assigned a lower priority ranking in order to reflect the State's preference for revising the applicable water quality standards, which may obviate the need to develop TMDLs for these waters.

We are also concerned that the policy provides that waters influenced by anthropogenic sources needed not be listed if natural sources by themselves would be sufficient to cause water quality standards violations. This provision must also be deleted, and would not be approvable if adopted as part of a water quality standards change pursuant to Section 303 (c). The same issue

arose in the State of Arizona's development of a Section 303(d) assessment methodology, and following discussion of the issue with EPA, the State decided not to apply this provision because they agreed that it is inconsistent with Arizona's water quality standards, that do contain a natural sources exclusion.

The policy proposes the application of a reference watershed approach to assessing bacterial standards exceedances, similar to the approach adopted for Santa Monica Bay. We note that in the case of Santa Monica Bay, the State properly adopted the reference watershed approach as a water quality standards modification; this was subsequently approved by EPA pursuant to Section 303(c). These provisions should also be deleted until the State decides to adopt reference watershed approaches to bacterial standards implementation.

Listing of Threatened Waters

The proposed policy provides no clear provisions for assessing and listing threatened waters. Pursuant to the requirements of 40 CFR 130.7, as interpreted in our 1997 and 2003 guidance documents, EPA expects each state to describe how it will assess whether waters which currently attain standards will likely fall out of attainment during the next listing cycle. The proposed policy makes reference to the use of certain types of data for trend analysis purposes, but does not actually describe how or if such data analysis will lead to listings of threatened waters. We expect the listing policy to clearly show how the requirement to list threatened waters was addressed. We are concerned by the proposed requirement that evidence of current beneficial use impairment be available to support a threatened waters designation because that requirement appears to conflict with federal regulations. This provision requiring evidence of current effects to support threatened waters designations should be deleted.

De-listing Provisions

For de-listing waters from the 303(d) list, the proposed policy appears to utilize the same statistical approach and underlying assumptions (fewer than 10% exceedances with 90% confidence level) as described in the listing methodology. We support the State's decision to apply a different null hypothesis in assessing potential delisting decisions (see Lin, *et al* ., 2000). The same concerns expressed above about the proper use of binomial statistical methods, issues of data characteristics, and proper interpretation of water quality standards also apply to the use of the proposed process for delisting waters.

Scheduling Considerations

The draft policy briefly discusses the State's proposed process for prioritizing and scheduling TMDLs. We concur with the policy that high priority TMDLs will be developed within two years; however the description of medium priority and low priority designations and associated schedule implications should be clarified. EPA's 1997 policy indicates that states are

expected to schedule TMDLs for completion within approximately 8-13 years of their initial listing dates, or the 1998 listing date, whichever is later (EPA, 1997b).

The State should describe more clearly the process for making individual priority ranking decisions. Some of the more pertinent factors might be: degree of threat to human health, aquatic life or wildlife, timeframe for NPDES permit revisions, unique water bodies, presence of threatened and endangered species, significant public interest and support of TMDL, important recreation and economic significance of water body, number of water quality standards exceendances per water body or number of unmet designated beneficial uses. We recommend that the State Board review Arizona's priority ranking process as an example of a much clearer and rigorous priority ranking and scheduling methodology. Upon request we would be happy to discuss other more rigorous priority ranking methods.

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August 31, 2004

RE: Erratum in Line-Edited Listing Guidance Submitted by Environmental Caucus

Dear Ms. Irvin:

It has come to my attention that one of the Environmental Caucus's important recommendations was inadvertently left out of the line-edited version of the draft listing guidance I sent on Wednesday, August 25, 2004. Specifically, the line-edited document I sent should have indicated our strong preference for removal of the "Water Quality Segments Being Addressed" category, but it did not. Although the cover letter that accompanied this document clearly articulates our position on this issue, we think it important that this position be reflected in the line-edited policy, and consequently I am submitting this revision. Please distribute it to the Board members and to any other interested persons.

Thank you very much. As always, please call me if you have any questions.

Sincerely,

Sarah G. Newkirk

California Water Quality Programs Manager

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September 1, 2004

Dear Ms. Irvin:

It has come to my attention that there was an error in the comments submitted by the environmental caucus of the AB 982 PAG last week. Attached, please find a corrected version of the line-edited draft 303(d) listing policy, and a cover letter explaining the error.

Thank you, and please feel free to call me if you have any questions.

Sincerely,

Sarah G. Newkirk
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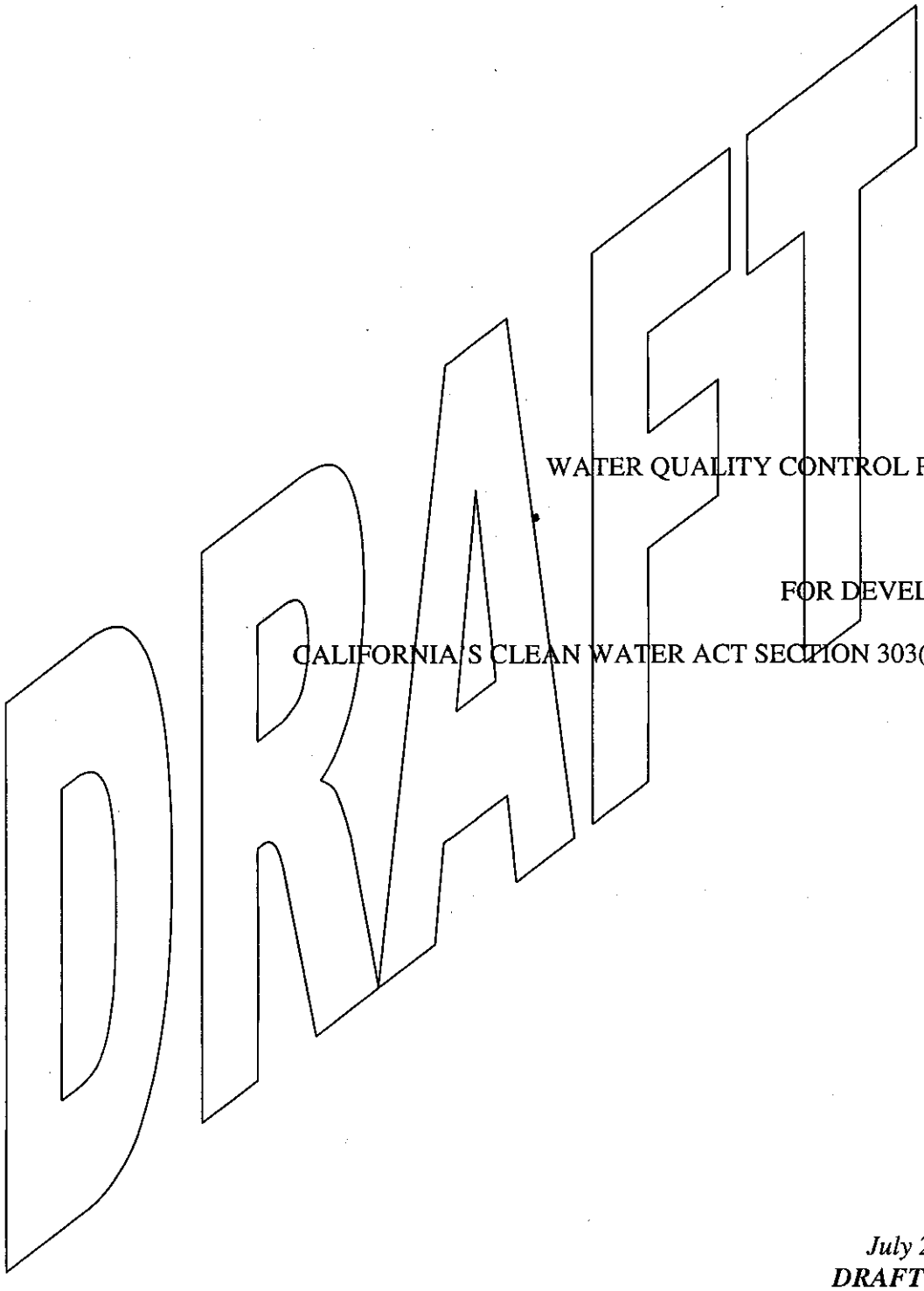
State of California

STATE WATER RESOURCES CONTROL BOARD



WATER QUALITY CONTROL POLICY

FOR DEVELOPING

CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST

July 22, 2004

DRAFT FINAL

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Table of Contents

WATER QUALITY CONTROL POLICY FOR DEVELOPING CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST

1 Introduction

Pursuant to California Water Code section 13191.3(a), this State policy for water quality control (Policy) describes the process by which the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) will comply with the listing requirements of section 303(d) of the federal Clean Water Act (CWA). The objective of this Policy is to establish a standardized approach for developing California's section 303(d) list in order to achieve the overall goal of achieving water quality standards and maintaining beneficial uses in all of California's surface waters.

