311 303(d) Sep 04
Item # ___
cc: Bd, DI
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August 25, 2004

Craig Wilson, Chief, TMDL Listing Unit
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Subject: Comments on *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List*, July, 2004

Dear Craig:

Attached please find my comments on the above-referenced Policy, in the form of a memorandum. I wish to commend State Board staff on their ongoing and successful efforts to bring order and consistency to the onerous task of identifying waters that should be placed on the state's Clean Water Act Section 303(d) list. The attached memorandum is intended to support the efforts of State Board staff and others in accomplishing this difficult task, particularly with respect to the technical challenges posed by the complexity of the relevant issues.

I generally support the comments provided by letter of August 24th from Craig Johns on behalf of the Regulated Caucus of the AB 982 PAG. My proposed approach is in large measure compatible with those comments, but goes farther in two areas: 1) developing a format and mechanism with which to implement an actual weight-of-evidence approach to listing, and 2) adding a methodology for developing a numerical "Pollutant Severity Score" that can be used to develop the priority ranking required by section 303(d)(1)(A).

I have not completed development of the spreadsheet Matrix that forms the framework for the listing decision process and the pollutant severity scoring, but I have provided a schematic and text description of how it works in the attached memorandum. I need to get back to doing paying work but will gladly continue development of the Matrix if there is sufficient interest.

Thank you for your consideration of these ideas. Please feel free to contact me with any questions or comments you may have.

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Sincerely,

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Consulting Environmental Scientist

cc: Tom Mumley
Craig Johns
Jim Scanlin
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MEMO TO: Craig J. Wilson, Chief, TMDL Listing Unit,
State Water Resources Control Board

DATE: August 25, 2004

SUBJECT: **Proposed Approach to Section 303(d) Listing/Delisting**

Summary

A systematic process is proposed for identifying waters that do not meet water quality standards, per the requirements of Section 303(d) of the federal Clean Water Act (CWA). Criteria are established for placement of waters on the Section 303(d) List based on a weight-of-evidence approach. A complementary methodology is described for developing a priority ranking for the listed waters in accordance with Section 303(d), based on a numerical "Pollutant Severity Score". An "Investigation Needed List" is proposed for waters for which there is some evidence of a pollution effect, but which do not meet the criteria for placement on the Section 303(d) List. Delisting is proposed to be accomplished by demonstration that a subject water body no longer meets the criteria for inclusion on the Section 303(d) List.

Introduction

This approach is proposed to address three fundamental problems with the proposed *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List*, July 2004 ("the Policy"):

- The State Policy as proposed does not constitute a weight-of-evidence approach, which is both called for in the text of the Policy and is desirable; and
- CWA Section 303(d) requires the state to identify those waters "*for which effluent limitations...are not stringent enough to implement any water quality standard applicable to such waters.*" A "water quality standard" is generally understood to be comprised of a designated beneficial use and a water quality objective or criterion designed to protect that beneficial use. The Policy permits listing of waters under Section 303(d) based on exceedance of any one line of evidence, including exceedance of a numerical or narrative water quality objective, without corresponding evidence of beneficial use impairment; and
- The Policy does not provide for a means of establishing a priority ranking for listed water bodies as required under CWA Section 303(d)(1)(A): "*The 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.*"

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I am proposing an overhaul of the proposed listing approach, incorporating an explicit weight-of-evidence methodology that requires multiple lines of evidence for listing. This alternative approach also produces a numerical "Pollutant Severity Score" that can be used to produce a priority ranking for Section 303(d)-listed water bodies. The proposed methodology makes use of certain key components of the State Board's proposed Policy, such as the application of the binomial distribution for assessment of exceedances of water quality criteria/objectives for conventional and other pollutants. The proposed approach also corrects an error in the State Board's Policy regarding the once-in-three-years exceedance frequency that applies to most criteria/objectives for toxic pollutants (especially trace metals and organic compounds).

Overview

The focus of CWA Section 303(d)(1)(A) is squarely on identification of any waters *not meeting standards*, and prioritization of those waters for further action (consisting nominally of establishing TMDLs). This memorandum describes a process for systematically evaluating the available information to assess whether a specific water body is failing to meet any applicable water quality standard. Water bodies (or segments) so identified would then be placed on the Section 303(d) "List of Impaired Waters"[1]. Criteria are established for identifying such waters, involving a weight of evidence approach in which multiple lines of evidence are required for listing.

