

Documents Supporting the Discussions of the AB 982 Public Advisory Group

1. Vassey, S.K. 1999. Economic Considerations in TMDL Development and Basin Planning. Memorandum from Sheila K. Vassey to Stefan Lorenzato. Dated October 27, 1999.
2. U.S. Environmental Protection Agency (EPA). 2000a. Guidance for Developing TMDL's in California. EPA Region 9. Dated January 7, 2000. 29 pp.
3. EPA. 2000b. California TMDL Program Review. By D. Smith, D. Eberhardt, C. McGovern, J. Pedersen, and E. McNaughton. Submitted to the State Water Resources Control Board by the U.S. Environmental Protection Agency. 49 pp plus 3 pp transmittal letter dated May 5, 2000.



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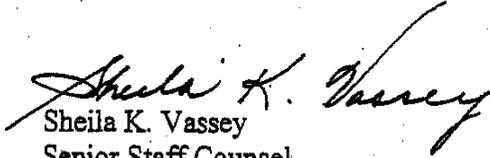
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DATE: OCT 27 1999

SUBJECT: ECONOMIC CONSIDERATIONS IN TMDL DEVELOPMENT AND
BASIN PLANNING

ISSUE

When are the Regional Water Quality Control Boards (Regional Water Boards or Boards) legally required to consider economics in Total Maximum Daily Load (TMDL)¹ development and water quality control planning (basin planning)?²

CONCLUSION

The Regional Water Boards, in general, adopt TMDLs as basin plan amendments. Under state law, there are three triggers for Regional Water Board consideration of economics or costs in basin planning. These are:

- The Regional Water Boards must estimate costs and identify potential financing sources in the basin plan before implementing any agricultural water quality control program.
- The Boards must consider economics in establishing water quality objectives that ensure the reasonable protection of beneficial uses.

¹ See 33 U.S.C. § 1313(d); 40 C.F.R. § 130.7.

² See Wat. Code §§ 13240-13247.

- The Boards must comply with the California Environmental Quality Control Act (CEQA)³ when they amend their basin plans. CEQA requires that the Boards analyze the reasonably foreseeable methods of compliance with proposed performance standards and treatment requirements. This analysis must include economic factors.

Economic factors come into play under federal law when the Regional Water Boards designate uses. Specifically, the Boards can decide not to designate, dedesignate, or establish a subcategory of, a potential use where achieving the use would cause substantial and widespread economic and social impact.

DISCUSSION

I. STATE LAW

Under federal and state law, the Regional Water Boards are required to include TMDLs in their basin plans.⁴ There are three statutory triggers for an economic or cost analysis in basin planning. These triggers are:

- adoption of an agricultural water quality control program;
- adoption of water quality objectives; and
- adoption of a treatment requirement or performance standard (CEQA).

Each category is briefly discussed below.

A. Agricultural Water Quality Control Program

Agricultural activities are significant sources of nonpoint source pollution. Many waterbodies in the state are impaired due to one or more agricultural operations. As a result, the Regional Water Boards will be faced with developing programs to control agricultural activities, as part of TMDL development.

Under the Porter-Cologne Water Quality Control Act (Porter-Cologne),⁵ before a Regional Water Board implements an agricultural water quality control program, the Board must identify

³ Pub. Resources Code § 21000 et seq.

⁴ See 33 U.S.C. § 1313(d); 40 C.F.R. § 130.7(d)(2) (TMDLs must be incorporated into the state's water quality management plan. In California the basin plans are part of the state's water quality management plan.); Wat. Code §§ 13050(j), 13242.

⁵ Wat. Code § 13000 et seq.

the total cost of the program and potential sources of financing.⁶ This information must be included in the basin plan.

The statute does not define "agricultural" programs. The Legislature has, however, defined agricultural activities elsewhere to mean activities that generate "horticultural, viticultural, forestry, dairy, livestock, poultry, bee, or farm product[s]."⁷ Because "agricultural" programs under Porter-Cologne are not restricted to particular activities, presumably, the Legislature intended that the term be interpreted broadly. Thus, the Regional Water Boards should identify costs and financing sources for agricultural water quality control programs" covering not only typical farming activities but also silviculture, horticulture, dairy, and the other listed activities.

The statute focuses only on costs and financing sources. The statute does not require the Regional Water Boards to do, for example, a cost-benefit analysis or an economic analysis.

B. Water Quality Objectives

Porter-Cologne requires that the Regional Water Boards take "economic considerations", among other factors, into account when they establish water quality objectives.⁸ The objectives must ensure the reasonable protection of beneficial uses and the prevention of nuisance.⁹

Attached to this memorandum is a 1994 memorandum containing guidance on the consideration of economics in the adoption of water quality objectives.¹⁰ The key points of this guidance are:

- The Boards have an affirmative duty to consider economics when adopting water quality objectives.
- At a minimum, the Boards must analyze: (1) whether a proposed objective is currently being attained; (2) if not, what methods are available to achieve compliance with the objective; and (3) the costs of those methods.

⁶ *Id.* § 13141.

⁷ Food & Agr. Code §§ 564(a), 54004.

⁸ Wat. Code § 13241. The other factors include the past, present, and probable future beneficial uses of water; environmental characteristics of the hydrographic unit under consideration; water quality conditions that could reasonably be achieved through the coordinated control of all factors affecting water quality in the area, the need for developing housing, and the need to develop and use recycled water.

⁹ *Ibid.*

¹⁰ Memorandum, dated January 4, 1994, from William R. Attwater, Chief Counsel, to Regional Water Board Executive Officers and Attorneys, entitled "Guidance on Consideration of Economics in the Adoption of Water Quality Objectives".

- If the economic consequences of adoption of a proposed objective are potentially significant, the Boards must state on the record why adoption of the objective is necessary to ensure the reasonable protection of beneficial uses or the prevention of nuisance.
- The Regional Water Boards can adopt objectives despite significant economic consequences.
- The Boards are not required to do a formal cost-benefit analysis.

C. CEQA

The Regional Water Boards must comply with CEQA when they amend their basin plans.¹¹ The State Resources Agency has certified the basin-planning program as exempt from the requirement to prepare environmental documents under CEQA.¹² In lieu of preparing an environmental impact report or negative declaration, the Boards must comply with the State Water Resources Control Board's regulations on exempt regulatory programs when they amend their basin plans.¹³ These regulations require the Boards to prepare a written report that analyzes the environmental impacts of proposed basin plan amendments.¹⁴ In general, CEQA requires the Regional Water Boards to consider economic factors only in relation to physical changes in the environment.¹⁵

CEQA also has specific provisions governing the Regional Water Boards' adoption of regulations, such as the regulatory provisions of basin plans that establish performance standards or treatment requirements. The Boards must do an environmental analysis of the reasonably foreseeable methods of compliance with those standards or requirements.¹⁶ They must consider economic factors in this analysis.

CEQA does not define "performance standard"; however, the term is defined in the rulemaking provisions of the Administrative Procedure Act.¹⁷ A "performance standard" is a regulation that describes an objective with the criteria stated for achieving the objective.¹⁸

¹¹ See Pub. Resources Code § 21080.

¹² See Cal. Code Regs., tit. 14, § 15251(g).

¹³ See Cal. Code Regs., tit. 23, §§ 3775-3782.

¹⁴ *Id.* § 3777.

¹⁵ See Cal. Code Regs., tit. 14, § 15064(e).

¹⁶ Pub. Resources Code § 21159.

¹⁷ Gov. Code §§ 11340-11359.

¹⁸ *Id.* § 11342(d).

TMDLs will typically include performance standards. TMDLs normally contain a quantifiable target that interprets the applicable water quality standard. They also include wasteload¹⁹ allocations for point sources, and load allocations²⁰ for nonpoint sources and natural background to achieve the target.²¹ The quantifiable target together with the allocations may be considered a performance standard. Thus, the Regional Water Board must identify the reasonably foreseeable methods of compliance with the wasteload and load allocations and consider economic factors for those methods. This economic analysis is similar to the analysis for water quality objectives discussed above. That is, the Regional Water Board should determine: (1) whether the allocations are being attained; (2) if not, what methods of compliance are reasonably foreseeable to attain the allocations; and (3) what are the costs of these methods.

II. FEDERAL LAW

Under federal law, economics can be considered in designating potential beneficial uses. Specifically, the federal water quality standards regulations allow a state to dedesignate, to decide not to designate, or to establish a subcategory of a potential beneficial use on economic grounds. To rely on this basis, the state must demonstrate that attaining the use is infeasible because the controls necessary to attain the use "would result in substantial and widespread economic and social impact."²²

The states can take this action only for potential uses. These are uses that do not meet the definition of an "existing use". Existing uses are those uses actually attained in the water body on or after November 28, 1975.²³

Attachment

¹⁹ See 40 C.F.R. § 130.2(g). A wasteload allocation is the portion of the receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution.

²⁰ See *id.* § 130.2(g). A load allocation is the portion of the receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources.

²¹ See *id.* § 130.2(i). A TMDL is the sum of the individual wasteload and load allocations.

²² See *id.* § 131.10(g)(6).

²³ *Id.* § 131.3(e).

Cheon

State of California

m e m o r a n d u m

To : Regional Water Board
Executive Officers

Date: JAN -4 1994

Regional Water Board Attorneys



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Subject: GUIDANCE ON CONSIDERATION OF ECONOMICS IN THE ADOPTION OF WATER
QUALITY OBJECTIVES

ISSUE

What is required of a Regional Water Quality Control Board (Regional Water Board) in order to fulfill its statutory duty to consider economics when adopting water quality objectives in water quality control plans or in waste discharge requirements?

CONCLUSION

A Regional Water Board is under an affirmative duty to consider economics when adopting water quality objectives in water quality control plans or, in the absence of applicable objectives in a water quality control plan, when adopting objectives on a case-by-case basis in waste discharge requirements. To fulfill this duty, the Regional Water Board should assess the costs of the proposed adoption of a water quality objective. This assessment will generally require the Regional Water Board to review available information to determine the following: (1) whether the objective is currently being attained; (2) what methods are available to achieve compliance with the objective, if it is not currently being attained; and (3) the costs of those methods. The Regional Water Board should also consider any information on economic impacts provided by the regulated community and other interested parties.

If the potential economic impacts of the proposed adoption of a water quality objective appear to be significant, the Regional Water Board must articulate why adoption of the objective is necessary to assure the reasonable protection of beneficial uses of state waters, despite the potential adverse economic consequences. For water quality control plan amendments, this

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discussion could be included in the staff report or resolution for the proposed amendment. For waste discharge requirements, the rationale must be reflected in the findings.

DISCUSSION

A. Legal Analysis

1. Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, Water Code Section 13000 et seq. (Porter-Cologne Act or Act), the State Water Resources Control Board (State Water Board) and the Regional Water Boards are the principal state agencies charged with responsibility for water quality protection. The State and Regional Water Boards (Boards) exercise this responsibility primarily through the adoption of water quality control plans and the regulation of waste discharges which could affect water quality. See Water Code Secs. 13170, 13170.2, 13240, 13263, 13377, 13391.

Water quality control plans contain water quality objectives, as well as beneficial uses for the waters designated for protection and a program of implementation to achieve the objectives. Id. Sec. 13050(j). In the absence of applicable water quality objectives in a water quality control plan, the Regional Water Board may also develop objectives on a case-by-case basis in waste discharge requirements. See id. Sec. 13263(a).¹

When adopting objectives either in a water quality control plan or in waste discharge requirements, the Boards are required to exercise their judgment to "ensure the reasonable protection of beneficial uses and the prevention of nuisance". Id. Secs. 13241, 13263; see id. Sec. 13170. The Porter-Cologne Act recognizes that water quality may change to some degree without

¹ The focus of this memorandum is limited to an analysis of the Boards' obligation to consider economics when adopting water quality objectives either in water quality control plans or, on a case-by-case basis, in waste discharge requirements. This memorandum does not discuss the extent to which the Boards' are required to consider the factors specified in Water Code Section 13241 in other situations. Specifically, this memorandum does not discuss the applicability of Section 13241 to the development of numeric effluent limitations, implementing narrative objectives contained in a water quality control plan. Further guidance on the latter topic will be developed at a later date.