CWA section 303(d) requires states to identify waters that do not meet, or are not expected to meet by the next listing cycle, applicable water quality standards after the application of certain technology-based controls and schedule such waters for development of Total Maximum Daily Loads (TMDLs) [40 Code of Federal Regulations (CFR) 130.7(c) and (d)]. Water quality limited segments are defined as state waters "for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters. [33 USC 1313(d)(1)(A).] The states are required to assemble and evaluate all existing and readily available water quality-related data and information to develop the list [40 CFR 130.7(b)(5)] and to provide documentation for listing or not listing a state's waters [40 CFR 130.7(b)(6)]. The methodology to be used to develop the section 303(d) list [40 CFR 130.7(b)(6)(i)] is established by this Policy and includes:

- California Listing Factors and Delisting Factors;
- The process for gathering and evaluating of readily available data and information; and
- Total Maximum Daily Load (TMDL) scheduling.

This Policy applies only to the listing process methodology used to comply with CWA section 303(d). In order to make decisions regarding standards attainment, this Policy provides guidance for interpreting data and information as they are compared to beneficial uses, existing numeric and narrative water quality objectives, and antidegradation considerations. The Policy shall not be used to:

- determine compliance with any permit or waste discharge requirement provision;
- establish, revise, or refine any water quality objective or beneficial use; or
- translate narrative water quality objectives for the purposes of regulating point sources.

Data and information from water bodies shall be analyzed under the provisions of this Policy using a weight-of-evidence approach. The weight-of-evidence approach shall be used to evaluate whether the evidence is in favor of or against placing waters on or removing waters from the section 303(d) list (section 2). The following steps describe the weight-of-evidence approach:

1. Data and Information Preprocessing: All data and information for existing listings shall be solicited and assembled, as appropriate (sections 6.1.1 and 6.1.2.1). Water body fact sheets (section 6.1.2.2) describing the assessments shall be prepared. Evaluation guidelines (section 6.1.3), if needed, shall be selected and the quality of the data (section 6.1.4) and quantity of data (section 6.1.5) shall be assessed.

2. Data and Information Processing: All data and information shall be evaluated using the decision rules listed in sections 3 or 4, as appropriate, and using applicable implementation factors (including, but not limited to, sections 6.1.2.2 and 6.1.5.1 through 6.1.5.9). RWQCBs shall also develop a schedule for completion of TMDLs (section 5). All other information not addressed under sections 3, 4, 5, or 6, shall be evaluated and presented in fact sheets.

3. Data Assessment: An assessment in favor of or against a list action for a water body-pollutant combination shall be presented in fact sheets. The assessment shall identify and discuss relationships between all available lines of evidence for water bodies and pollutants. This assessment shall be made on a pollutant-by-pollutant (including toxicity) basis, where such information is available. RWQCBs shall approve all decisions to list or delist a water segment (section 6.2).

2 Structure of the CWA Section 303(d) List

This section describes the categories of waters that shall be included in the section 303(d) list. Sections 3 and 4 contain the factors that shall be used to add and remove waters from the list. At a minimum, the California section 303(d) list shall identify waters where standards are not met, pollutants, pollution or toxicity contributing to standards exceedance, where such information is available, and the TMDL completion schedule. The section 303(d) list shall contain the following categories:

2.1 Water Quality Limited Segments for Which a TMDL Is Needed

Waters shall be placed in this category of the section 303(d) list if it is determined, in accordance with the California Listing Factors, that the water quality standard is not attained or it is expected that the standard will not be attained before the start of the next listing cycle; the standards nonattainment is due to toxicity, a pollutant, or pollutants; and remediation of the standards attainment problem requires one or more TMDLs.

The water segment shall remain in this category of the section 303(d) list until TMDLs for all pollutants have been completed, U.S. Environmental Protection Agency (USEPA) has approved the TMDLs, and implementation plans have been adopted. The water segment will remain in this category until it is demonstrated in accordance with section 4 that water quality standards are attained.

A water segment may be assigned a lower priority for TMDL development and implementation, as discussed in Section 5, if a TMDL has been developed and approved by USEPA and the approved implementation plan is expected to result in full attainment of the standard within an adopted time frame, or if a RWQCB certifies under the provisions of the Water Quality Control Policy for Addressing Impaired Waters that pollution control requirements other than TMDLs are reasonably expected to result in the attainment of the water quality standard within an adopted time frame.

2.2 Water Quality Limited Segments for Which a TMDL Is Not Needed

Waters shall be placed in this category of the section 303(d) list if the water quality standard is not attained or it is expected that the standard will not be attained before the start of the next listing cycle, and the standards nonattainment is due to factors other than toxicity or a pollutant or pollutants.

A water segment shall be placed in this category if it is determined, in accordance with the California Listing Factors, that standards are not attained in the water segment, or that the water segment is expected to fall out of attainment before the next listing cycle, solely due to factors other than toxicity or a pollutant or pollutants. If toxicity or pollutant(s) are suspected of

contributing to the impairment or projected impairment, then the water segment shall be placed on the list described in Section 2.1.

The water segment shall remain in this category of the section 303(d) list until it is demonstrated in accordance with section 4 that water quality standards are attained.

~~2.2Water Quality Limited Segments Being Addressed~~

~~Water segments shall be placed in this category under two circumstances:~~

~~1.A TMDL has been developed and approved by USEPA and the approved implementation plan is expected to result in full attainment of the standard within an adopted time frame; or~~

~~2. If a RWQCB certifies under the provisions of the Water Quality Control Policy for Addressing Impaired Waters that pollution control requirements other than TMDLs are reasonably expected to result in the attainment of the water quality standard within an adopted time frame~~not to exceed the date by which the next list of impaired waters is due under federal regulations.

3 California Listing Factors

RWQCBs and SWRCB shall use the following factors to develop the California section 303(d) list.

3.1 Water Quality Limited Segments Factors

This section provides the methodology for developing the Water Quality Limited Segments category of the section 303(d) list. Waters meeting the conditions in section 3.1 exceed water quality standards.

In developing the list, the state shall evaluate all existing readily available water quality-related data and information. Data and information, collected during a known spill or violation of an effluent limit in a permit or waste discharge requirement (WDR), may be used in conjunction with other data to demonstrate that there is an exceedance of a water quality standard in the water body. Visual assessments or other semi-quantitative assessments shall also be considered ~~as ancillary lines of evidence to support~~ in evaluating a potential section 303(d) listing, and may be given greater weight where accompanied by quantitative information or where the quality of the information justifies a greater degree of reliance.

Water segments shall be placed on the section 303(d) list if any of the following conditions are met.

3.1.1 Numeric Water Quality Objectives and Criteria for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded in two or more samples within a three-year period.