Waters for which there is evidence of water quality impacts or pollution effects, including exceedances of applicable water quality objectives or impairments of beneficial uses, but which do not meet the weight of evidence criteria for listing on the List of Impaired Waters, are placed on an "Investigation Needed List". This list will serve as an adjunct to the Section 303(d) List, and should be used by the state to prioritize additional data collection efforts.

The functional engine of this approach is a matrix for incorporation of all available data and other evidence regarding the health of a specific water body. This matrix forms a means of organizing and assessing all pertinent information, and provides a mechanism for evaluating data and information in a consistent, comprehensive and structured format. Two parallel activities are performed using the matrix:

- *Listing Decision*: a decision process using "Yes/No" answers to a series of questions, leading to a determination as to whether a water body should be listed on the List of Impaired Waters or the Investigation Needed List, and
- *Pollution Severity Scoring*: a numerical scoring of the pollution-related evidence that allows for relative ranking of water bodies based on their demonstrated severity of pollution.

[1] This term is used to retain consistency with past terminology and with the State's *Water Quality Control Policy for Addressing Impaired Waters*, and is herein considered synonymous with the Section 303(d) List.

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Within the Matrix, a *weighted scoring system* provides for grading of the severity of pollution-related problems for each water body, based on the cumulative weight of evidence, including those associated with beneficial uses. The final weighted scores for individual water bodies can be compiled to establish a priority ranking for waters within a region or the state.

In parallel with the scoring system is a *decision process* designed to determine whether water bodies should be placed on the List of Impaired Waters, the Investigation Needed List, or on neither of those lists. This is accomplished through "Yes/No" answers to questions related to the available data/evidence. To be placed on the List of Impaired Waters, the water body must have "Yes" answers to the following three questions:

1. Is there a documented exceedance of a pollutant-specific water quality criterion/objective that meets the established criteria within the specified period?
2. Is there documented evidence of beneficial use impairment within the specified period?
3. Is a pollutant for which a qualified criterion/objective exceedance is documented likely to be the cause of an observed beneficial use impairment?

Water bodies that do not have "Yes" answers to all three questions, but for which the answers to questions 1 or 2 are "Yes", should be placed on the Investigation Needed List. This list should be annotated, such that the key evidence available, as well as the additional evidence needed - regarding either pollutant-specific exceedances of criteria/objectives or beneficial use impairments - should be noted for each water body. The matrix for each water body should be attached, linked or otherwise accessible.

The Particulars

The Water Quality Assessment Matrix (Matrix) is a process-oriented mechanism for organizing and assessing water quality data and information. The Matrix consists of three general organizational categories:

I. *Environmental Indicators*: provides for compilation of visual or other evidence of pollution or beneficial use impairment, particularly when the evidence is anecdotal or less scientifically rigorous than required for the Water Quality Objectives or Beneficial Use categories.
II. *Water Quality Objectives*: entails compilation of all numerical data (chemical concentrations, toxicity test results, etc.) and their related numerical or narrative water quality criteria/objectives, with assessments of exceedances according to prescribed protocols.
III. *Beneficial Uses*: entails compilation of all demonstrated instances of beneficial use impairments that have been documented on a scientifically-sound or regulatory basis, with scientific and/or regulatory justification.

A schematic overview of the proposed Matrix is shown in Figure 1. *(Note that this figure prints on legal size paper, in landscape orientation.)*

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Initial steps in using the Matrix to assess a given water body:

- All available data for the specific water body must be compiled and organized into the three categories as described above.
- Applicable water quality criteria/objectives must be specified for all pollutants for Category II, Water Quality Objectives. This should include all applicable regulations, including the Basin Plans, California Toxics Rule (CTR), National Toxics Rule (NTR) and other state and federal criteria or objectives;
- Water quality data and other data pertaining to water quality objectives assessment must be assembled into a spreadsheet or database file and sorted to determine the overall number of samples, the number of samples measured above the criterion/objective, and the % exceedance of objectives for each pollutant.

The data are then used to derive answers to the three questions shown in the Matrix, as well as to calculate scores for the pollutant severity ranking, as described below.

Listing Questions:

Completion of the Matrix requires answering the following questions pertinent to determining whether the water body should be listed as an impaired water body.

1) Is a Water Quality Objective Exceeded?

- For numerical objectives, compare the chemical concentration data to the exceedance criteria specified in the Matrix; if "Yes" note pollutant and calculate exceedance frequency;
- For narrative objectives, compare the test data to the exceedance criteria noted; if exceedance is shown, answer whether the exceedance is associated with a known, causative pollutant; if "Yes", note pollutant and calculate exceedance frequency (note that an exceedance of a narrative objective without identification of the responsible pollutant does not quality as a "Yes" answer).