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causing an unreasonable effect on beneficial uses. Id. The Act, therefore, identifies factors which the Boards must consider in determining what level of protection is reasonable. Id.² These factors include economic considerations. Id.³

The legislative history of the Porter-Cologne Act indicates that "[c]onservatism in the direction of high quality should guide the establishment of objectives both in water quality control plans and in waste discharge requirements". Recommended Changes in Water Quality Control, Final Report of the Study Panel to the [State Water Board], Study Project--Water Quality Control Program, p. 15 (1969) (Final Report). Objectives should "be tailored on the high quality side of needs of the present and future beneficial uses". Id. at 12. Nevertheless, objectives must be reasonable, and economic considerations are a necessary part of the determination of reasonableness. "The regional boards must balance environmental characteristics, past, present and future beneficial uses, and economic considerations (both the cost of providing treatment facilities and the economic value of development) in establishing plans to achieve the highest water quality which is reasonable." Id. at 13.

2. Senate Bill 919

The Boards are under an additional mandate to consider economics when adopting objectives as a result of the recent enactment of Senate Bill 919. 1993 Cal. Stats., Chap. 1131, Sec. 8, to be codified at Pub. Res. Code, Div. 13, Ch. 4.5, Art. 4. The legislation, which is

2 Other factors which must be considered include:

- (a) Past, present, and probable future beneficial uses of water;
- (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
- (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- (d) The need for developing housing within the region;
- (e) The need to develop and use recycled water.

³ See also Water Code Section 13000 which mandates that activities and factors which may affect water quality "shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible" (emphasis added).

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effective January 1, 1994, amended the California Environmental Quality Control Act, Public Resources Code Section 21000 et seq. (CEQA), to require that, whenever the Boards adopt rules requiring the installation of pollution control equipment or establishing a performance standard or treatment requirement, the Boards must conduct an environmental analysis of the reasonably foreseeable methods of compliance. This analysis must take into account a reasonable range of factors, including economics. For the reasons explained above, the latter requirement is duplicative of existing requirements under the Porter-Cologne Act regarding consideration of economics.

B. Recommendation

The meaning of the mandate to "consider economics" in the Porter-Cologne Act is not entirely clear. It is clear that the Porter-Cologne Act does not specify the weight which must be given to economic considerations. Consequently, the Boards may adopt water quality objectives even though adoption may result in significant economic consequences to the regulated community. The Porter-Cologne Act also does not require the Boards to do a formal cost-benefit analysis.

The Porter-Cologne Act does impose an affirmative duty on the Boards to consider economics when adopting water quality objectives. The Boards probably cannot fulfill this duty simply by responding to economic information supplied by the regulated community. Rather, the Boards should assess the costs of adoption of a proposed water quality objective. This assessment will normally entail three steps. First, the Boards should review any available information on receiving water and effluent quality to determine whether the proposed objective is currently being attained or can be attained. If the proposed objective is not currently attainable, the Boards should identify the methods which are presently available for complying with the objective. Finally, the Boards should consider any available information on the costs associated with the treatment technologies or other methods which they have identified for complying with a proposed objective.⁴

⁴ See, for example, Managing Wastewater In Coastal Urban Areas, National Research Council (1993). This text provides data on ten technically feasible wastewater treatment technologies, which can be used to make comparative judgments about performance and to estimate the approximate costs of meeting various effluent discharge standards, including standards for toxic organics and metals.

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In making their assessment of the cost impacts of a proposed objective, the Boards are not required to engage in speculation. Rather, the Boards should review currently available information. In addition, the Boards should consider, and respond on the record, to any information provided by dischargers or other interested persons regarding the potential cost implications of adoption of a proposed objective.

If the economic consequences of adoption of a proposed water quality objective are potentially significant, the Boards must articulate why adoption of the objective is necessary to ensure reasonable protection of beneficial uses. If the objective is later subjected to a legal challenge, the courts will consider whether the Boards adequately considered all relevant factors and demonstrated a rational connection between those factors, the choice made, and the purposes of the Porter-Cologne Act. See California Hotel & Motel Assn. v. Industrial Welfare Com., 25 Cal.3d 200, 212, 157 Cal.Rptr. 840, 599 P.2d 31 (1979).

Reasons for adopting a water quality objective, despite adverse economic consequences, could include the sensitivity of the receiving waterbody and its beneficial uses, the toxicity of the regulated substance, the reliability of economic or attainability data provided by the regulated community, public health implications of adopting a less stringent objective, or other appropriate factors. These factors may also include the legislative directive that a "margin of safety [] be maintained to assure the protection of all beneficial uses." Final Report, p. 15 and App. A, p. 59.

If objectives are proposed for surface waters and adverse economic consequences stemming from adoption of the objectives could be avoided only if beneficial uses were downgraded, the Boards should address whether dedesignation would be feasible under the applicable requirements of the Clean Water Act and implementing regulations. See 40 C.F.R. Sec. 131.10. Dedesignation is feasible only for potential, rather than existing, uses. See *id.* Sec. 131.10(g). If dedesignation of potential beneficial uses is infeasible, the Boards should explain why, e.g., that there is a lack of data supporting dedesignation.⁵

⁵ It should also be noted that, even if dedesignation of potential beneficial uses is feasible, in the great majority of cases it will not have any significant effect on the selection of a proposed objective. This is so because the proposed objective will be necessary to protect existing beneficial uses, which cannot be dedesignated.

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The State or Regional Water Board's rationale for determining that adoption of a proposed objective is necessary to protect water quality, despite adverse economic consequences, must be discernible from the record. This reasoning could be included in the staff report or in the resolution adopting a proposed water quality control plan amendment. When objectives are established on a case-by-case basis in waste discharge requirements, the rationale must be included in the findings.

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Guidance for Developing TMDLs in California

EPA Region 9

January 7, 2000

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Disclaimer

This document provides guidance to the State of California concerning its responsibility under section 303(d) of the Clean Water Act concerning the development of TMDLs for water quality-limited segments listed under section 303(d). It also provides guidance to the public and the regulated community on how EPA intends to exercise its discretion in implementing section 303(d) and its regulations regarding TMDLs. The guidance is designed to implement national regulations and policies on these issues. The document does not, however, substitute for section 303(d) of the Clean Water Act or EPA's regulations; nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, the State of California, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA and State decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate and consistent with the requirements of section 303(d) and EPA's regulations. EPA may change this guidance in the future.

1. What does this guidance address?

Clean Water Act Section 303(d) establishes a water quality assessment and planning process through which states, territories, and authorized tribes are required to identify polluted waterbodies, set priorities for addressing these polluted waters, and write pollutant control plans called Total Maximum Daily Loads (TMDLs) in order to attain state water quality standards, including water quality standards promulgated by EPA for California. This process, known generally as the TMDL process, provides an effective mechanism for determining the causes of waterbody impairment and allocating responsibility among different pollutant discharge sources for reducing pollutant emissions to achieve water quality standards. The TMDL process affords the public the opportunity to participate in decisions about these pollutant control plans. States are generally responsible for developing TMDLs, and EPA reviews and approves TMDLs. If EPA disapproves a TMDL, EPA is responsible for establishing the TMDL for the State. In some cases, EPA may also establish TMDLs when the State has not yet adopted and submitted a required TMDL. TMDLs are implemented through existing regulatory and non-regulatory programs to control pollutant discharges from point sources (e.g. discharges from wastewater treatment plants) and nonpoint sources (e.g. polluted runoff from agricultural lands).

The goal of a Total Maximum Daily Load (TMDL) is to attain state water quality standards including water quality standards promulgated by EPA for California. A TMDL is a written, quantitative assessment of water quality problems and contributing pollutant sources. It identifies one or more numeric targets based on applicable water quality standards, specifies the maximum amount of a pollutant that can be discharged (or the amount of a pollutant that needs to be reduced) to meet water quality standards, allocates pollutant loads among sources in the watershed, and provides a basis for taking actions needed to meet the numeric target(s) and implement water quality standards.

This guidance describes the minimum federal requirements for developing TMDLs as well as additional requirements for establishing TMDLs in California which must be met in order to comply with State legal and administrative procedures.¹ It is important that TMDLs include all the required elements and comply with federal and state procedural requirements in order to ensure that the TMDLs include information needed to implement effective pollutant controls, provide meaningful opportunities for public input, and are legally and technically defensible. More than 500 waterbodies or segments have been identified as needing TMDLs in California, many for multiple pollutants. Therefore, a great deal of work needs to be done by the State, EPA, and interested stakeholders to develop and implement TMDLs. This guidance, which is tailored to California's unique legal and administrative process, should assist in completing this work in a timely manner.

¹ This guidance reports EPA's understanding of requirements which stem from State statutes, regulations, or policies, based on information furnished by the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs). Interested parties should contact the SWRCB or RWQCBs to obtain definitive guidance concerning State-related requirements.

This guidance is based on existing federal and state requirements in effect in January, 2000. The guidance does not address proposed changes in federal TMDL requirements or possible changes in California's TMDL program being considered in the State legislature. The guidance also does not address the process for identifying waterbodies that do not meet Water Quality Standards after application of technology-based and other required controls (the Section 303(d) list). The guidance does not discuss TMDL implementation requirements in detail since TMDL implementation plans are currently governed by regulatory provisions which are separate from TMDL development requirements. Finally, the guidance focuses upon legal and procedural requirements and does not provide technical guidance concerning scientific methodologies for developing TMDLs.

In August 1999, EPA published proposed revisions to the TMDL regulations and national TMDL guidance. This California guidance will remain in effect unless EPA determines that it is superseded by new regulations and/or guidance.

2. Minimum Required Elements of TMDLs

2.1 Federal Requirements

State TMDL SUBMITTAL and TMDLs established by EPA **must** contain the following elements indicated in bold type in order to be approvable under the Clean Water Act (CWA) and associated federal regulations²:

1. Submittal Letter

A letter must be submitted by the State providing notification that the final TMDL(s) for specific water(s)/pollutant(s) were adopted by the State and submitted to EPA for approval under Section 303(d) of the CWA [40 CFR 130.7(d)].

2. Water Quality Standards Attainment

The TMDL and associated waste load and load allocations must be set at levels necessary to result in attainment of all applicable water quality standards, including designated beneficial uses, narrative water quality objectives³, numeric water quality objectives, and State anti-degradation policies [40 CFR 130.7(c)(1)].

3. Numeric Target(s)

The TMDL document describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative objectives, and antidegradation

²In this document, the term "must" is used to describe a federal requirement. The terms "may" or "should" are used to describe recommended program actions or elements.

³ In California, the term "water quality objective" is equivalent to the federal "water quality criteria".

policies. Numeric water quality target(s) for TMDL must be identified, and an adequate basis for target(s) as interpretation of water quality standards must be specifically documented in the submittal. [40 CFR 130.7(c)(1)] TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

These targets identify the specific instream (and potentially hillslope) goals or endpoints for the TMDL which equate to attainment of the water quality standard. In some cases, multiple indicators and associated numeric target values may be needed to interpret an individual water quality standard (e.g. multiple fish habitat indicators to interpret acceptable sediment levels). In addition, some TMDLs may incorporate multiple numeric targets to account for seasonal differences in acceptable pollutant levels in a particular water body.