~~as follows:~~

~~□Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.1.~~

- ~~For sample populations less than 21, when 3 or more samples exceed standards, the segment shall be listed.~~

3.1.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water

Numeric water quality objectives for conventional pollutants are exceeded in more than 10 percent of the samples with at least two exceedances. ~~as follows:~~

~~□Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.2.~~

- ~~For sample populations less than 26, when 5 or more samples exceed standards, the segment shall be listed.~~

For depressed dissolved oxygen, if measurements of dissolved oxygen taken over the day (diel) show low concentrations in the morning and sufficient or high concentrations in the afternoon, then it shall be assumed that nutrients are responsible for the observed dissolved oxygen concentrations if riparian cover, substrate composition or other pertinent factors can be ruled out as controlling dissolved oxygen fluctuations. ~~When continuous monitoring data are available, the seven-day average of daily minimum measurements shall be assessed.~~ In the absence of diel

measurements, concurrently collected measurements of nutrient concentration shall be assessed using applicable water quality objectives or acceptable evaluation guidelines (section 6.1.3) or~~and using the binomial distribution~~ as described in section 3.1.1.

3.1.3 Numerical Water Quality Objectives or Standards for Bacteria Where Recreational Uses Apply

In the absence of a site-specific exceedance frequency, a water segment shall be placed on the section 303(d) list if bacteria water quality standards in California Code of Regulations, Basin Plans, or statewide plans are exceeded as described in section 3.1.2~~ using the binomial distribution as described in section 3.1.2~~. RWQCBs asserting that data from a reference water segment or beach were not available must provide adequate documentation to support that assertion.

If a site-specific exceedance frequency is available, it should~~may~~ be used instead of the ten percent exceedance frequency as described in Table 3.1~~2~~. The site-specific exceedance frequency shall be the number of water quality standard exceedances in a relatively unimpacted watershed (i.e., a reference water segment). Those water bodies that exceed bacteria water quality standards at a greater frequency than a reference water body should be placed on the section 303(d) list. To the extent possible and allowed by water quality objectives, RWQCBs shall identify one or more reference beaches or water segments to compare the measurements.

For bacterial measurements from coastal beaches, if water quality monitoring was conducted April 1 through October 31 only, a four percent exceedance percentage shall be used only if a reference water segment or beach cannot be identified. If the exceedance is due to a beach closure related to a sewage spill, the water segment shall not be placed on the section 303(d) list, though recurring beach closures due to sewage spills shall be considered for listing. Beach postings that are not backed by water quality data shall not be used to support placement of a water segment on the section 303(d) list. Rain advisories shall be considered when evaluating beach waters for listing where routine wet weather monitoring is not conducted.

3.1.4 Health Advisories

A water segment shall be placed on the section 303(d) list if a health advisory against the consumption of edible resident organisms, or a shellfish harvesting ban has been issued by the Office of Environmental Health Hazard Assessment (OEHHA), or Department of Health Services and there is a designated or existing fish consumption beneficial use for the segment. In addition, water segment-specific data must be available indicating the evaluation guideline for tissue is exceeded.

3.1.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

A water segment shall be placed on the section 303(d) list if the tissue pollutant levels in organisms exceed a pollutant-specific evaluation guideline (satisfying the requirements of section 6.1.3) ~~using the binomial distribution~~ as described in section 3.1.1.

Acceptable tissue concentrations may be ~~based on composite samples~~ measured either as muscle tissue or whole body residues. Residues in liver tissue alone are not considered a suitable

measure. Samples can be collected either from transplanted animals or from resident populations.

3.1.6 Water/Sediment Toxicity

A water segment shall be placed on the section 303(d) list if the water segment exhibits ~~statistically significant~~ water or sediment toxicity ~~using the binomial distribution~~ as described in section 3.1.1. The segment shall be listed if the observed toxicity is associated with a pollutant or pollutants. Waters may ~~also~~ be placed on the section 303(d) list for toxicity alone. If the pollutant causing or contributing to the toxicity is identified, the pollutant shall be included on the section 303(d) list as soon as possible (i.e., during the next listing cycle).

Reference conditions may include laboratory controls (using a t-test or other applicable statistical test), the lower confidence interval of the reference envelope, or, for sediments, response less than 90 percent of the minimum significant difference for each specific test organism.

Appropriate reference and control measures must be included in the toxicity testing. Acceptable methods include, but are not limited to, those listed in water quality control plans, the methods used by Surface Water Ambient Monitoring Program (SWAMP), the Southern California Bight Projects of the Southern California Coastal Water Research Project, American Society for Testing and Materials (ASTM), USEPA, the Regional Monitoring Program of the San Francisco Estuary Institute, and the Bay Protection and Toxic Cleanup Program (BPTCP).

Association of pollutant concentrations with toxic or other biological effects should be determined by any one of the following:

A. Sediment quality guidelines (satisfying the requirements of section 6.1.3) are exceeded ~~using the binomial distribution~~ as described in section 3.1.1. In addition, using rank correlation, the observed effects are correlated with measurements of chemical concentration in sediments. If these conditions are met, the pollutant shall be identified as "sediment pollutant(s)."

B. For sediments, an evaluation of equilibrium partitioning or other type of toxicological response that identifies the pollutant that may cause the observed impact. Comparison to reference conditions within a watershed or ecoregion may be used to establish sediment impacts.

C. Development of an evaluation (such as a toxicity identification evaluation) that identifies the pollutant that contributes to or caused the observed impact.

3.1.7 Nuisance

A water segment shall be placed on the section 303(d) list if qualitative assessments of the water segment for nuisance water odor, taste, excessive algae growth, foam, turbidity, oil,- trash, and color, particularly but not necessarily where ~~are~~ associated with numerical water quality data, ~~that~~ meets any one of the following:

3.1.7.1 Nutrient-related

An acceptable nutrient-related evaluation guideline is exceeded ~~using the binomial distribution~~ as described in section 3.1.1 for excessive algae growth, unnatural foam, odor, and taste. Waters may also be placed on the section 303(d) list when a significant nuisance condition exists as compared to reference conditions, or when nutrient concentrations exceed levels shown to cause or contribute to excessive algae growth. If listing for nitrogen or phosphorus specifically, RWQCBs should consider whether the ratio of these two nutrients indicates which is the limiting agent.

3.1.7.2 Other Types

An acceptable evaluation guideline is exceeded ~~using the binomial distribution~~ as described in section 3.1.1 for taste, color, oil sheen, turbidity, litter, trash, and odor not related to nutrients. Water segments may also be placed on the section 303(d) list when there is significant nuisance condition compared to reference conditions.

3.1.8 Adverse Biological Response

A water segment shall be placed on the section 303(d) list if the water segment exhibits adverse biological response measured in resident individuals as compared to reference conditions ~~and these impacts are associated with water or sediment concentrations of pollutants as described in section 3.1.6~~. Indicators~~Endpoints~~ for this factor include reduction in growth, reduction in reproductive capacity, abnormal development, histopathological abnormalities, and other adverse conditions.

Qualitative visual assessments or other semi-qualitative assessments may be used ~~as secondary lines of evidence~~ to support placement on the section 303(d) list, particularly in conjunction with other lines of evidence. These types of assessments include fish kills or bird kills related to water quality conditions.

For adverse biological response related to sedimentation, the water segment shall be placed on the section 303(d) list if adverse biological response is identified and effects are associated with clean sediment loads in water or with loads stored in the channel. Waters shall be placed on the section 303(d) list if evaluation guidelines (satisfying the conditions of section 6.1.3) are exceeded ~~using the binomial distribution~~ as described in section 3.1.1.

3.1.9 Degradation of Biological Populations and Communities

A water segment shall be placed on the section 303(d) list if the water segment exhibits significant degradation in biological populations and/or communities as compared to reference site(s), ~~and is associated with water or sediment concentrations of pollutants~~ including but not limited to differences in chemical concentrations, temperature, dissolved oxygen, and trash. This condition requires diminished numbers of species or individuals of a single species or other metrics when compared to reference site(s). The analysis should rely on measurements from at least two stations. Comparisons to reference site conditions shall be made during similar season and/or hydrologic conditions.

Association of chemical concentrations, temperature, dissolved oxygen, trash, and other pollutants shall be determined using sections 3.1.1, 3.1.2, 3.1.6, 3.1.7, 6.1.5.9, or other applicable sections.