[Note that the exceedance criteria shown in the Matrix reflect a) the once-in-three-years exceedance frequency allowed under the CTR and other regulations pertaining to toxic pollutants, and b) the binomial distribution criteria as specified in Table 3.2 of the draft State Policy for conventional pollutants, bacteria indicators, and other exceedances of numerical or narrative water quality objectives.]

2) Has a Beneficial Use Impairment been documented?

- If "Yes", note impairment; provide scientific or regulatory reference(s) for each impairment.

3) Is the documented beneficial use impairment likely caused by a pollutant which exceeds a water quality objective?

- If "Yes", note pollutant associated with use impairment.

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If the answer is "Yes" to all three questions, list the water body on the Section 303(d) Impaired Waters List. If the answer is "Yes" to one or two questions, or if a narrative objective is exceeded but the pollutant is not known, list the water body on the Investigation Needed List.

Scoring

In parallel with the listing decision-making process, scores are developed for data entered into each of the Matrix categories as follows:

I. *Environmental Indicators*: each pollution indicator documented within the previous five years is assessed a flat score; the number of documented indicators is tallied and multiplied times the flat score to obtain a weighted score for the category (Score "X").
II. *Water Quality Objectives*: percent exceedance is calculated for each pollutant and water body as: # of exceedances divided by total number of samples within the prescribed time period; each calculated percent exceedance is multiplied by a categorical weighting factor, and the weighted scores are summed to obtain a weighted score for the category (Score "Y").
III. *Beneficial Uses*: each documented beneficial use impairment within the previous five years is assigned a flat score; the number of documented impairments is tallied and multiplied times the flat score to obtain a weighted score for the category (Score "Z").

The categorical scores X, Y and Z are then summed to derive the overall Pollutant Severity Score. The relative scores for various water bodies may then be used to compile a *priority ranking* of water bodies within a region or the state.

It is envisioned that as a matter of work priority, the numerical scores would be derived as described above first for water bodies qualifying for the List of Impaired Waters, and then for those on the Investigation Needed List. The former should be used to develop a priority ranking for waters not meeting standards and applied to development of TMDLs as required per Section 303(d)(1)(C). The latter should be used to develop priorities for funding of additional research or data collection activities. If resources permit, it may also be useful to derive pollution severity scores for waters that do not qualify for either list, as a means of identifying other waters that may warrant additional study.

Sub-Categories and TMDL Adopted/Alternatives

This proposed approach does not divide the Section 303(d) List into sub-categories.

The Investigation Needed List is considered to be adjunct to the 303(d) List, and is generated in the process of evaluating whether specific waters meet the criteria for listing per Section 303(d). The presumption is that waters placed on the Investigation Need List may receive sufficient study so as to provide any missing information required to fully document water quality impairments and warrant placement on the Section 303(d) List of

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Impaired Waters. It is therefore considered to be a useful tool for the state in satisfying its obligations under Section 303(d).

Waters for which a TMDL has been developed do not require a separate category, as they may be removed from the 303(d) List once the criteria for listing are no longer met (see below).

Waters for which a viable regulatory alternative to a TMDL exists may be handled as appropriate according to the State's *Water Quality Control Policy for Addressing Impaired Waters* (in preparation). Additional guidance related to this process is provided in CWA Sections 303(d)(1)(C), 303(d)(2), and 304(a)(2).

Delisting

Under the proposed scheme, delisting follows a fairly straightforward approach, whereby waters are removed from the Section 303(d) Impaired Waters List when the answers to questions 1-3 from the Matrix are no longer all "Yes". Waters removed from the 303(d) List could be placed on the Investigation Needed List or neither list, depending on whether some or no data still point to water quality objectives exceedances or beneficial use impacts.

Note that this approach provides a built-in time lag that provides some certainty in determining whether a water body has temporarily or more permanently been restored to non-impaired status, based on the time period limitations for the Water Quality Objectives and Beneficial Use evidence categories. As an example, consider a water body that had been placed on the Impaired Waters List due to diazinon concentrations that exceeded a Basin Plan water quality objective more than once in the previous three years, coupled with demonstrated impacts on the "COLD" beneficial use. Such water body would be removed from the list if a) either three years had passed with no more than one exceedance of the diazinon objective, or b) scientific study had demonstrated that the beneficial use impairment had ceased.