In many cases where applicable standards are expressed in numeric terms, it is appropriate to set the numeric target equal to the numeric water quality standard. However, it may be desirable to interpret a numeric standard in terms other than the method through which the standard is expressed as long as the target(s) can be shown to relate back to achieving the water quality standard(s). For some pollutants (e.g., bioaccumulative toxins or salts) or receiving water settings (e.g. lakes or poorly mixed waters), it makes more sense from the standpoint of source control and impact assessment to focus the TMDL on reductions of pollutant mass loads than solely on avoidance of exceedences of concentration-based standards.

In situations where applicable water quality standards are expressed in narrative terms or where 303(d) listings were prompted primarily by beneficial use or antidegradation concerns, it is necessary to develop a quantitative interpretation of narrative standards. Since a TMDL is an inherently quantitative analysis, it is necessary to determine appropriate quantitative indicators of the water quality problem of concern in order to calculate a TMDL. It is sometimes possible to supplement instream indicators and targets with hillslope targets-- measures of conditions within the watershed which are directly associated with waterbodies meeting their water quality standards for the pollutant(s) of concern.

The numeric targets section generally includes the following elements:

- ▶ identification of one or more instream indicators (and possibly hillslope indicators) and the basis for using the indicator(s) to interpret or apply applicable water quality standards
- ▶ identification of target levels for each indicator and the technical basis for the targets
- ▶ comparison of historical or existing conditions and target conditions for the indicators selected for the TMDL.

If it is determined that water quality standards are now being met throughout the year taking into account seasonal variations and other critical conditions, and are not expected to be exceeded by the next listing cycle, then the TMDL is not required (although it can be developed to support permit issuance or for informational purposes pursuant to Clean Water Act Section 303(d)(3)). If the State determines a TMDL is not necessary after the TMDL development process has begun, the State would normally stop work on the TMDL and identify the waterbody as a candidate for removal from the 303(d) list at the time of the next listing cycle. EPA

encourages the State to notify interested members of the public of this finding and potentially provide an opportunity for public review of the State's analysis. For TMDLs required under consent decrees, the State should notify EPA immediately of any finding that the TMDL is not necessary in order for EPA to ensure that consent decree requirements are met.

4. Source Analysis

Point, nonpoint, and background sources of pollutants of concern must be described, including the magnitude and location of sources. The TMDL document demonstrates all sources have been considered [40 CFR 130.2(i) and 40 CFR 130.7(c)(1)].

An understanding of pollutant loading sources and the amounts and timing of pollutant discharges is vital to the development of effective TMDLs. The TMDL document must provide estimates of the amounts of pollutants entering the receiving water of concern or, in some cases, the amount of pollutant that is bioavailable based on historic loadings stored in the aquatic environment. These pollutant sources or causes of the problem need to be documented based on studies, literature reviews or other sources of information. Because the source analysis provides the key basis for determining the levels of pollutant reductions needed to meet water quality standards, and the allowable assimilative capacity, TMDL, wasteload allocations, and load allocations, quantified source analyses are required. Sources can be categorized in many ways, including but not limited to discharge source, land use category, ownership, pollutant production process (e.g. sedimentation processes), and/or tributary watershed areas. The source analysis must discuss in detail the data and methods used to estimate source contributions.

5. Link Between Numeric Target(s) and Pollutant(s) of Concern

The TMDL document must describe the relationship between numeric target(s) and identified pollutant sources, and estimate total assimilative capacity (loading capacity) of the waterbody for the pollutant of concern [40 CFR 130.7(d) and 40 CFR 130.2 (i) and (f)].

The loading capacity is the critical quantitative link between the applicable water quality standards (as interpreted through numeric targets) and the TMDL. Thus, a maximum allowable pollutant load must be estimated to address the site-specific nature of the impairment. The loading capacity reflects the maximum amount of a pollutant that may be delivered to the waterbody and still achieve water quality standards. A number of different loading capacity approaches have been approved as part of TMDLs.

The loading capacity section must discuss the methods and data used to estimate loading capacity. A range of methods can be used from predictive water quality models to inferred linkages based on comparison of local reference conditions with existing conditions in the watershed of concern. In some cases, loading capacity may vary within the watershed of concern (e.g., toxics loading capacity may be higher in areas with high water mixing rates than in backwater areas with poor water exchange), and in different time periods (e.g. nutrient loading capacity may be lowest during high temperature summer low flow periods). The basis for spatial and temporal variations in loading capacity estimates should be discussed in detail.

6. TMDLs and Individual Load and Wasteload Allocations

The document must identify the TMDL (total allowed pollutant amount) and its components: appropriate wasteload allocations for point sources and load allocations for nonpoint sources and natural background. If no point sources are present or anticipated, wasteload allocations are zero. If no nonpoint sources are present or anticipated, load allocations are zero. TMDLs and associated wasteload and load allocations must be expressed in quantitative terms [40 CFR 130.2 (e-i) and 40 CFR 130.7(c)].

The method of TMDL calculations must be discussed in detail. In some cases it will be appropriate to reserve (i.e., not allocate) a portion of the allowable loading capacity as part of the TMDL and its associated allocations. Such reserves may address the margin of safety requirement, account for sources which do not receive specific allocations, and/or to provide for future sources (although EPA advises providing for future sources through establishment of load allocations for future loading sources where feasible).

Separate wasteload and load allocations are needed for point and nonpoint sources, respectively. In cases where it is feasible, individual wasteload allocations should be established for each existing or anticipated future point source discharge, including NPDES-permitted stormwater discharges. However, circumstances may arise in which it is appropriate to set wasteload allocations that cover more than one discharge (e.g., discharges covered by a general permit). The State should coordinate with EPA prior to proposing a wasteload allocation which addresses more than one discharge, and clearly explain how the group wasteload allocation would be implemented.

Load allocations for nonpoint sources may be expressed as specific allocations for specific dischargers or as “gross allotments” to nonpoint source discharger categories. Separate nonpoint source allocations should be established for background loadings. Allocations may be based on a variety of technical, economic, and political factors. The methodology used to set allocations should be discussed in detail. It is advisable to include some assessment of the feasibility of the allocations in order to increase the likelihood that the TMDL can actually be attained through implementation actions and, accordingly, is sufficient to be approved by EPA.

TMDLs (and thus, load allocations and wasteload allocations) can be expressed as “*mass per time, toxicity, or other appropriate measure*”, depending on the type of waterbody and the sources that contribute to impairment. When using allocations in some “*other appropriate measure*” a discussion of why the “*other appropriate measure*” was used is necessary. “*Other appropriate measures*” may include an estimate of the percent reduction in discharge of the pollutant of concern which is needed to attain water quality standards. Where the percent reduction approach is used, the specific pollutant loading baseline against which the reductions are to be measured must be specified. For example, if the water quality impairment is due to excessive sedimentation from upland conditions, then the allocations may relate to the decrease in amount of erosion from uplands. If the problem is sedimentation related to channel conditions, then the allocations may relate to the decrease in the amount of bank erosion or the increase in stream stability.

Load allocations can be expressed in many ways. It is important to express load allocations in ways that can be implemented and monitored effectively. Where feasible, load allocations should be expressed in terms of:

- ▶ individual discharge location,
- ▶ individual land ownership, or
- ▶ individual land area subject to management jurisdiction by a single entity.

Where it is infeasible to set load allocations in these terms, load allocations may be expressed in the following ways:

- ▶ by pollutant discharge process (e.g. landslides),
- ▶ by land use type (e.g., rangeland),
- ▶ by land characteristics (e.g., geologic type)
- ▶ by discharger group (e.g. construction sites),
- ▶ by tributary subbasin area,
- ▶ by waterbody segment, or
- ▶ other discreet source description method approved by EPA.

In some TMDLs, it will be appropriate to express load allocations in terms of multiple classifications. Examples may include:

- ▶ lands managed for timber harvest with slopes greater than X% or less than X%,
- ▶ row crop lands located within 1000 feet of perennial streams or outside that zone, or
- ▶ unpaved roads within the A, B, and C subbasins of a larger watershed.

Federal regulations do not establish specific criteria which must be considered in dividing and allocating any available loading capacity between contributing sources. The State may consider a mix of the following allocation criteria (see Technical Support Document for Water Quality Based Permit Decisions (EPA, 1991) for more information):

- ▶ technical and engineering feasibility,
- ▶ cost or relative cost,
- ▶ economic impacts/benefits,
- ▶ cost effectiveness,
- ▶ fairness/equity,
- ▶ ability to monitor implementation and effectiveness,
- ▶ assurance and timeliness of attainment of the TMDL and water quality standards,
- ▶ relative source contributions, and/or
- ▶ other appropriate criteria.

7. Margin of Safety

The TMDL document must describe an explicit and/or implicit margin of safety for each pollutant [40 CFR 130.7(c)].

An explicit margin of safety can be provided by reserving (not allocating) a portion of the loading capacity identified for the waterbody for the pollutant of concern. An implicit margin of safety can be provided by making and documenting conservative assumptions used in the TMDL analysis. The TMDL submittal must provide a detailed explanation of the basis for margin of safety which shows why it is adequate to account for uncertainty in the TMDL. Where an implicit margin of safety is provided, the submittal should include a specific discussion of sources of uncertainty in the analysis and how individual analytical assumptions or other provisions adequately account for these specific sources of uncertainty.

Different analysis steps in TMDL development will involve different levels of uncertainty in the accuracy of results. TMDL developers should consider and document the types of uncertainty involved in each step of the analysis. Because TMDLs must account for uncertainties in the analysis, the different sources of uncertainty should be summarized. A margin of safety is required in the TMDL to account for uncertainty in the understanding of the relationship between pollutant discharges and water quality impacts. In any case, assumptions must be stated and the basis behind the margin of safety must be documented. The margin of safety is not meant to compensate for a failure to consider known sources.

8. Seasonal Variations and Critical Conditions

The TMDL document must describe the method used to account for seasonal variations and critical conditions (e.g., stream flows, pollutant loadings, and other water quality parameters) in the TMDL(s) [40 CFR 130.7(c)].

Pollutant discharges and associated effects on beneficial uses may vary in different years and at different times of the year. The TMDL developer should evaluate how seasonal or interannual variations in loadings, flows, pollutant fate and transport, pollutant effects, ecological conditions or other factors affect the waterbody of concern in TMDL. TMDLs are required to demonstrate how seasonal variations and critical conditions were accounted for in the TMDL analysis in order to ensure that the TMDL results in attainment of water quality standards throughout the year. The TMDL document must show how the TMDL accounts for seasonal variations and critical conditions concerning receiving water flow (e.g. low flow during drought periods), receiving water conditions (e.g. temperature), beneficial use impacts (e.g., key aquatic life stages), pollutant loadings (e.g., high flow nonpoint source runoff), and other environmental factors which affect the relationship between pollutant loading and water quality impacts. This element is required in order to ensure that the TMDL will protect the receiving water during the periods in which it is most sensitive to the impacts associated with the pollutant(s) of concern.

9. Public Participation

The TMDL package must document the provision of public notice and public comment opportunity concerning TMDL calculations; and explains how public comments were considered in the final TMDL(s) [40 CFR 130.7(c)(1)].

Minimum requirements for public participation for state adopted and EPA established TMDLs are discussed in the following section. However, there are additional ways of providing for public participation in TMDL development beyond the minimum. Table 1 on the following page summarizes three models of stakeholder participation and discusses some advantages and disadvantages of each model. These examples do not cover all approaches to providing for public participation but are intended to illustrate a range of viable public participation models. Although the State can address minimum federal requirements concerning public participation by providing a 30 day notice and comment period and preparing a comment responsiveness summary, EPA encourages that, where feasible, the State communicate with the public earlier in the process of developing a particular TMDL to discuss the TMDL approach and stakeholder involvement opportunities.

10. Technical Analysis

The TMDL document must provide an appropriate level of technical analysis supporting all TMDL elements [40 CFR 130.2(i) and 40 CFR 130.7(c)].