For population or community degradation related to sedimentation, the water segment shall be placed on the section 303(d) list if degraded populations or communities are identified and effects are associated with clean sediment loads in water or with loads stored in the channel when compared to evaluation guidelines (satisfying the conditions of section 6.1.3) ~~using the binomial distribution~~ as described in section 3.1.1 or as compared to reference sites.

Bioassessment data used for listing decisions shall be consistent with section 6.1.5.8. For bioassessment, measurements at one stream reach may be sufficient to warrant listing ~~provided that the impairment is associated with a pollutant(s) as described in this section~~.

3.1.10 Trends in Water Quality

A water segment shall be placed on the section 303(d) list if the water segment exhibits concentrations of pollutants or water body conditions for any listing factor that shows a trend of declining water quality standards attainment. This section is focused on addressing the antidegradation component of water quality standards and threatened waters as defined in 40 CFR 130.2(j) by identifying trends of declining water quality. Numeric, pollutant-specific water quality objectives need not be exceeded to satisfy this listing factor. In assessing trends in water quality RWQCBs shall:

~~1.~~1. Use data sufficient to demonstrate a trend in deteriorating water quality as compared to baseline conditions~~Use data collected for at least three years;~~
~~2.Establish specific baseline conditions~~;
2. Specify the~~statistical~~ approaches used to evaluate the declining trend in water quality measurements;
~~4.~~3. Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate;
~~5.~~4. Determine the occurrence of adverse biological response (section 3.1.8), degradation of biological populations and communities (section 3.1.9), or toxicity (section 3.1.6); and
~~6.~~5. Assess whether the declining trend in water quality is expected to result in nonattainment of ~~not meet~~ water quality standards by the next listing cycle.

Waters shall be placed on the section 303(d) list if the declining trend in water quality is substantiated as called for in ~~(~~steps 1 through 54 above~~) and impacts are observed (step 5)~~.

3.1.11 Situation-Specific Weight of Evidence Listing Factor

When all other Listing Factors do not result in the listing of a water segment but information indicates non-attainment of standards, a water segment shall be placed on the section 303(d) list if the weight of evidence demonstrates that a water quality standard is not attained.

When recommending listing based on the situation-specific weight of evidence, the RWQCB must justify its recommendation by:

- Providing any data or information supporting the listing;

- Describing in fact sheets how the data or information affords a substantial basis in fact from which the listing can be reasonably inferred;
- Demonstrating that the weight of evidence of the data and information indicate that the water quality standard is not attained; and
- Demonstrating that the approach used is scientifically defensible and reproducible.

Table 3.1: Minimum Number of Measured Exceedances Needed to Place a Water Segment on the Section 303(d) List for Conventional or Other Pollutants Such That the Actual Exceedance Rate Is Greater Than or Equal to Ten Percent ($k_{list} = 0.1(N+1)$.

Sample Size	Place on the 303(d) list if at least this number of exceedances
10	2
12	2
19	2
26	2
33	3
41	4
48	4
56	5
64	6
72	7
80	8
89	9
97	9
105	10

TABLE 3.1: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR TOXICANTS.

Null Hypothesis: Actual exceedance proportion ≤ 5 percent.
Alternate Hypothesis: Actual exceedance proportion > 20 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
21 – 28	3
29 – 37	4
38 – 46	5
47 – 55	6
56 – 64	7
65 – 73	8
74 – 82	9
83 – 91	10
92 – 100	11
101 – 109	12
110 – 118	13
119 – 127	14

For sample sizes greater than 127, the minimum number of measured exceedances is established where □and □≤ 0.2 and where |□ – □| is minimized.

□= Excel® Function BINOMDIST(n-k, n, 1 – 0.05, TRUE)
□= Excel® Function BINOMDIST(k-1, n, 0.20, TRUE)
where n = the number of samples,
k = minimum number of measured exceedances to place a water on the section 303(d) list,
0.05 = acceptable exceedance proportion, and
0.20 = unacceptable exceedance proportion.

TABLE 3.2: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

Null Hypothesis: Actual exceedance proportion ≤ 10 percent.
Alternate Hypothesis: Actual proportion > 25 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
26 – 30	5
31 – 36	6
37 – 42	7
43 – 48	8
49 – 54	9
55 – 60	10
61 – 66	11
67 – 72	12
73 – 78	13
79 – 84	14
85 – 91	15
92 – 97	16
98 – 103	17
104 – 109	18
110 – 115	19
116 – 121	20

For sample sizes greater than 121, the minimum number of measured exceedances is established where □ and □ ≤ 0.2 and where |□ – □| is minimized.

□ = Excel® Function BINOMDIST(n-k, n, 1 – 0.10, TRUE)
□ = Excel® Function BINOMDIST(k-1, n, 0.25, TRUE)
where n = the number of samples,
k = minimum number of measured exceedances to place a water segment on section 303(d) list,
0.10 = acceptable exceedance proportion, and
0.25 = unacceptable exceedance proportion.

~~3.2Water Quality Limited Segment Being Addressed~~

~~This section provides the methodology for development of the Water Quality Limited Segments Being Addressed category. A water segment shall be placed on this portion of the section 303(d) list if the conditions for placement in the water quality limited segments category (section 3.1) are met and any of the following additional conditions are met:~~

~~1. A TMDL has been approved by USEPA for the pollutant water segment combination and an implementation plan has been approved for the TMDL.~~
~~2. The RWQCB has certified under the provisions of the Water Quality Control Policy for Addressing Impaired Waters that pollution control requirements other than TMDLs are reasonably expected to result in the attainment of the water quality standard within an adopted time frame the period before the next 303(d) list is due under federal regulations.~~

4 California Delisting Factors

This section provides the methodology for removing waters from the section 303(d) list ~~(including the Water Quality Limited Segments Category and Water Quality Limited Segments Being Addressed category)~~.

All listings of water segments shall be removed from the section 303(d) list if the listing was based on faulty data, and it is demonstrated that the listing would not have occurred in the absence of such faulty data. Faulty data include, but are not limited to, typographical errors, improper quality assurance/quality control procedures, or limitations related to the analytical methods that would lead to improper conclusions regarding the water quality status of the segment. To complete the reevaluation of a faulty listing: (1) the basis for the original listing shall be documented; and, (2) documentation shall be provided demonstrating that (a) the listing was based on faulty data or information or on a deviation from listing policies at the time of the listing, and (b) the listing would not have occurred but for these factors. Regional Boards seeking to delist a water segment on this basis must:

- Specify the approaches used to evaluate the faulty data and identify whether other data, including data on declining trends in water quality measurements, justify listing notwithstanding the faulty data;
- Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate;
- Demonstrate the absence of an adverse biological response (section 3.1.8), degradation of biological populations and communities (section 3.1.9), or toxicity (section 3.1.6); and
- Memorialize the analysis and conclusions in a fact sheet.

If objectives or standards have been revised and it is demonstrated that the site or water meets the new water quality standards or objectives, the water segment shall be removed from the section 303(d) list. The listing of a segment shall be reevaluated if the water quality standard has been changed and data and information are provided to demonstrate that the new standard or objective is not exceeded. Such data and information shall be independent of the data and information used to make the original listing decision, and shall be spatially representative of the water body, and temporally representative over a period of at least three years; and shall otherwise meet or exceed the data and related standards set forth in this Policy for listing of waters.

Any interested party may request an existing listing be reassessed under the delisting factors of this Policy. In requesting the reevaluation, the interested party must, using the delisting factors: state the reason(s) the listing is inappropriate and the Policy would lead to a different outcome; and provide the data and information necessary to enable the RWQCB and SWRCB to conduct the review. Such data and information shall be independent of the data and information used to make the original listing decision, and shall be spatially representative of the water body, and

temporally representative over a period of at least three years and shall otherwise meet or exceed the data and related standards set forth in this Policy for listing of waters.

Water segments or pollutants shall be removed from the section 303(d) list if any of the following conditions are met.