Conclusions

This memorandum provides a brief description of a proposed methodology for developing the list of water bodies that do not meet water quality standards within the state, and a means of developing relative scores by which a priority ranking of those water bodies may be derived. The methodology involves a true weight-of-evidence approach, both for making the listing decision and for developing the Pollutant Severity Scores for priority ranking.

The Matrix used to identify waters for listing and derive the Pollutant Severity Scores is presented schematically (Figure 1); a prototype Matrix may be obtained upon request to the author.

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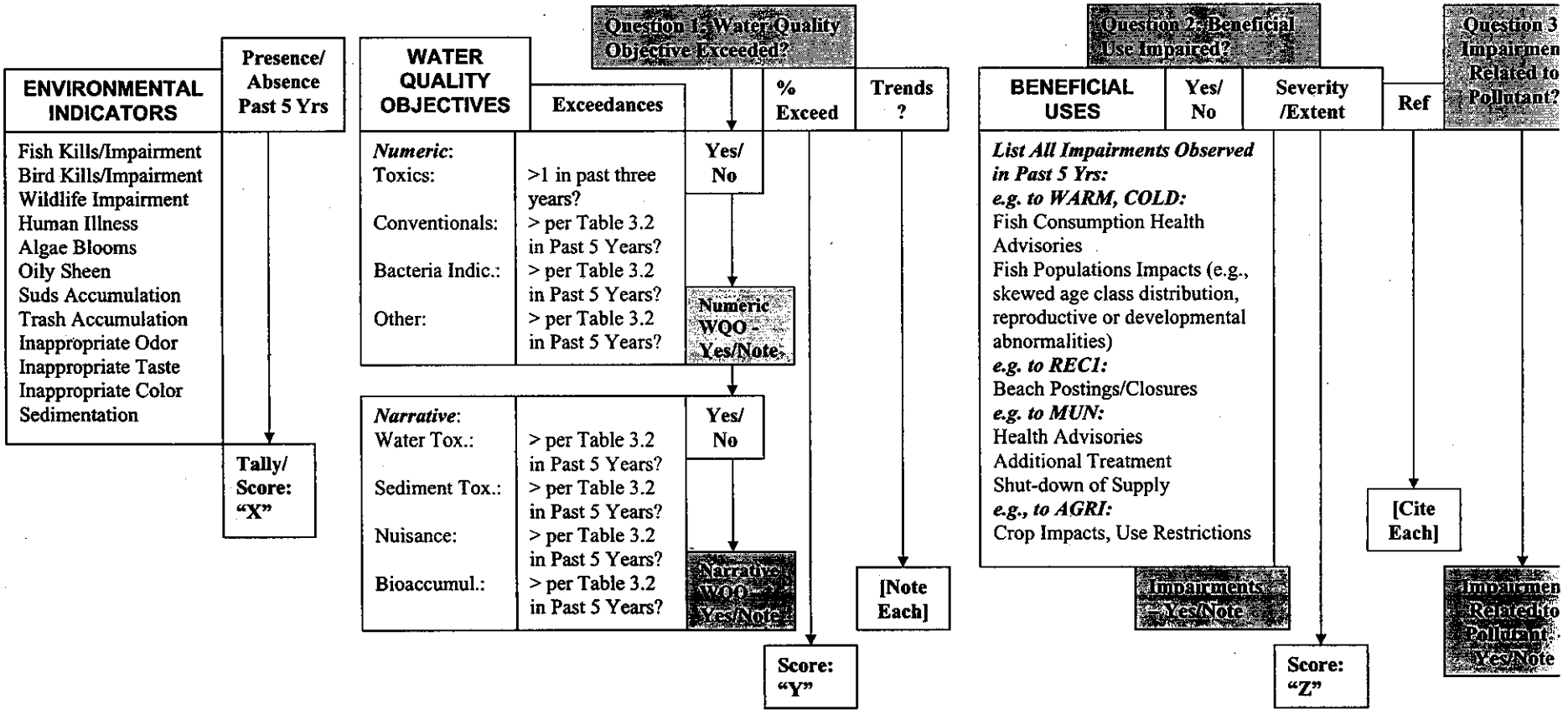
Figure 1. SCHEMATIC OF *DRAFT* WATER QUALITY ASSESSMENT MATRIX



Yes answers to all three questions indicate water body qualifies for inclusion on List of Impaired Waters. For narrative objectives, answer whether each noted exceedance is associated with a specific pollutant.

POLLUTION SEVERITY SCORE = X+Y+Z

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