The State may include needed technical analysis in the TMDL document, submit copies of supporting documentation providing technical analysis supporting the TMDL, or cite documents in the State's administrative record which discuss the supporting technical analysis in detail. If the State cites documents as the basis for technical findings in the TMDL which are not submitted with the TMDL package, the TMDL document must clearly summarize the technical analysis supporting the findings concerning individual TMDL elements. In addition, the State should maintain these documents in its administrative record for review by EPA on request.

Table 1: Public Participation Models

Model	Characteristics	Advantages	Disadvantages
Public Notice and Comment	<ul style="list-style-type: none"> - provides formal opportunity to review proposed TMDL, may include public hearings - responses are provided to public comments in final TMDL or in a responsiveness summary - State or EPA explain how comments were considered in the final decision 	<ul style="list-style-type: none"> - less time and resource intensive - satisfies minimum public participation requirements - avoids repetition of effort where TMDL based on previous, uncontroversial decisions 	<ul style="list-style-type: none"> - interested parties will not hear about TMDL - reduces chance of local support and buy-in - developing comment responses can be time consuming and difficult - may be dissatisfying to stakeholders who want more involvement
Stakeholder Consultation Plus Public Comment Period	<ul style="list-style-type: none"> - developer meets several times with stakeholders during TMDL development - developer informs group of progress and draft analysis, seeks input 	<ul style="list-style-type: none"> - involved stakeholders not taken by surprise - increases chances for local support/buy in - earlier identification of tough or contentious issues 	<ul style="list-style-type: none"> - moderately time/resource intensive - may be dissatisfying to stakeholders who want more involvement - difficult to manage expectations
Extensive Stakeholder Collaboration Plus Public Comment Period	<ul style="list-style-type: none"> - stakeholders involved from outset in different TMDL elements - stakeholders may do substantial analysis, not just review state work - stakeholders may attempt to seek agreement on TMDL content 	<ul style="list-style-type: none"> - best chances for local support/buy in - improves ability to identify and evaluate implementation measures - may reduce resources needed for analysis since other parties do some analysis 	<ul style="list-style-type: none"> - very time/resource intensive - may be unrealistic to get consensus or agreement on TMDL content - problematic for TMDLs with tight, inflexible deadlines - may be unsatisfying to interested stakeholders--extensive time commitments required may be infeasible for many interested groups

Requirements For The Phased Approach To TMDLs

EPA has described an approach to TMDL development in situations where data and information needed to determine the TMDL and associated allocations are limited. This “phased approach” to TMDLs enables States to adopt TMDLs and begin implementation while collecting additional information needed to review and, if necessary, revise TMDL elements based on new information (see Guidance for Water Quality Based Decisions-- The TMDL Process (EPA, 1991) for more information). For TMDLs developed under the “phased approach”, the following additional element must be included in the TMDL submittal:

11. Monitoring and Review Plan

TMDLs developed under phased approach must identify specific implementation actions, monitoring plans and a schedule for considering revisions to the TMDLs.

EPA also recommends that any TMDL include a monitoring and review process whether it is developed pursuant to the phased approach or not.

Requirement Concerning Point/Nonpoint Source Allocation Practicability

For waters affected by both point source and nonpoint source discharges, TMDL documents must address the following additional requirement. Note that EPA has also established national policies concerning reasonable assurances as part of TMDL implementation plans, which are discussed in the implementation section of this guidance.

12. Showing of Practicability of Nonpoint Source Load Allocations

Where point source(s) receive less stringent wasteload allocations because nonpoint source reductions are expected and reflected in load allocations, the TMDL must include a demonstration that nonpoint source loading reductions needed to implement load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

This means that the load allocations are technically feasible and reasonably assured of being implemented in a reasonable period of time. Reasonable assurances may be provided through use of regulatory, non-regulatory, or incentive based implementation mechanisms as appropriate but must include an actual demonstration that the measures identified will actually obtain the predicted reductions and that the State is able to assure this result.

2.2 Other EPA Guidance Concerning TMDL Content

In addition to these minimum required elements, EPA recommends that all TMDLs should contain the following elements in order to facilitate public and EPA review of the TMDL:

Problem Statement

The process of problem definition identifies the context for TMDL development and describes the water quality standards issue(s) which prompted development of the TMDL. The problem statement should identify:

- ▶ name(s) and location(s) of waterbody segments for which the TMDL is being developed,
- ▶ the pollutant(s) for which the TMDL is being developed and information about why the pollutant(s) are being addressed,
- ▶ the specific applicable water quality standard(s) for those pollutants,
- ▶ a description of the water quality impairment or threat which necessitated TMDL development, and
- ▶ adequate background information about the watershed setting for the TMDL to help the reader understand the key water quality, pollutant discharge, land use, and resource protection issues in the watershed.

Administrative Record Keeping

An administrative record that supports development and approval of the TMDL should also be prepared. Components of the administrative record should include all materials used to develop the TMDL and make decisions, including any data or references that were used, records of any correspondence, and other background materials. Such a record is needed in order to ensure that the public has the opportunity to review documents which formed the basis for the TMDL. In addition, EPA may request access to documents upon which the State relied in developing a TMDL if necessary to determine whether a TMDL submittal complies with federal requirements. As discussed above under Technical Analysis, the State should maintain in its administrative record copies of technical documents which serve as the basis for one or more findings contained in the TMDL submittal to EPA.

2.3 Federal Requirements and Guidance Concerning TMDL Implementation

States are not currently required to include implementation plans as part of the TMDL submittal. However, federal regulations require States to incorporate TMDLs in the State Water Quality Management Plan along with adequate implementation measures to implement all aspects of the plan (including the TMDLs) [40 CFR 130.6]. Therefore, TMDL implementation measures must be identified by the State and submitted for EPA's review, either concurrent with the TMDL or afterward. EPA suggests that the implementation plan should be prepared and submitted concurrent with the TMDL. If the State plans to prepare the implementation plan after the TMDL, the State's TMDL submittal should provide a schedule for developing the implementation plan.⁴ Federal regulations do not currently provide that EPA will establish an implementation plan for TMDLs established by EPA. However, EPA may make implementation recommendations as part of TMDLs it establishes. States should consider EPA's implementation recommendations at the time the State develops its implementation measures for the TMDL and should adopt these measures into the Basin Plan unless the State identifies alternative measures which are sufficient to implement the TMDL.

The State's TMDL implementation plan submittal should describe planned implementation actions or, where appropriate, specific process(es) and schedule(s) for determining future implementation actions. The implementation plan needs to be sufficient to implement all wasteload and load allocations in a reasonable period of time. TMDL(s) and implementation measures are formally incorporated into the water quality management plan through the state's established process for amending that plan. Water quality management plan revisions must be consistent with other existing provisions of the water quality management plan [40 CFR 130.6].

⁴ As discussed in Section 2.4 below, the State of California's position is that State law usually requires the Regional Boards to adopt implementation provisions concurrent with TMDLs in order to meet State Basin Planning requirements for TMDL adoption.

Reasonable Assurances Concerning Implementation

EPA's national policy is that all TMDLs are expected to provide reasonable assurances that they can and will be implemented in a manner that results in attainment of water quality standards (EPA, 1997). This means that the wasteload and load allocations are technically feasible and reasonably assured of being implemented in a reasonable period of time. Reasonable assurances may be provided through use of regulatory, non-regulatory, or incentive based implementation mechanisms as appropriate.

TMDLs and NPDES Permits

Discharge permits issued under Clean Water Act Section 402 (the NPDES program) contain effluent limitations for individual pollutants. These effluent limitations must be consistent with any wasteload allocations developed as part of TMDLs approved or established by EPA. This provision applies to all types of NPDES permits (including stormwater and general permits). If these procedures are not addressed in the TMDL, the NPDES permit writer determines the specific method of assuring that a new or revised permit is consistent with its wasteload allocation at the time the permit is scheduled for issuance.

To avoid permitting problems, EPA recommends that the State evaluate how waste load allocations will be translated into NPDES permit limits as part of developing the TMDL implementation plan. EPA believes it is useful to do this concurrent with TMDL development. Consideration of permitting issues will also assist in evaluating the practicability of WLAs during the allocation step of TMDL development. Permitting issues which the State should consider in establishing WLAs include:

- ▶ whether WLAs and effluent limits will be expressed on a concentration and/or mass basis,
- ▶ whether pollutant trading is contemplated as part of the TMDL and WLAs,
- ▶ appropriate permit averaging periods,
- ▶ whether mixing zones are appropriate, and, if so, how they would be delineated, and
- ▶ ambient monitoring provisions.

TMDLs and Nonpoint Sources

There are few specific federal requirements concerning implementation of nonpoint source controls pursuant to load allocations. As discussed above, the State must demonstrate reasonable assurances that the load allocations will be (1) set at sufficient levels to attain Water Quality Standards and (2) implemented, if wasteload allocations were relaxed based on the expectation of nonpoint source reductions. EPA's national policy is that all implementation plans for all TMDLs will provide reasonable assurances that all wasteload and load allocations will be implemented in a timely manner. EPA recommends evaluating at a specific level how load allocations will be implemented as part of the TMDL implementation plan, and believes it is useful to do this concurrent with TMDL development. Consideration of potential nonpoint source management approaches and the effectiveness of available management practices will

assist in evaluating the practicability of load allocations and assessing whether there is reasonable assurance that the TMDL will be implemented and result in attainment of water quality standards.

2.4 State of California-Related Requirements

In addition to federal requirements, the Regional Water Quality Control Boards and State Water Resources Control Board are required to comply with various additional requirements under State law in order to develop, adopt, and submit a TMDL and associated implementation measures to EPA. These State-related requirements are summarized below in table 2, based on material provided to EPA by the State. The process through which the State develops these required materials is discussed in the following section. In addition, Appendix A to this guidance provides a legal opinion from the Office of Chief Counsel, State Water Resources Control Board, which describes economic considerations in TMDL development and basin planning which stem from State law.

EPA does not review TMDL submittals for compliance with State-related requirements, and they are listed here for information purposes only. Interested parties should contact the State or Regional Board TMDL contacts for more definitive guidance concerning State-related requirements.

Table 2: State Basin Planning Required Elements

Requirements For Basin Plan Amendment	Summary
Administrative Record	Record of information used to make the staff decision and only admissible evidence during legal challenge
Notification	Provide State Board staff of draft amendment for review of state board and Office of Administrative Law (OAL) requirements, State Board and EPA review of TMDL staff report draft
Index	List of contents, and number pages
Public Process	Evidence of meetings, sign in sheets, mailing lists
Public Comment	Comment letters from 45 days between Public draft presentation and Board presentation
Records cited	List of records on which amendment is based
Peer Review and report	Route through Division of Water Quality (DWQ) coordinator, allow time for technical peer review
TMDL introduction	Confirm that supporting material in chapter introduction is sufficient and diagrams and basin plan material are updated
CEQA check list	Documents no environmental impact assumption
Amendment	Copy as presented for Regional Board consideration (may be the same as required for printing and distribution below)
Transcript	Of regional board meeting where amendment was approved

Requirements For Basin Plan Amendment	Summary
Exhibit	Copies of those exhibits presented at hearing by staff and public
Late Public Comments	Summary of verbal responses to comments made at hearing and to those received after formal comment period
Economic Cost Analysis	Analysis of costs of agricultural controls, performance standards, and/or treatment requirements mandated by amendment (see Appendix A for details.)
Staff Report/TMDL	Rationale for amendment
Adopted Amendment	Adopted amendment and signed resolution
Printing and Distribution	Basin Plan update inserts mailed to current holders and updated 'record of amendments' page for insertion
Required Approvals and Concurrences	
Regional Water Board	approves TMDL and basin plan amendment
State Water Board	approves TMDL and basin plan amendment following Regional Board action
Office of Administrative Law	concurs that basin plan amendment meets State Administrative Procedures Act requirements
U.S. EPA	approves state submitted TMDL and basin plan amendment

3. Steps in TMDL Development and Approval

There are likely to be three approaches through which TMDLs are completed in California– (1) State adoption, (2) EPA establishment, and (3) State adoption following extensive 3rd party assistance in developing TMDL component parts. This section describes the procedural steps in completing TMDLs through these 3 approaches.