4.1 Numeric Water Quality Objectives, Criteria, or Standards for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are ~~not~~ exceeded fewer than two times in a three-year period. The minimum sample size is 22, and none of the samples used to support the original listing decision may be used to support the delisting decision. ~~as follows:~~

~~- Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.1.~~

4.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water

Numeric water quality objectives for conventional pollutants are ~~not~~ exceeded in fewer than 10 percent of the samples. The minimum sample size is 22, and none of the samples used to support the original listing decision may be used to support the delisting decision. ~~as follows:~~

- ~~Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.2.~~

4.3 Numeric Water Quality Objectives for Bacteria in Water

Numeric water quality objectives or standards for bacteria are not exceeded as described in section 4.2. If a site-specific exceedance frequency was used to place the water on the section 303(d) list, then the same exceedance frequency shall be used in the assessment to remove waters from the section 303(d) list. ~~using the binomial distribution as described in section 4.2. If a site-specific exceedance frequency was used to place the water on the section 303(d) list, then the same exceedance frequency shall be used in the assessment to remove waters from the section 303(d) list.~~ To the extent possible and allowed by water quality objectives, RWQCBs shall identify one or more reference beaches or water segments in a relatively unimpacted watershed to compare the measurements.

4.4 Health Advisories

The health advisory used to list the water segment has been removed or the chemical or biological contaminant-specific evaluation guideline for tissue is no longer exceeded.

4.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

Numeric pollutant-specific evaluation guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.6 Water/Sediment Toxicity

Water/Sediment Toxicity or associated water or sediment quality guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.7 Nuisance

The water segment no longer satisfies the conditions for a nuisance listing or associated numerical water or sediment data meets any one of the following:

4.7.1 Nutrient-related

For excessive algae growth, unnatural foam, odor, taste, applicable numerical nutrient-related evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.7.2 Other Types

Acceptable numerical evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in sections 4.1 and 4.2 for color, oil sheen, turbidity, trash, taste, or odor not related to nutrients. These types of nuisance shall also be removed from the list when there is no significant nuisance condition when compared to reference conditions.

4.8 Adverse Biological Response

Adverse biological response is no longer evident or associated water or sediment numeric pollutant-specific evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.9 Degradation of Biological Populations and Communities

Water quality standards are attained and b~~B~~iological populations and community~~ies~~ degradation in the water segment is no longer evident as compared to reference site(s), or associated water or sediment numeric pollutant-specific evaluation guidelines are not exceeded ~~using the binomial distribution~~ as described in section 4.1.

4.10 Trends in Water Quality

The factors for assessing trends in water quality (section 3.1.10) are not substantiated (steps 1 through 54) ~~or impacts are no longer observed (step 5)~~.

4.11 Situation-Specific Weight of Evidence Delisting Factor

When all other Delisting Factors do not result in the delisting of a water segment but information indicates attainment of standards, a water segment shall be removed from the section 303(d) list if the substantial weight of evidence collected over a consecutive three-year period demonstrates that ~~a~~ water quality standards are ~~is~~ attained in the water segment.

When recommending delisting based on the situation-specific weight of evidence, the RWQCB must justify its recommendation by:

- Providing any data or information supporting the delisting;
- Describing in fact sheets how the data or information affords a substantial basis in fact from which the justification for delisting can be reasonably inferred;
- Demonstrating that the substantial weight of evidence of the data and information indicates that the water quality standard is attained; and
- Demonstrating that the approach used is scientifically defensible and reproducible.

~~And shall otherwise meet the standards set forth in Chapter 4 (above).~~

Table 4.1: Maximum Number of Measured Exceedances Allowed to Remove a Water Segment from the 303(d) List for Conventional and Other Pollutants Such That Fewer than 10 Percent of Samples Exceed Water Quality Objectives With at Least 95% Confidence and Power.

Sample Size	Remove from 303(d) list if no more than this number of exceedances
22-28	0
29-45	1
46-60	2
61-75	3
76-88	4
89-100	5

TABLE 4.1: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR TOXICANTS.

Null Hypothesis: Actual exceedance proportion ≥ 20 percent.
Alternate Hypothesis: Actual proportion < 5 percent of the samples
The minimum effect size is 15 percent.

Sample Size	Delist if the number of exceedances equal or is less than
21—28	2
29—37	3
38—46	4
47—55	5
56—64	6
65—73	7
74—82	8
83—91	9
92—100	10
101—109	11
110—118	12
119—127	13

For sample sizes greater than 127, the maximum number of measured exceedances allowed is established where □and □≤ 0.2 and where |□ - □ is minimized.

□= Excel® Function BINOMDIST(k, n, 0.20, TRUE)
□= Excel® Function BINOMDIST(n-k-1, n, 1—0.05, TRUE)
where n = the number of samples,
k = maximum number of measured exceedances allowed,
0.05 = acceptable exceedance proportion, and
0.20 = unacceptable exceedance proportion.

TABLE 4.2: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

Null Hypothesis: Actual exceedance proportion ≥ 25 percent.
Alternate Hypothesis: Actual exceedance proportion < 10 percent.
The minimum effect size is 15 percent.

Sample Size	Delist if the number of exceedances equal or is less than
26 – 30	4
31 – 36	5
37 – 42	6
43 – 48	7
49 – 54	8
55 – 60	9
61 – 66	10
67 – 72	11
73 – 78	12
79 – 84	13
85 – 91	14
92 – 97	15
98 – 103	16
104 – 109	17
110 – 115	18
116 – 121	19

For sample sizes greater than 121, the maximum number of exceedances allowed is established at □ and □ ≤ 0.2 and where |□ – □| is minimized.

□ = Excel® Function BINOMDIST(k, n, 0.25, TRUE)
□ = Excel® Function BINOMDIST(n-k-1, n, 1 – 0.1, TRUE)
where n = the number of samples,
k = maximum number of measured exceedances allowed,
0.10 = acceptable exceedance proportion, and
0.25 = unacceptable exceedance proportion.

5 TMDL Scheduling

A schedule shall be established by the RWQCBs and SWRCB for waters on the section 303(d) list that identifies the TMDLs that will be established within the current listing cycle and the number of TMDLs scheduled to be developed thereafter.

For water quality limited segments needing a TMDL, RWQCBs shall develop a completion schedule in compliance with federal law and regulation based on, but not limited to, the following criteria:

- Water body significance (such as importance and extent of beneficial uses, threatened and endangered species concerns, and size of water body);
- Degree that water quality objectives are not met or beneficial uses are not attained or threatened (such as the severity of the pollution or number of pollutants/stressors of concern) [40 CFR 130.7(b)(4)];
- Degree of impairment;
- Potential threat to human health and the environment;
- Water quality benefits of activities ongoing in the watershed;
- Potential for beneficial use protection and recovery;
- Degree of public concern;
- Availability of funding; and
- Availability of data and information to address the water quality problem.

All water body-pollutant combinations on the section 303(d) list shall be assigned a TMDL schedule date. In no circumstances shall the schedule for TMDL adoption exceed 13 years from the date of listing.

6 Policy Implementation

This section provides SWRCB guidance on implementation of this Policy. The most recently completed section 303(d) list shall form the basis for any subsequent lists.

6.1 Process for Evaluation of Readily Available Data and Information

- All readily available data and information shall be evaluated. To develop the section 303(d) list the RWQCBs and SWRCB shall use the following process.

6.1.1 Definition of Readily Available Data and Information

RWQCBs and SWRCB shall actively solicit, assemble, and consider all readily available data and information. Data and information that shall be reviewed include, but are not limited to: submittals resulting from the solicitation, selected data possessed by the RWQCBs, and other sources. At a minimum, readily available data and information includes paper and electronic copies of:

- The most recent section 303(d) list, and the most recent section 305(b) report;
- Drinking water source assessments;
- Municipal Separate Storm Sewer System (MS4) reports;
- Information on water quality problems in documents prepared to satisfy Superfund and Resource Conservation and Recovery Act requirements;
- Fish and shellfish advisories, beach postings and closures, or other water quality-based restrictions;
- Reports of fish kills, cancers, lesions or tumors;
- Dilution calculations, trend analyses, or predictive models for assessing the physical, chemical, or biological condition of streams, rivers, lakes, reservoirs, estuaries, coastal lagoons, or the ocean;
- Applicable water quality data and information from SWAMP, USEPA's Storage and Retrieval Database Access (STORET) or other USEPA databases and information sources, the Bay-Delta Tributaries Database, Southern California Coastal Water Research Project, and the San Francisco Estuary Regional Monitoring Program; and
- Water quality problems and existing and readily available water quality data and information reported by local, state and federal agencies (including receiving water monitoring data from discharger monitoring reports), citizen monitoring groups, academic institutions, and the public. The Federal agencies that shall be actively solicited for data and information include but are not limited to: U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, U.S. Geological Survey, and U.S. Fish and Wildlife Service.