3.1 State-Adopted TMDLs

This approach entails preparation of a TMDL by Regional Board staff, approval by the Regional Board, approval by State Board, approval by Office of Administrative Law, and approval by U.S. EPA. The steps in this process are summarized in table 3 below.

Table 3: Steps in Developing and Adopting State-Adopted TMDLs

Step	Timing	Responsible Party
Develop draft TMDL/ Basin Plan Amendment(BPA) - usually involves detailed workplan and may involve significant stakeholder involvement	varies	Regional Board staff (often with substantial assistance from other parties)
Provide TMDL/BPA and record for peer review	varies	Regional Board staff
Peer review completed	within 60 days	Peer reviewer(s)
Respond to peer review	varies	Regional Board staff
Provide draft TMDL/BPA to EPA for review	varies	Regional Board and EPA staff
Open public comment period	45 days	Regional Board staff
Hold public hearing	varies	Regional Board
Adopt TMDL, considering public comments	varies	Regional Board
Transmit BPA/TMDL and record to State Board	varies	Regional Board staff
Prepare approval package for State Board	varies	State Board staff
Open comment period	30 days	State Board staff
Hold meeting to hear public comments	varies	State Board
Approve TMDL considering public comments	varies	State Board
Transmit BPA/TMDL and supporting record to Office of Administrative Law	varies	State Board Staff
Review BPA/TMDL for consistency with State Administrative Procedures Act	within 60 days	OAL staff
Transmit concurrence/comments to State Board	within 60 days	OAL staff
(If needed) Resolve OAL comments	varies	State and Regional Board staff
(If needed) obtain OAL concurrence	varies	State Board staff, OAL staff
Transmit final TMDL/BPA and record to EPA	varies	State Board staff
Approve or disapprove TMDL	30 days	EPA
If disapprove, establish TMDL	within 30 days after disapproval	EPA
Open comment period	30 days min.	EPA
Transmit final TMDL to State for inclusion in Basin Plan after considering public comments and making changes if needed	within 30 days after comment period	EPA

3.2 EPA-Established TMDLs

EPA's process for establishing a TMDL is more straightforward than the State's process and is summarized in table 4.

Table 4: EPA's Process for Establishing TMDLs

Step	Timeline	Responsible Party
Develop draft TMDL	varies	EPA staff, often with help from State or other parties
Public notice draft TMDL	30 day minimum	EPA staff
Hold public hearing if warranted	varies	EPA staff
Develop final TMDL, considering public comment	varies	EPA staff
Establish and transmit final TMDL to State for inclusion in Basin Plan with implementation measures	immediately upon establishment	EPA Division Director

3.3 Process Steps for Third Party Involvement in TMDL Development

Several TMDLs have been developed in California for which third parties (e.g., dischargers, land managers, or citizen groups) have prepared significant portions of the TMDL analysis or provided support for TMDL development. Third parties can assist in TMDL development in several capacities. They may include:

- ▶ developing significant work products with State and/or EPA oversight,
- ▶ administering stakeholder meetings and organizations,
- ▶ providing technical support for individual components of the TMDL,
- ▶ providing specific funding assistance for individual TMDL analysis elements, and
- ▶ providing expert review of specified components of TMDLs.

Table 5 suggests steps for more intensive involvement of third parties in TMDL development. EPA strongly recommends that these steps be followed in order to ensure that intensive third party involvement in TMDL development is productive. Only the State water quality agency or EPA are authorized to actually adopt or establish TMDLs, but third parties can assist a great deal in TMDL work in a well-managed process. Where a particular stakeholder group or discharger plays an enhanced role in TMDL development, the TMDL development process should provide specific opportunities for the Regional Board and other interested stakeholders to participate in the selection and application of the methods used to develop TMDL components. These extra opportunities for involvement in review of 3rd party efforts are needed to ensure that the selected approaches are valid and balanced.

Table 5: Steps for Involving Third Parties in TMDL Analysis

Step	Timeframe	Responsible Party
Contact Regional Board to discuss potential TMDL-related work (also contact EPA if consent decree TMDL involved)	as soon as possible	Third party organization with work conducted as part of a public process
Regional Board and Third Party establish written agreement specifying resource commitments, work to be done by third party, technical workplan,	as soon as possible	Regional Board and Third Party (and EPA if consent decree TMDLs involved)

Step	Timeframe	Responsible Party
milestones, interim deliverables, schedules, public involvement provisions, and project dependencies.		
Designate State staff contact who will work with Third Party throughout project to ensure work products are consistent with all TMDL requirements	as soon as possible	Regional Board staff
Neutral peer reviewers review technical approach	as soon as possible (can be done earlier)	peer reviewers identified and overseen by Regional Board, (also EPA if consent decree involved), third party funds
Adjust approach as needed to address peer review comments	varies	Third Party, with Regional Board oversight
Perform activities/analysis per workplan	per schedule	Third party with Regional Board staff oversight
Deliver interim/final products to Regional Board (and EPA if consent decree TMDLs involved)	per schedule	Third party with Regional Board oversight
Public review/adoption process as described above.	see above	see above

3.4 How Does EPA Review and Establish TMDLs?

EPA Region 9 staff usually review draft TMDLs and provide comments to the State before the State adopts the TMDLs, in order to help ensure that the TMDLs include all federally-required elements.

The Clean Water Act and EPA regulations require EPA to review State-adopted TMDLs and either approve or disapprove the TMDLs within 30 days of final submission. EPA reviews TMDL submissions to ensure that:

- ▶ all TMDL elements required by the Clean Water Act and EPA regulations are present,
- ▶ adequate explanations and documentation are provided for each element, and
- ▶ the TMDL will result in attainment of applicable State water quality standards.

EPA Region 9 generally uses a checklist prepared by Region 9 to document its review of the TMDL submission (see Appendix B). The checklist identifies each TMDL element required by the Clean Water Act or EPA's regulations, briefly describes the element, and provides a brief explanation of EPA's analysis indicating that the element is or is not consistent with federal requirements. The checklist also addresses TMDL implementation elements in order to assist in review of State TMDL submissions which include implementation measures.

If EPA finds that all required elements are present and are adequately documented, and that the TMDL is therefore expected to result in attainment of water quality standards, EPA approves the TMDL. If any required element is missing or insufficiently documented, EPA attempts to clarify the submission during the 30 day review period. If the State does not provide

the missing TMDL element(s) or does not clarify or document the basis for its findings, EPA disapproves the TMDL.⁵ If EPA disapproves the TMDL, it has 30 days to establish a TMDL which meets federal requirements.

EPA is not required to provide for public review and comment on its decision to approve or disapprove a State-established TMDL because the State provides the public with the opportunity to review and comment on the TMDL prior to State adoption of the TMDL. If EPA establishes a TMDL, EPA provides the public with an opportunity to review and comment on the TMDL, considers public comments concerning the EPA-established TMDL, and makes changes to the TMDL if warranted based on comments received from the public.

After EPA completes its review of the final TMDL submittal, staff complete a staff report, checklist, and decision letter. The Water Division Director is the official who actually makes the final decisions concerning TMDL submissions. The decision letter signed by the Water Division Director is transmitted along with the staff report and checklist to the Executive Director of the State Water Resources Control Board with a copy to the Executive Officer of the appropriate Regional Water Quality Control Board.

EPA sometimes establishes TMDLs without having disapproved a State TMDL submission (e.g., to meet court-ordered schedules or at the request of the State). EPA-established TMDLs must contain the minimum federally required elements mandated by the Clean Water Act and EPA regulations, and result in attainment of water quality standards. When EPA establishes a TMDL, it provides an opportunity for public review and comment on the TMDL, prepares a public comment responsiveness summary, and makes changes in the TMDL if needed based on comments received. The TMDL is established through the action of the Water Division Director. The final TMDL is transmitted to the Executive Director of the State Water Resources Control Board with a copy to the Executive Officer of the appropriate Regional Water Quality Control Board for inclusion in the Basin Plan by the State.

4. Additional Guidance for TMDL Development

4.1 Water Quality Standards and TMDLs

Under the Clean Water Act and EPA's regulations, the TMDL process is designed to implement existing water quality standards in waters where water quality is not good enough to meet those standards. In most situations, existing water quality standards will need to be applied in developing TMDLs. For many TMDLs, the State will need to interpret narrative objectives,

⁵ If the State provides insufficient opportunities for public participation or does not describe how public comments were considered in the final TMDL, EPA may open a comment period and make its final decision following the close of the comment period, after considering comments received from the public.

use nonattainment, or (possibly) antidegradation policies quantitatively to develop TMDL numeric targets if no numeric standards are in effect or numeric standards are not designed to address the impairment of concern. Federal regulations do not require the state to adopt TMDL numeric targets as state water quality standards. To assist in interpreting narrative objectives, beneficial use designations, and/or antidegradation policies, TMDL writers should consult applicable California implementation procedures for water quality standards.

In some cases, it may be appropriate to reevaluate the appropriateness of water quality standards for the targeted waters. Separate federal regulations provide for modifying water quality standards for individual water bodies when specified showings can be made. Additional guidance documents concerning modification of water quality standards are listed in the references. As early in the process as possible, parties who are interested in seeking revisions of water quality standards on a site-specific basis should consult with Water Quality Standards program staff at EPA Region 9, the State Water Resources Control Board, and the appropriate Regional Water Quality Control Board to discuss the suitability of standards modifications in particular situations.

4.2 TMDL Planning and Project Management

Each TMDL project is different. Planning and managing a complex TMDL project can be difficult. The following checklist summarizes factors TMDL analysts should consider in initiating a TMDL project:

- ▶ How long do you have to complete the TMDL?
- ▶ Do you face resource constraints? What staff, contractor, or stakeholder resources are available? Are resources assured for future years?
- ▶ Can other agencies, stakeholders, or programs help you do the TMDL?
- ▶ How complex are the watershed setting and pollutant issues of concern?
- ▶ What information, data, and prior efforts are available regarding the watershed setting and pollutant of concern?
- ▶ What is the scope of the TMDL? What area and what pollutants are to be addressed?

EPA strongly encourages the State to develop detailed workplans to guide the technical analysis and stakeholder participation aspects of the TMDL before starting the TMDL. The State should distribute workplans to stakeholders for input if time and resources allow. The workplans should include specific information on technical methods, interim milestones in TMDL development, responsible parties, schedules, interim deliverables, and project dependencies. It is often useful to plan a TMDL timeline by working backwards from an existing decision deadline to determine how much time is actually available to develop the TMDL. In addition, the workplans should:

- ▶ include estimated resources/costs of the project and the specific method of funding to be used, including provisions for contract assistance where needed,
- ▶ factor in time for review of the draft TMDL by EPA and interested stakeholders,

- ▶ provide some flexibility to account for unforeseen events, and
- ▶ provide for each step prescribed in the State and federal administrative processes.

TMDL planners should assess whether it is feasible to coordinate with related program decisions/activities to reduce the amount of work done solely to support the TMDL decision. Examples of coordination opportunities include:

- ▶ standards revisions already planned or underway,
- ▶ discharge permitting decisions,
- ▶ rotating basin management approaches or other watershed management planning (if any),
- ▶ development of environmental impact statements or reports for planned projects, and
- ▶ other activity in watershed (e.g., hydropower licenses issued by Federal Energy Regulatory Commission, habitat conservation plans developed pursuant to Federal Endangered Species Act, Section 319 nonpoint source management projects).

In many locations in California, there is considerable interest in developing TMDLs through a “watershed approach”. The State should consider the following factors which, in EPA’s experience, are key to effectively melding TMDL development and locally focused watershed management planning:

- ▶ Regional Boards should clarify that TMDL (and perhaps other regulatory) decisions that will need to be made and establish timeframes (if any) for making these decisions.
- ▶ These efforts should start several years before a TMDL is scheduled for adoption because this approach generally takes substantial time to complete.
- ▶ The State should obtain agreement to ground rules by all participants, including ground rules with respect to regulatory deadlines.
- ▶ The State should secure firm commitments from stakeholders concerning participation, funding support, etc.
- ▶ The State should use existing stakeholder groups where feasible, if those groups are interested in working on TMDL issues.
- ▶ The group should develop a detailed schedule which contemplates key decisions and dependencies related to the minimum TMDL requirements and how they are completed.
- ▶ State water quality staff should participate fully as stakeholders and have the time and resources available which are necessary to do so.

5. Sources of Additional Information and Guidance

Further information concerning TMDL development can be obtained from EPA Region 9 by visiting the Region 9 web site at www.epa.gov/region09/water/tmdl or by calling the Region 9 Water Division office at (415) 744-2012. In addition, information concerning the national TMDL program and national reference documents can be obtained by visiting the EPA Headquarters web site at www.epa.gov/OWOW/tmdl. Several cited references which provide useful guidance concerning TMDLs and related programs are listed below, and can be obtained or will soon be available through the EPA Headquarters web site.

EPA, 1990. *Technical Support Document for Water Quality-Based Toxics Control*. EPA 505-2-90-001.

EPA, 1991. *Guidance for Water Quality-Based Decisions: The TMDL Process*. EPA 440/4-91-001.

EPA, 1996. *Catalog of Publications: Office of Science and Technology*. EPA-820-R-96-001. (Wasteload Allocation Guidance Series).

EPA, 1997. *New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)*. Memorandum from Robert Perciasepe to Regional Administrators, August 8, 1997.

EPA, 1999. *Protocol for Developing Sediment TMDLs*. EPA 841-B-99-004, October, 1999.

EPA, 1999. *Protocol for Developing Nutrient TMDLs*. EPA 841-B-99-007, November, 1999.

Documents which should assist in considering modifications of water quality standards on a site specific basis include:

EPA 1983-84. *Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses* Vol. 1, EPA 440/4-86-037, 1983; Vol. 2 Estuarine Systems, EPA 440/4-86-038, 1984; Vol. 3: Lake Systems, EPA 440/4-86-039, 1984.

EPA Region 9, 1992. *Guidance for Modifying Water Quality Standards and Protecting Effluent-Dependent Ecosystems*. Interim Final, June 1992.

EPA, 1993. *Water Quality Standards Handbook*. 2nd Edition. EPA 823-B-93-002, September 1993.

EPA, 1994. *Interim Guidance on Determination and Use of Water Effect Ratios for Metals*. EPA 823-B-94-001, February 1994.

EPA, 1995. *Interim Economic Guidance for Water Quality Standards: Workbook*. EPA 823/B-95-002.

Appendix A: “Economic Considerations in TMDL Development and Basin Planning”-- An Opinion From Office of the Chief Counsel, California State Water Resources Control Board

TMDL analysts with the State and Regional Water Boards and other interested stakeholders have requested clarification concerning economic analysis considerations in the TMDL process. Neither the federal Clean Water Act nor EPA regulations require that any particular form of economic analysis must be conducted to meet federal requirements for TMDL adoption. The Office of Chief Counsel, State Water Resources Control Board, issued the following memorandum addressing economic analysis requirements under State law. The Office of Chief Counsel is solely responsible for the content of the memorandum. EPA had no role in its preparation, and we are including it with the guidance solely to convey the State’s legal analysis of State requirements.



Winston H. Hickox
*Secretary for
Environmental
Protection*

State Water Resources Control Board

Office of Chief Counsel

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Gray Davis
Governor

TO: Stefan Lorenzato
TMDL Coordinator
Division of Water Quality

FROM: Sheila K. Vassey
Senior Staff Counsel
OFFICE OF CHIEF COUNSEL

DATE:

SUBJECT: ECONOMIC CONSIDERATIONS IN TMDL DEVELOPMENT AND
BASIN PLANNING

ISSUE

When are the Regional Water Quality Control Boards (Regional Water Boards or Boards) legally required to consider economics in Total Maximum Daily Load (TMDL)¹ development and water quality control planning (basin planning)?²

CONCLUSION

The Regional Water Boards, in general, adopt TMDLs as basin plan amendments. Under state law, there are three triggers for Regional Water Board consideration of economics or costs in basin planning. These are:

- The Regional Water Boards must estimate costs and identify potential financing sources in the basin plan before implementing any agricultural water quality control program.
- The Boards must consider economics in establishing water quality objectives that ensure the reasonable protection of beneficial uses.

¹ See 33 U.S.C. § 1313(d); 40 C.F.R. § 130.7.

² See Wat. Code §§ 13240-13247.

- The Boards must comply with the California Environmental Quality Control Act (CEQA)³ when they amend their basin plans. CEQA requires that the Boards analyze the reasonably foreseeable methods of compliance with proposed performance standards and treatment requirements. This analysis must include economic factors.

Economic factors come into play under federal law when the Regional Water Boards designate uses. Specifically, the Boards can decide not to designate, dedesignate, or establish a subcategory of, a potential use where achieving the use would cause substantial and widespread economic and social impact.

DISCUSSION

I. STATE LAW

Under federal and state law, the Regional Water Boards are required to include TMDLs in their basin plans.⁴ There are three statutory triggers for an economic or cost analysis in basin planning. These triggers are:

- adoption of an agricultural water quality control program;
- adoption of water quality objectives; and
- adoption of a treatment requirement or performance standard (CEQA).

Each category is briefly discussed below.

A. Agricultural Water Quality Control Program

Agricultural activities are significant sources of nonpoint source pollution. Many waterbodies in the state are impaired due to one or more agricultural operations. As a result, the Regional Water Boards will be faced with developing programs to control agricultural activities, as part of TMDL development.

Under the Porter-Cologne Water Quality Control Act (Porter-Cologne),⁵ before a Regional Water Board implements an agricultural water quality control program, the Board must identify

³ Pub. Resources Code § 21000 et seq.

⁴ See 33 U.S.C. § 1313(d); 40 C.F.R. § 130.7(d)(2) (TMDLs must be incorporated into the state's water quality management plan. In California the basin plans are part of the state's water quality management plan.); Wat. Code §§ 13050(j), 13242.

⁵ Wat. Code § 13000 et seq.

the total cost of the program and potential sources of financing.⁶ This information must be included in the basin plan.

The statute does not define “agricultural” programs. The Legislature has, however, defined agricultural activities elsewhere to mean activities that generate “horticultural, viticultural, forestry, dairy, livestock, poultry, bee, or farm product[s].”⁷ Because “agricultural” programs under Porter-Cologne are not restricted to particular activities, presumably, the Legislature intended that the term be interpreted broadly. Thus, the Regional Water Boards should identify costs and financing sources for agricultural water quality control programs” covering not only typical farming activities but also silviculture, horticulture, dairy, and the other listed activities.

The statute focuses only on costs and financing sources. The statute does not require the Regional Water Boards to do, for example, a cost-benefit analysis or an economic analysis.

B. Water Quality Objectives

Porter-Cologne requires that the Regional Water Boards take “economic considerations”, among other factors, into account when they establish water quality objectives.⁸ The objectives must ensure the reasonable protection of beneficial uses and the prevention of nuisance.⁹

Attached to this memorandum is a 1994 memorandum containing guidance on the consideration of economics in the adoption of water quality objectives.¹⁰ The key points of this guidance are:

- The Boards have an affirmative duty to consider economics when adopting water quality objectives.
- At a minimum, the Boards must analyze: (1) whether a proposed objective is currently being attained; (2) if not, what methods are available to achieve compliance with the objective; and (3) the costs of those methods.

⁶ *Id.* § 13141.

⁷ Food & Agr. Code §§ 564(a), 54004.

⁸ Wat. Code § 13241. The other factors include the past, present, and probable future beneficial uses of water; environmental characteristics of the hydrographic unit under consideration; water quality conditions that could reasonably be achieved through the coordinated control of all factors affecting water quality in the area, the need for developing housing, and the need to develop and use recycled water.

⁹ *Ibid.*

¹⁰ Memorandum, dated January 4, 1994, from William R. Attwater, Chief Counsel, to Regional Water Board Executive Officers and Attorneys, entitled “Guidance on Consideration of Economics in the Adoption of Water Quality Objectives”.

- If the economic consequences of adoption of a proposed objective are potentially significant, the Boards must state on the record why adoption of the objective is necessary to ensure the reasonable protection of beneficial uses or the prevention of nuisance.
- The Regional Water Boards can adopt objectives despite significant economic consequences.
- The Boards are not required to do a formal cost-benefit analysis.

C. CEQA

The Regional Water Boards must comply with CEQA when they amend their basin plans.¹¹ The State Resources Agency has certified the basin-planning program as exempt from the requirement to prepare environmental documents under CEQA.¹² In lieu of preparing an environmental impact report or negative declaration, the Boards must comply with the State Water Resources Control Board's regulations on exempt regulatory programs when they amend their basin plans.¹³ These regulations require the Boards to prepare a written report that analyzes the environmental impacts of proposed basin plan amendments.¹⁴ In general, CEQA requires the Regional Water Boards to consider economic factors only in relation to physical changes in the environment.¹⁵

CEQA also has specific provisions governing the Regional Water Boards' adoption of regulations, such as the regulatory provisions of basin plans that establish performance standards or treatment requirements. The Boards must do an environmental analysis of the reasonably foreseeable methods of compliance with those standards or requirements.¹⁶ They must consider economic factors in this analysis.

CEQA does not define "performance standard"; however, the term is defined in the rulemaking provisions of the Administrative Procedure Act.¹⁷ A "performance standard" is a regulation that describes an objective with the criteria stated for achieving the objective.¹⁸

¹¹ See Pub. Resources Code § 21080.

¹² See Cal. Code Regs., tit. 14, § 15251(g).

¹³ See Cal. Code Regs., tit. 23, §§ 3775-3782.

¹⁴ *Id.* § 3777.

¹⁵ See Cal. Code Regs., tit. 14, § 15064(e).

¹⁶ Pub. Resources Code § 21159.

¹⁷ Gov. Code §§ 11340-11359.

¹⁸ *Id.* § 11342(d).

TMDLs will typically include performance standards. TMDLs normally contain a quantifiable target that interprets the applicable water quality standard. They also include wasteload¹⁹ allocations for point sources, and load allocations²⁰ for nonpoint sources and natural background to achieve the target.²¹ The quantifiable target together with the allocations may be considered a performance standard. Thus, the Regional Water Board must identify the reasonably foreseeable methods of compliance with the wasteload and load allocations and consider economic factors for those methods. This economic analysis is similar to the analysis for water quality objectives discussed above. That is, the Regional Water Board should determine: (1) whether the allocations are being attained; (2) if not, what methods of compliance are reasonably foreseeable to attain the allocations; and (3) what are the costs of these methods.

II. FEDERAL LAW

Under federal law, economics can be considered in designating potential beneficial uses. Specifically, the federal water quality standards regulations allow a state to dedesignate, to decide not to designate, or to establish a subcategory of a potential beneficial use on economic grounds. To rely on this basis, the state must demonstrate that attaining the use is infeasible because the controls necessary to attain the use “would result in substantial and widespread economic and social impact.”²²

The states can take this action only for potential uses. These are uses that do not meet the definition of an “existing use”. Existing uses are those uses actually attained in the water body on or after November 28, 1975.²³

Attachment

¹⁹ See 40 C.F.R. § 130.2(g). A wasteload allocation is the portion of the receiving water’s loading capacity that is allocated to one of its existing or future point sources of pollution.