6.1.2 Administration of the Listing Process

6.1.2.1 Solicitation of All Readily Available Data and Information

SWRCB and RWQCBs shall seek all readily available data and information on the quality of surface waters of the State. Readily available data and information shall be solicited from any

interested party, including but not limited to, private citizens, public agencies, state and federal governmental agencies, non-profit organizations, and businesses possessing data and information regarding the quality of the Region's waters.

Though the SWRCB and RWQCBs must specifically solicit all readily available data and assessment information, SWRCB and RWQCB may place emphasis in the solicitation on the data and information generated since the last listing cycle. For the purposes of this solicitation, information means any documentation, or citation to such documentation, describing the water quality condition of a surface water body. Data are considered a subset of information that consists of reports detailing measurements of specific environmental characteristics. The data and information may pertain to physical, chemical, and/or biological conditions of the State's waters or watersheds. Each RWQCB and the SWRCB shall document its methods and sources for soliciting existing and readily available data and information.

The solicitation letter may request that ~~I~~information solicited ~~should~~ contain the following:

- The name of the person or organization providing the information or citation to information;
- The name of the person certifying the completeness and accuracy of the data and information and a statement describing the standards exceedance;
- Mailing address, telephone numbers, and email address of a contact person for the information provided;
- A copy of all information provided, or a complete citation to a data source in which the information can be found. The submittal must specify the software used to format the information and provide definitions for any codes or abbreviations used;
- Bibliographic citations for all information provided; and
- If computer model outputs are included in the information, provide bibliographic citations and specify any calibration and quality assurance information available for the model(s) used.

The solicitation letter may request that ~~D~~data solicited ~~should~~ contain the following:

- Data in electronic form, spreadsheet, database, or ASCII formats. If possible, t~~T~~he submittal should use the SWAMP data format and should define any codes or abbreviations used in the database.
- Metadata for the ~~field~~ data, i.e., when measurements were taken, locations, number of samples, detection limits, and other relevant factors.
- Metadata for any Geographical Information System data must be included. The metadata must detail all the parameters of the projection, including datum.
- A copy of the quality assurance procedures.
- A copy of the data.
- Data from citizen volunteer water quality monitoring efforts require the name of the group and indication of any training in water quality assessment completed by members of the group. Data submitted by citizen monitoring groups should meet the data quality assurance procedures as detailed in section 6.1.4.
- For photographic documentation, adhere to the guidelines detailed in section 6.1.4.

Data and information previously submitted to RWQCBs, such as Discharge Monitoring Reports, need not be solicited if the data and information ~~are~~ remain available to RWQCBs.

6.1.2.2 RWQCB Fact Sheet Preparation

When data and information are available, each RWQCB shall prepare a standardized fact sheet for each water and pollutant combination that is proposed for inclusion in or deletion from the section 303(d) list. Fact sheets shall present a description of the line(s) of evidence used to support each component of the weight of evidence approach. Fact sheets shall be prepared for all data and information solicited. If the data and information reviewed indicate standards are attained, a single fact sheet may address multiple water and pollutant combinations.

The fact sheets shall contain the following:

A. Region
B. Type of water body (Bay and Harbors, Coastal Shoreline, Estuary, Lake/Reservoir, Ocean, Rivers/Stream, Saline Lake, Tidal Wetlands, Freshwater Wetland)
C. Name of water body segment (including Calwater watershed containing the downstream extent of the segment)
D. If available, the ~~P~~pollutant or type of pollution that appears to be responsible for standards exceedance
E. Medium (water, sediment, tissue, habitat, etc.)
F. Water quality standards (copy applicable water quality standard, objective, or criterion from appropriate plan or regulation) including:
    1. Beneficial use affected
    2. Numeric water quality objective/water quality criteria plus metric (single value threshold, mean, median, etc.) or narrative water quality objective plus guideline(s) used to interpret attainment or non-attainment
    3. Antidegradation considerations (if applicable to situation)
    4. Any other provision of the standard used
G. Brief Watershed Description (e.g., land use, precipitation patterns, or other factors considered in the assessment)
H. Summary of data and/or information
    1. Spatial representation, area that beneficial use is affected or determined to be supported, including a map, any site specific information, and reference condition
    2. Temporal representation
    3. Age of data and/or information
    4. Effect of seasonality and events/conditions that might influence data and/or information evaluation (e.g., storms, flow conditions, laboratory data qualifiers, etc.)
    5. Number of samples or observations
    6. Number of samples or observations exceeding guideline or standard
    7. Source of or reference for data and/or information
I. For numeric data include:
    1. Quality assurance assessment
J. For non-numeric data include:
    1. Types of observations
    2. Perspective on magnitude of problem

3. Numeric indices derived from qualitative data

K. Potential source of pollutant (the source category should be identified as specifically as possible)

L. Details of the pProgram(s) addressing the problem, if applicable~~known~~

M. Data evaluation as required by sections 3 or 4 of this Policy

N. Recommendation

O. TMDL schedule (developed only for the section 303(d) list as required by section 5 of this Policy).

6.1.3 Evaluation Guideline Selection Process

Narrative water quality objectives shall be evaluated using interpretive evaluation guidelines. When evaluating narrative water quality objectives or beneficial use protection, RWQCBs and SWRCB shall identify evaluation guidelines that represent standards attainment or beneficial use protection. The guidelines are not water quality objectives and shall only be used for the purpose of developing the section 303(d) list. If appropriate evaluation guidelines cannot be identified or if evaluation guidelines do not result in listing in waters where some data indicate impairment, other data or information may be used per section 3.1.11.

To select an evaluation guideline, the RWQCB or SWRCB shall:

- Identify the water body and ~~,~~pollutants~~,~~ or pollution that appear responsible for the impairment or projected impairment, and beneficial uses;
- Identify the narrative water quality objectives or applicable water quality criteria;
- Identify the appropriate interpretive evaluation guideline that potentially represents water quality objective attainment or protection of beneficial uses. If this Policy requires evaluation values to be used as one line of evidence, the evaluation value selected shall be used in concert with the other required line(s) of evidence to support the listing or delisting decision. Depending on the beneficial use and narrative standard, the following considerations shall be used in the selection of evaluation guidelines:

  Sediment Quality Guidelines for Marine, Estuarine, and Freshwater Sediments: RWQCBs may select sediment quality guidelines that have been published in the peer-reviewed literature or by state or federal agencies. Acceptable guidelines include selected values (e.g., effects range-median, probable effects level, probable effects concentration), and other sediment quality guidelines. ~~Only those sediment guidelines that are predictive of sediment toxicity shall be used (i.e., those guidelines that have been shown in published studies to be predictive of sediment toxicity in 50 percent or more of the samples analyzed).~~ RWQCBs may select sediment guidelines that are predictive of sediment toxicity (i.e., those guidelines that have been shown in published studies to be predictive of sediment toxicity in 50 percent or more of the samples analyzed). RWQCBs may select sediment guidelines that are predictive of potential impacts due to bio-accumulation.

Evaluation Guidelines for Protection from the Consumption of Fish and Shellfish: RWQCBs may select evaluation guidelines published by USEPA or OEHHA. Maximum Tissue Residue

Levels (MTRLs) and Elevated Data Levels (EDLs) shall not be used to evaluate fish or shellfish tissue data. In the event that guidelines have not been published by USEPA or OEHHA, RWQCBs may utilize evaluation levels based on chemical effects and properties.
Evaluation Guidelines for Protection of Aquatic Life from Bioaccumulation of Toxic Substances: RWQCBs may select the evaluation values for the protection of aquatic life published by the National Academy of Science and other reputable sources. In the event that guidelines have not been published by USEPA or OEHHA, RWQCBs may utilize evaluation levels based on chemical effects and properties.

For other parameters, evaluation guidelines may be used if it can be demonstrated that the evaluation guideline is:

- Applicable to the beneficial use
- Protective of the beneficial use
- Linked to the pollutant or pollution under consideration
- Scientifically-based and peer reviewed
- Well described
- ~~Identifies a range above which impacts occur and below which no or few impacts are predicted. For non-threshold chemicals, risk levels shall be consistent with comparable water quality objectives or water quality criteria.~~

RWQCBs shall assess the appropriateness of the guideline in the hydrographic unit. Justification for the alternate evaluation guidelines shall be referenced in the water body fact sheet.

6.1.4 Data Quality Assessment Process

Even though all data and information must be used, the quality of the data used in the development of the section 303(d) list shall be of sufficient high quality to make determinations of water quality standards attainment. Data supported by a Quality Assurance Project Plan (QAPP) pursuant to the requirements of 40 CFR 31.45 are acceptable for use in developing the section 303(d) list.

The data from major monitoring programs in California and published U.S. Geological Survey (USGS) reports are considered of adequate quality. The major programs include SWAMP, the Southern California Bight Projects of the Southern California Coastal Water Research Project, USEPA's Environmental Monitoring and Assessment Program and other EPA monitoring programs, the Regional Monitoring Program of the San Francisco Estuary Institute, and the BPTCP.

Numeric data are considered credible and relevant for listing purposes if the data set submitted meets the minimum quality assurance/quality control requirements outlined below. A QAPP or equivalent documentation must be available containing, at a minimum, the following elements:

- Objectives of the study, project, or monitoring program;
- Methods used for sample collection and handling;
- Field and laboratory measurement and analysis;

- Data management, validation, and recordkeeping (including proper chain of custody) procedures;
- Quality assurance and quality control requirements;
- A statement certifying the adequacy of the QAPP (plus name of person certifying the document); and
- A description of personnel training.

A site-specific or project-specific sampling and analysis plan for numeric data should also be available containing:

- Data quality objectives or requirements of the project;
- A statement that data quality objectives or requirements were achieved;
- Rationale for the selection of sampling sites, water quality parameters, sampling frequency and methods that assure the samples are spatially and temporally representative of the surface water and representative of conditions within the targeted sampling timeframe; and
- Documentation to support the conclusion that results are reproducible.

The RWQCBs shall make a finding in the fact sheets on the availability of the QAPP (or equivalent), adequacy of data collection, analysis practices, and adequacy of the data verification process (including the chain of custody, detection limits, holding times, statistical treatment of data, precision and bias, etc). If any data quality objectives or requirements in the QAPP are not met, the reason for not meeting them and the potential impact on the overall assessment shall be documented.

Data without rigorous quality control can be used in combination with high quality data and information. If the data collection and analysis is not supported by a QAPP (or equivalent) or if it is not possible to tell if the data collection and analysis were supported by a QAPP (or equivalent), then the data and information should not be used by itself to support listing or delisting of a water segment unless justified by the situation-specific weight of evidence listing factor (section 3.1.11 or 4.11). . All data of whatever quality can be used as part of a weight of evidence determination (sections 3.1.11 or 4.11).

For narrative and qualitative submittals, the submission should, to the extent data and information are available~~must~~:

- describe existing or projected events or conditions that indicate impacts on water quality;
- provide linkage between the measurement endpoint (e.g., a study that may have been performed for some other purpose) and the water quality standard of interest;
- be scientifically defensible;
- provide analyst's credentials and training; and
- be verifiable by SWRCB or RWQCB.

For photographic documentation, the submission should: ~~must:~~

- identify the date;

- identify location on a general area map;
- either mark location on a USGS 7.5 minute quad map along with quad sheet name or provide location latitude/longitude;
- provide a thorough description of photograph(s);
- describe the spatial and temporal representation of the photographs;
- provide linkage between photograph-represented condition and condition that indicates impacts on water quality;
- provide photographer's rationale for area photographed and camera settings used; and
- be verifiable by SWRCB and RWQCB.

6.1.5 Data Quantity Assessment Process

Before determining if water quality standards are exceeded or are projected to be exceeded before the next listing cycle, RWQCBs have wide discretion establishing how data and information are to be evaluated, including the flexibility to establish water segmentation, as well as the scale of spatial and temporal data and information that are to be reviewed. The following considerations shall be documented in each water body fact sheet.

6.1.5.1 Water Body Specific Information

Data used to assess water quality standards attainment should be actual data that can be quantified and qualified. Information that is descriptive, estimated, modeled, or projected shall be considered~~may be used as ancillary lines of evidence for listing or delisting decisions~~. In order to be used in developing the lists:

- Data must be measured at one or more sites in the water segment;
- If applicable and available, environmental conditions in a water body or at a site must be taken into consideration (e.g., effects of seasonality, events such as storms, the occurrence of wildfires, land use practices, etc.); and
- The fact sheet shall contain a description of readily available pertinent factors such as the depth of water quality measurements, flow, hardness, pH, the extent of tidal influence, and other relevant sample- and water body-specific factors.

6.1.5.2 Spatial Representation

Samples should be representative of the water body segment. To the extent possible, samples should represent statistically or in a consistent targeted manner the segment of the water body.

Samples should be spatially independent. Factors that affect spatial independence, such as proximity to sources, should be considered. ~~Samples collected within 200 meters of each other should be considered samples from the same station or location. However, s~~Samples less than 200 meters apart may be considered to be spatially independent samples if justified in the water body fact sheet.

6.1.5.3 Temporal Representation

Samples should be representative of the critical timing that the pollutant or pollution is expected to impact the water body. Samples used in the assessment must be temporally independent. ~~If the majority of samples were collected on a single day or during a single short-term natural event~~

~~(e.g., a storm, flood, or wildfire), the data shall not be used as the primary data set supporting the listing decision.~~

Documentation should include the time of day in which the sample was taken, and, to the extent possible, the critical season for the pollutant and applicable water quality standard. In general, samples should be available from two or more seasons or from two or more events when effects or water quality objective exceedances would be expected to be clearly manifested.

Sampling ephemeral waters, during a specific season, or during human-caused events (except spills) should be used to assess significant pollutant-related exceedances of water quality standards. Timing of the sampling should include the critical season for the pollutant and applicable water quality standard. If the implementation of a management practice(s) has resulted in a demonstrably statistically significant change in the water body segment, ~~only~~ recently collected data [since the implementation of the management measure(s)] should be given higher priority for consideration~~ed~~. The water quality fact sheet should describe the significance of the sample timing.

6.1.5.4 Aggregation of Data by Reach/Area

At a minimum, data shall be aggregated by the water body segments as defined in the Basin Plans. In the absence of a Basin Plan segmentation system, the RWQCBs should -define distinct reaches based on hydrology~~ and relatively homogeneous land use~~.

If available data suggest that a pollutant may cause an excursion above a water quality objective, the RWQCB should, to the extent information is readily available, -identify land uses, subwatersheds, tributaries, or dischargers that could be contributing the pollutant to the water body. The RWQCBs should identify stream reaches or lake/estuary areas that may have different pollutant levels based on significant differences in land use, tributary inflow, or discharge input. Based on these evaluations of the water body setting, RWQCBs should aggregate the data by appropriate reach or area.

Data must be measured at one or more sites in the water segment in order to place a water segment on the section 303(d) list.

6.1.5.5 Quantitation of Chemical Concentrations

When available data are less than or equal to the quantitation limit and the quantitation limit is less than or equal to the water quality standard, the value will be considered as meeting the water quality standard, objective, criterion, or evaluation guideline.