²⁰ See *id.* § 130.2(g). A load allocation is the portion of the receiving water’s loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources.

²¹ See *id.* § 130.2(i). A TMDL is the sum of the individual wasteload and load allocations.

²² See *id.* § 131.10(g)(6).

²³ *Id.* § 131.3(e).

Appendix B: EPA Region 9 TMDL Review Checklist

EPA Region 9 uses this checklist to review TMDLs submitted for EPA Region 9 approval to ensure that the TMDLs meet all the requirements of the Clean Water Act and EPA's regulations concerning TMDL content. Because many TMDL submissions from California and other states also include TMDL implementation measures pursuant to EPA's regulatory requirements at 40 CFR 130.6, the checklist also includes review criteria for TMDL implementation measures. EPA regulations do not require the submission of implementation measures at the same time as TMDLs are submitted.

State:

Pollutant(s):

Date Received By EPA:

Waterbodies:

Date of State Submission:

EPA Reviewer:

TMDL Review Criteria (per Clean Water Act Section 303(d) and 40 CFR 130.2 and 130.7)	Approved	Comments
1. Submittal Letter: State submittal letter indicates final TMDL(s) for specific water(s)/pollutant(s) were adopted by state and submitted to EPA for approval under 303(d).		
2. Water Quality Standards Attainment: TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.		
3. Numeric Target(s): Submission describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. Numeric water quality target(s) for TMDL identified, and adequate basis for target(s) as interpretation of water quality standards is provided.		
4. Source Analysis: Point, nonpoint, and background sources of pollutants of concern are described, including the magnitude and location of sources. Submittal demonstrates all significant sources have been considered.		
5. Allocations: Submittal identifies appropriate wasteload allocations for point sources and load allocations for nonpoint sources. If no point sources are present, wasteload allocations are zero. If no nonpoint sources are present, load allocations are zero.		
6. Link Between Numeric Target(s) and Pollutant(s) of Concern: Submittal describes relationship between numeric target(s) and identified pollutant sources. For each pollutant, describes analytical basis for conclusion that sum of wasteload allocations, load allocations, and margin of safety does not exceed the loading capacity of the receiving water(s).		
7. Margin of Safety: Submission describes explicit and/or implicit margin of safety for each pollutant.		

<p>8. Seasonal Variations and Critical Conditions: Submission describes method for accounting for seasonal variations and critical conditions in the TMDL(s)</p>		
<p>9. Public Participation: Submission documents provision of public notice and public comment opportunity; and explains how public comments were considered in the final TMDL(s).</p>		
<p>10. Technical Analysis: Submission provides appropriate level of technical analysis supporting TMDL elements.</p>		
<p style="text-align: center;">Note: The following criteria do not apply to all TMDLs, but must be applied in the situations noted.</p>		
<p>11. Monitoring Plan for TMDLs Under Phased Approach (where phased approach is used): TMDLs developed under phased approach identify implementation actions, monitoring plan and schedule for considering revisions to TMDL.</p>		
<p>12. Reasonable Assurances (for waters affected by both point and nonpoint sources): Where point source(s) receive less stringent wasteload allocations because nonpoint source reductions are expected and reflected in load allocations, implementation plan provides reasonable assurances that nonpoint implementation actions are sufficient to result in attainment of load allocations in a reasonable period of time. Reasonable assurances may be provided through use of regulatory, non-regulatory, or incentive based implementation mechanisms as appropriate.</p>		
<p>Implementation Plan Review Criteria (per Clean Water Act Section 303(e) and 40 CFR 130.6)</p>		
<p>13. Clear Implementation Plan: Submittal describes planned implementation actions or, where appropriate, specific process and schedule for determining future implementation actions . Plan is sufficient to implement all wasteload and load allocations in reasonable period of time. TMDL(s) and implementation measures are incorporated into the water quality management plan. Water quality management plan revisions are consistent with other existing provisions of the water quality management plan.</p>		

May 5, 2000

Mr. Edward C. Anton
Acting Executive Director
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 94912

Dear Mr. Anton:

As part of EPA's oversight responsibilities under Section 303(d) of the Clean Water Act, EPA is providing its review of California's Section 303(d) program ("California TMDL Program Review"). EPA initiated this program review in mid-1999. By this letter, EPA is making a determination, based in substantial part on the review of California's program, that EPA need not establish total maximum daily loads ("TMDLs") in California at this time.

Enclosed with this letter please find EPA's review of California's Section 303(d) program, including 303(d) listing, priority ranking, and TMDL development and implementation activities. EPA conducted this review in consultation with your staff, and we appreciate the State and Regional Boards' assistance in reviewing progress by the State and EPA in implementing California's TMDL program. Our program review found that California has made major improvements in its TMDL program which should enable the State to undertake its Section 303(d) responsibilities in a timely manner, consistent with all statutory and regulatory requirements. Through our discussions with your staff, we have identified some actions which we believe will assist you in continuing to improve California's TMDL development capabilities, including measures to clarify TMDL requirements, improve TMDL planning, provide technical training, and improve State-EPA communications.

The Clean Water Act appropriately places on the States the primary responsibility for implementing the TMDL program within its borders. EPA has the responsibility of overseeing State program implementation and has discretionary authority to take appropriate action in the case of inadequate State action in carrying out its Section 303(d) responsibilities. EPA firmly believes that the most efficient and effective approach for the Agency to implement its oversight responsibilities is to work in partnership with States to assist them in developing State TMDL programs that are consistent with the goals and requirements of the Clean Water Act. Therefore, EPA will continue our partnership with the State by providing technical and financial assistance, while carrying out our oversight responsibilities.

At present, EPA believes that California's commitment to the TMDL program will succeed and should be given a chance to work. California has established TMDLs, has developed a long term schedule for the development of TMDLs for all of its listed waters, and has demonstrated its commitment to its plan to develop TMDLs. Therefore, EPA is exercising its discretionary authority to determine that, at this time, there is no need for EPA to establish TMDLs for California waters. Of course, EPA will continue to work with the State to ensure that the TMDL obligations in the consent decrees to which EPA is a signatory are fulfilled.

More than 46 TMDLs have been completed for waters on California's 303(d) list (see Table 1 of the California TMDL Program Review). At least 4 TMDLs were completed and approved by EPA during the 1970s and early 1980s. Five TMDLs were completed between 1994 and 1995. Since 1997, 28 TMDLs were completed, including 12 TMDLs adopted by the State, 11 TMDLs established by U.S. EPA to meet consent decree schedules but based almost entirely on the State's technical TMDL work, and 5 TMDLs developed and established by U.S. EPA. Each of the State-adopted TMDLs includes a robust implementation plan. Also of significance, during the past two years California has demonstrated its ability to complete and adopt a substantial number of technically difficult TMDLs. See, California TMDL Program Review, Section 4, TMDL Submissions and Approvals. Therefore, EPA believes California continues to meet its responsibilities under Section 303(d).

California has developed a long term schedule for the development of TMDLs for all of its listed waters within the next 12 years. That schedule is consistent with EPA guidance and represents an appropriate and achievable timeframe for TMDL development for California's water quality limited segments.¹ On behalf of the Regional Administrator, and based on our program review, I am pleased to notify you of our concurrence with California's TMDL development schedule dated June 1999. EPA also reaffirms our approval of California's 1998 TMDL targeting commitments. California's TMDL schedule is appropriate given the relatively high degree of technical complexity of most TMDLs on the State's schedule, the difficulty of estimating nonpoint source pollutant sources which appear primarily responsible for most water quality impairments identified on the Section 303(d) list, and the limited availability of data necessary for TMDL development. See, California TMDL Program Review, Section B, Schedules and Targets for TMDL Development.

Finally, California's TMDL program budget is approximately \$7 million/year and is funded by a combination of federal and state resources. In addition, EPA Region 9 expends approximately \$1 million/year to support staff and expert contractors to develop TMDLs directly,

¹ On August 8, 1997, EPA issued policy guidance urging each State to establish an appropriate schedule for establishing TMDLs for all waters on its 1998 Section 303(d) list (and all lists submitted thereafter). The guidance recommended that "State schedules should be expeditious and (should) normally extend from eight to thirteen years in length, but could be shorter or longer, subject to several factors including the complexity of the TMDLs to be developed, data availability, and the relative significance of the environmental harm or threat to be addressed.

assist the State in developing TMDLs, and oversee State TMDL and 303(d) list development efforts. We believe sufficient resources are currently available for the State to complete TMDLs scheduled for completion over the next 3-5 years, although additional resources are likely to be needed to complete the remaining TMDLs planned for the last years of the schedule.

Pursuant to our oversight responsibilities under the Clean Water Act, EPA will periodically review California's progress in implementing its Section 303(d) responsibilities. EPA will consider whether California is continuing to develop and submit TMDLs in substantial accord with its schedule (or demonstrates that TMDLs are not needed for those waters and pollutants consistent with Section 303(d) and EPA's implementing regulations) and developing Section 303(d) list updates consistent with the schedules and requirements in applicable regulations. We look forward to our continuing partnership in this program and will work with you and your staff to implement the action plan identified in the program review. If you have questions concerning this letter or the enclosed program review, please call me at (415) 744-1860 or have your staff call David Smith at (415) 744-1860.

Sincerely,

(Signed by)

Alexis Strauss
Director
Water Division

Enclosure

cc: Regional Board Executive Officers

CALIFORNIA TMDL PROGRAM REVIEW

Prepared by David Smith, Doug Eberhardt, Cheryl McGovern, Joel Pedersen, and Eugenia McNaughton¹
U.S. EPA Region 9
May 4, 2000

1. Introduction

This review of California's TMDL program (1) assess the performance of the State Water Resources Control Board (State Board), the nine Regional Water Quality Control Boards (Regional Boards) and U.S. EPA in implementing the mandates of Clean Water Act Section 303(d), (2) identifies areas for improvement, and (3) describes specific actions needed to ensure that Clean Water Act requirements are met. The review focuses upon activities of the past 5 years and planned for the next 5 years; however, the review also evaluates California's program performance since the mid-1970s and long term future TMDL development schedule. EPA, State Board, and the Regional Boards intend to implement actions recommended in this review to strengthen California's listing and TMDL development efforts under Section 303(d).

The program review was conducted by EPA using the U.S. EPA, Region 9's "Program Review Criteria Checklist" (see EPA, 2000a) and information in EPA administrative records and grant files. EPA initiated the program review in June, 1999 (see Strauss, 1999a). The review incorporates information from discussions with staff and managers from the State Board and each of the nine Regional Boards. To assist in this statewide review, EPA staff completed separate reviews of each Regional Board's TMDL program efforts (see EPA, 2000b).

The program review addresses 303(d) listing, TMDL scheduling and targeting, TMDL submissions and approvals, TMDL content, State capacity/program funding, and TMDL implementation and monitoring. Each section presents findings and recommendations for State Board, Regional Boards and EPA.