When the sample value is less than the quantitation limit and the quantitation limit is greater than the water quality standard, objective, criterion, or evaluation guideline, further data should be collected to ensure an accurate listing decision~~the result shall not be used in the analysis~~.

The quantitation limit includes the minimum level, practical quantitation level, or reporting limit.

6.1.5.6 Evaluation of Data Consistent with the Expression of Numeric Water Quality Objectives, Water Quality Criteria, or Evaluation Guidelines

If the water quality objectives, criteria, or guidelines state a specific averaging period and/or mathematical transformation, the data should be evaluated in a consistent manner prior to conducting any statistical analysis for placement of the water on the section 303(d) list. If sufficient data are not available for the stated averaging period, the available data shall be used to represent the averaging period.

To be considered temporally independent, samples collected during the averaging period shall be combined and considered one sampling event. For data that is not temporally independent (e.g., when multiple samples are collected at a single location on the same day), the measurements shall be combined and represented by a single resultant value. For dissolved oxygen measurements, the minimum value shall be used to determine compliance with the water quality objective. For pH measurements, the minimum or maximum values of the data set shall be used to determine compliance with the water quality objective.

If the averaging period is not stated for the standard, objective, criterion, or evaluation guideline, then the samples ~~collected less than 7 days apart~~ shall be considered independently ~~averaged~~.

6.1.5.7 ~~Binomial Model Statistics~~Numerical Evaluation

Once data have been summarized, RWQCBs shall determine if standards are exceeded. The RWQCBs shall determine for each averaging period which data points exceed water quality standards. The number of measurements that exceed standards shall be reported in the water body fact sheet.

When numerical data are evaluated, all of the following steps shall be completed:

A. For each data point representing the averaging period, the RWQCB shall answer the question: Are water quality standards met?

B. If the measurement is greater than the water quality standard, objective, criterion, or evaluation guideline, then the standard is exceeded.

C. Sum the number of samples exceeding the standard, objective, criterion, or evaluation guideline.

D. Sum the total number of measurements (sample population).

E. Compare the result to the appropriate table (i.e., Tables 3.1~~, 3.2, 4.1,~~ or 4.1~~2~~).

F. Report the result of this comparison in the water body fact sheet.

6.1.5.8 Evaluation of Bioassessment Data

When evaluating biological data and information, RWQCBs shall evaluate all readily available data and information and shall:

- Identify appropriate reference sites within water segments, watersheds, or ecoregions. Document methods for selection of reference sites.
- Evaluate bioassessment data at reference sites using water segment-appropriate method(s) and index period(s). Document sampling methods, index periods, and Quality Assurance/Quality Control procedures for the habitat being sampled and question(s) being asked.
- Evaluate bioassessment data from other sites, and compare to reference conditions. Evaluate physical habitat data and other water quality data, when available, to support conclusions about the status of the water segment.
- Calculate biological metrics for reference sites and develop Index of Biological Integrity if possible.

6.1.5.9 Evaluation of Temperature Data

Temperature water quality objectives shall be evaluated as described in sections 6.1.5.1 through 6.1.5.7. When "historic" or "natural" temperature data are not available, alternative approaches shall be employed to assess temperature impacts.

In the absence of necessary data to interpret numeric water quality objectives, recent temperature monitoring data shall be compared to the temperature requirements of aquatic life in the water segment. In many cases, fisheries, particularly salmonids, represent the beneficial uses most sensitive to temperature. Information on current and historic conditions and distribution of sensitive beneficial uses (e.g., fishery resources) in the water segment is necessary, as well as recent temperature data reflective of conditions experienced by the most sensitive life stage of the aquatic life species. If temperature data from past (historic) periods corresponding to times when the beneficial use was fully supported are not available, information about presence/absence or abundance of sensitive aquatic life species shall be used to infer past (historic) temperature conditions if loss of habitat, diversions, toxic spills, and other factors are also considered.

Determination of life stage temperature requirements of sensitive aquatic life species shall be based on peer-reviewed literature. Similarly, evaluation of temperature data shall be based on temperature metrics reflective of the temperature requirements for the sensitive aquatic life species, including but not limited to, the maximum weekly average temperature and upper lethal limit.

6.2 RWQCB Approval

At a public hearing, the RWQCB shall consider and approve each proposed list change as documented in water body fact sheet. Advance notice and opportunity for public comment shall be provided. RWQCB shall develop written responses to all comments. After consideration of all

testimony, RWQCBs shall approve a resolution in support of their recommendations for the section 303(d) list. RWQCBs shall submit to SWRCB the water body fact sheets, responses to comments, documentation of the hearing process, and a copy of all data and information considered. For the 2004 section 303(d) list, RWQCB approval of list changes is not required.

6.3 SWRCB Approval

During the development of the 2004 section 303(d) list, SWRCB shall perform all tasks required by this Policy.

Subsequent to the 2004 listing cycle, SWRCB shall evaluate RWQCB-developed water body fact sheets for completeness, consistency with this Policy, and consistency with applicable law. The SWRCB shall assemble the fact sheets and consolidate all the RWQCB lists into the statewide section 303(d) list.

Before the adoption of the section 303(d) list, the SWRCB shall hold a public workshop. Advance notice and opportunity for public comment shall be provided. Comments shall be limited to the issues raised before the RWQCBs. Requests for review of specific listing decisions must be submitted to the SWRCB within 30 days of the RWQCB's decision. The SWRCB shall consider changes only to waters that are requested for review unless the SWRCB, on its own motion, decides to consider recommendations on other waters. The SWRCB shall give substantial deference to the RWQCB on decisions made under the Weight of Evidence approach described in Section 3.1.11. Subsequent to the workshop, the SWRCB shall approve the section 303(d) list at a Board Meeting. The approved section 303(d) list and the supporting fact sheets shall be submitted to USEPA for approval as required by the Clean Water Act.

7 Definitions

□(Alpha) is the statistical error of rejecting a null hypothesis that is true. This type of error is also called Type I error.

ALTERNATE HYPOTHESIS is a statement or claim that a statistical test is set up to establish.

□(Beta) is the statistical error of failing to reject a null hypothesis that is not true. This type of error is also called Type II error.

BINOMDIST is an Excel® function that is used to calculate the cumulative binomial distribution.

BINOMIAL DISTRIBUTION is a mathematical distribution that describes the probabilities associated with the possible number of times particular outcomes will occur in series of observations (i.e., samples). Each observation may have only one of two possible results (e.g., standard exceeded or standard not exceeded).

BIOACCUMULATION is the process by which a chemical is taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

BIOASSESSMENT is an assessment of biological community information along with measures of the physical/habitat quality to determine, in the case of water quality, the integrity of a water body of interest.

CONVENTIONAL POLLUTANTS include dissolved oxygen, pH, and temperature.

DIEL measurements pertain to measurements taken over a 24-hour period of time.

EFFECT SIZE is maximum magnitude of exceedance frequency that is tolerated.

NULL HYPOTHESIS is a statement used in statistical testing that has been put forward either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved.

RANK CORRELATION is the association between paired values of two variables that have been replaced by their ranks within their respective samples (e.g., chemical measurements and response in a toxicity test).

REFERENCE CONDITION refers to the characteristics of water body segments least impaired by human activities. As such, reference conditions can be used to describe attainable biological or habitat conditions for water body segments with common watershed/catchment characteristics within defined geographical regions.

STATISTICAL SIGNIFICANCE occurs when it can be demonstrated that the probability of obtaining a difference by chance only is relatively low.

TOXICANTS include priority pollutants, metals, chlorine, and nutrients.

TOXICITY IDENTIFICATION EVALUATION (TIE) is a technique to identify the unexplained cause(s) of toxic events. TIE involves selectively removing classes of chemicals through a series of sample manipulations, effectively reducing complex mixtures of chemicals in natural waters to simple components for analysis. Following each manipulation the toxicity of the sample is assessed to see whether the toxicant class removed was responsible for the toxicity.

WATER QUALITY LIMITED SEGMENT is any segment of a water body where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after application of technology-based effluent limitations required by CWA sections 301(d) or 306.