This report provides a programmatic review of the minimum requirements and working procedures that are needed to fulfill Clean Water Act, Section 303(d) requirements. However, the State and Regional Boards maintain the position that TMDLs are an integrating tool used to connect the output from an array of water quality programs. As such, California's approach goes beyond the minimum federal requirements in several ways. The State acknowledges that the State and Regional Boards, with EPA assistance and oversight, are responsible for TMDL adoption and principally responsible for TMDL development. However, California views the responsibility for TMDLs as falling on many parties and not limited to USEPA and the State and Regional Water Boards. Much effort is being expended in California to develop the partnerships and

¹ Joe Karkoski, formerly with EPA Region 9, made substantial contributions to this review.

collaborations with other parties which are needed to implement change and improvement in water quality management aimed at full attainment of water quality standards. Watershed management and TMDLs are at the heart of this effort, but California staff emphasized in their discussions with EPA that numerous actions in addition to TMDLs will be needed to implement a comprehensive, watershed-based approach to water quality management. Consequently, the efforts analyzed in this report should not be interpreted as being representative of the full collaborative approach. Nor is the review intended as an evaluation of the entire California effort to attain water quality standards.

Summary of Findings and Recommendations

California's TMDL program is capable of developing Section 303(d) lists and TMDLs consistent with the requirements of the Clean Water Act and supporting federal regulations. The State's 303(d) lists and priority rankings have been generally consistent with federal statutory and regulatory requirements since 1992 (see Administrative Records for 1992, 1994, 1996, and 1998 303(d) listing decisions). However, EPA has had to add a relatively small number of waters and pollutants to the State's 303(d) list in 1992, 1996, and 1998.

Beginning in 1975, California has completed several TMDLs and submitted them for EPA approval. California also has developed several hundred water quality-based NPDES permits which ensure that point source discharges are subject to stringent effluent limitations. Water quality based effluent limitations contained in NPDES permits have been very effective in bringing many California waters into compliance with standards (see, e.g., SWRCB, 1999a). In addition, California has carried out many initiatives to address nonpoint source pollution which have proven effective in addressing many waterbody impairments (see US Department of Commerce and USEPA, 2000). Some of the State's efforts to address point and nonpoint sources may result in attainment of water quality standards in waters listed under Section 303(d) prior to TMDL development. In addition, many water quality assessment, planning and protection efforts carried out under other auspices may serve as the basis for TMDLs. EPA endorses the State's use of related approaches to address water quality problems or assist in TMDL development.

Since 1997, the State has greatly enhanced its capacity to develop TMDLs, and State and Regional Board managers are clearly committed to building an effective TMDL program (see, e.g., Martinson, 1998). In addition, U.S. EPA has entered into 3 consent decrees covering approximately half the waterbody-pollutant combinations on California's 303(d) list (See consent decrees in *Pacific Coast Federation of Fishermen's Association v Marcus, Defend the Bay v. Marcus*, and *Heal the Bay v Browner*). EPA and the State have developed a work-sharing arrangement through which EPA has the lead on some of the TMDLs required to meet the consent decree requirements, the State has the lead on the remainder, and EPA is committed to ensure that all consent decree TMDLs are completed on schedule (see, e.g., EPA and North Coast RWQCB, 1997).

More than 46 TMDLs have been completed for waters on California's 303(d) list (see Table 1).² More than 4 TMDLs were completed and approved by EPA during the 1970s and early 1980s³. Five TMDLs were completed between 1992 and 1995. Since 1997, 28 TMDLs were completed, including 12 TMDLs adopted by the State, 11 TMDLs established by U.S. EPA to meet consent decree schedules but based almost entirely on the State's technical TMDL work, and 5 additional TMDLs developed and established by U.S. EPA. Each of the State-adopted TMDLs includes a robust implementation plan. The State has established a schedule for completing all TMDLs for waters on its 1998 Section 303(d) list within the next 12 years (see 1998 California 303(d) list, SWRCB and RWQCBs, 1998). This schedule is consistent with EPA national policies concerning TMDL completion time frames (see Perciasepe, 1997).

California's TMDL program budget is approximately \$7 million/year and is funded by a combination of federal and state resources (see SWRCB, 1998 and SWRCB and RWQCBs, 1999a; also, personal communication with Stefan Lorenzato, SWRCB). In addition, EPA Region 9 expends approximately \$1 million/year to support staff and expert contractors to develop TMDLs directly, assist the State in developing TMDLs, and oversee State TMDL and 303(d) list development efforts. These resources should be sufficient to fund completion of all TMDLs scheduled for the next 3-5 years in a manner consistent with existing federal requirements. Provision of increased resources during the near term would greatly improve the State's capacity to develop and implement effective

²TMDLs are counted in terms of individual waterbody/pollutant combinations identified in the Section 303(d) list. For example, completion of TMDLs for nitrogen and phosphorus for Los Angeles River Reaches 12 and 14 (which were listed separately) would count as 4 TMDLs for purposes of this review. Lists of water quality limited segments, TMDLs, approval letters, and administrative records are on file with EPA Region 9 and are listed in the references.

³ Several Regional Boards developed and submitted lists of water quality limited segments and TMDLs as part of Basin Plans adopted in 1975 and updated in the early 1980s. EPA approved, in whole or in part, listing and TMDL development decisions in each Region. Appendix A discusses these older listing and TMDL development and approval actions in detail. EPA has identified 4 TMDLs submitted by the State in 1975 as part of the total count of TMDLs included in this review to demonstrate the State and EPA's early activities under Section 303(d); however, the actual count of TMDL actions submitted by the State and approved by EPA is greater than the number reported in Table 1 below.

TMDLs, particularly in the areas of water quality monitoring, technical assistance, and the public participation. In the future, additional resources will likely be needed in order to complete all TMDLs scheduled consistent with minimum federal requirements due to the increase in the numbers of TMDLs scheduled for the later period of the schedule. EPA will need to track this issue carefully in the future and work with the State to ensure sufficient resources are available for the TMDL program. The State and Regional Boards have demonstrated their capacity and intent to effectively implement the TMDL program; therefore, extensive EPA actions to develop Section 303(d) lists and/or TMDLs (other than those actions needed to meet consent decree commitments) are not needed at this time.

Table 1: TMDLs Completed In California (Note: This list is not inclusive of all TMDLs developed by California from 1975-1985 which are contained in Basin Plans.)

Waterbody	Pollutants	Year	By State or EPA	Impl. Plan
S. San Francisco Bay	Oxygen Demand	1975	State	Yes
Napa River	Oxygen Demand	1975	State	Yes
Petaluma River	Oxygen Demand	1975	State	Yes
Santa Ana River Reach 3	phosphorus, nitrogen ammonia, TDS	1975	State	Yes
Santa Ana R. Reach 3,4,5	total nitrogen	1994	State	Yes
Laguna de Santa Rosa	ammonia, dis. oxygen	1995	State	Yes
Garcia River	sediment	1997	EPA, based on draft State TMDL	No
Redwood Creek	sediment	1998	EPA	No
S. Fork Trinity River	sediment	1998	EPA	No
Upper Newport Bay	sediment, nitrogen phosphorus	1998	EPA, based on draft State TMDL	No
Lower Newport Bay	sediment, nitrogen phosphorus	1998	EPA, based on draft State TMDL	No
San Diego Creek Reaches 1 and 2	sediment, nitrogen phosphorus	1998	EPA, based on draft State TMDL	No
Salt Slough	selenium	1999	State	Yes
Upper Newport Bay	sediment, nitrogen phosphorus	1999	State	Yes
Lower Newport Bay	sediment, nitrogen phosphorus	1999	State	Yes
San Diego Creek Reaches 1 and 2	sediment, nitrogen phosphorus	1999	State	Yes

Noyo River	sediment	1999	EPA, based on draft State TMDL	No
Van Duzen River	sediment	1999	EPA	No
S. Fork Eel River	temperature, sediment	1999	EPA	No
Upper Newport Bay	fecal coliform	2000	State	Yes
Lower Newport Bay	fecal coliform	2000	State	Yes

Source: Basin Plans for Regional Boards 2 and 8, 1975, and Administrative Records on file with EPA.

2. Section 303(d) Lists

Findings

California has identified water quality limited segments since 1975, generally on a 2 year cycle (see, generally, 303(d) lists identified in references). State Board and Regional Boards have generally prepared 303(d) lists that meet the Federal requirements, although EPA has had to add a limited number of waters and pollutants to the State's list in 1992, 1996, and 1998. Factors influencing the 303(d) assessments performed by each Regional Board included:

- the modest level of staff resources dedicated to the assessment,
- late national guidance from the EPA on list preparation requirements (i.e. generally only 6 months prior to the April 1 deadline),
- unclear State listing, delisting, and data requirements criteria,
- modest efforts to gather and analyze available data, and
- limitations in resources to collect new monitoring data to support the assessments.

The level of effort devoted to the 303(d) listing effort has generally increased and improved over time, as has the documentation to support listing decisions. The staff time dedicated to 303(d) assessments has gone from about 3 staff full time equivalents (FTE) statewide in 1992 (0.2-0.3 FTE in each Regional Board) to about 7 FTE statewide in 1998 (0.5-0.7 FTE in each Regional Board and State Board) (see EPA, 2000b). The 1998 303(d) listing guidelines that Regional Boards generally used helped provide a clearer basis for listing decisions (see Administrative Record for 1998 Section 303(d) List). However, these guidelines did not provide detailed decision criteria concerning minimum data requirements, acceptable numbers of exceedances, interpretation of narrative objectives, and priority ranking decisions. Regional Board listing documents varied substantially in the degree of explanatory detail provided. In several cases, it was difficult for EPA to determine whether and in what manner the State assessed attainment of narrative and/or numeric water quality standards. In response to EPA comments on a draft list, or at EPA's request following submission of the list, the Regional Boards satisfactorily clarified their approaches to interpreting water quality standards prior to

EPA's listing decisions (see "Review of California's 1998 Section 303(d) List", November 3, 1998 in Administrative Record for 1998 Section 303(d) List).

In 1998, the State applied a set of priority ranking factors identified in the Statewide listing guidance to establish TMDL development priority rankings. The factors considered were reasonably comprehensive, and considered waterbody significance, the degree of impairment or threat, and practical factors concerning TMDL development. The manner in which factors were applied was not explained in detail by most Regional Boards (Region 4 was a notable exception which provided a detailed discussion of its priority ranking approach).

The public participation process followed for each list provided adequate public notification and opportunity to comment on Regional Board and State Board preliminary listing decisions. However, Regional Boards and State Board varied a great deal in the level of public participation opportunities that were provided. Each Regional Board provided at least a 30 day comment period and responded to written comments received. However, written responses from some Regional Boards were so limited that they did not fully respond to each detailed comment received. In addition, responses to oral comments made at public hearings at which Regional Boards adopted the lists were limited because staff did not have ample time to review and answer some comments. Finally, some Board members were apparently unfamiliar with 303(d) listing requirements and so were not well prepared to make decisions in a timely manner.

In 1998, the State Board determined that it needed to formally adopt the statewide 303(d) list through a public process rather than simply combining the Regional Board lists into a single statewide list and transmitting the list for EPA approval. Although opportunities for both written and oral comment were provided in 1998 by State Board, insufficient responses to comments were provided by State staff. USEPA (with substantial help from staff at Regional and State Boards) assisted the State Board by preparing detailed responses to public comments made to the State Board. The State Board members did not appear to be fully aware of 303(d) listing requirements at the time of their decision, and staff did not correct some misunderstandings concerning listing flexibility which arose at the time of the decision.

In 1998, California conducted monitored assessments of approximately 15% of its surface waters, including a high percentage of mainstem rivers, estuaries, and waters in urban areas (based on analysis of Section 305(b) Reports, e.g., SWRCB, 1999). The effective coverage of these monitored assessments was actually higher because quality of many mainstem rivers was indicative of water quality conditions in tributary streams. Although many Regional Boards have significant local or project-specific monitoring efforts in their Regions, the State has not maintained an ongoing, comprehensive region-wide monitoring network due primarily to resource constraints. Extensive data are available from other organizations (e.g., USGS, California Department of Water Resources, County Health Departments, and dischargers), but these data are also uneven

in their coverage. The State and Regional Boards varied in the degree of effort spent to obtain and analyze data from other sources in the 303(d) listing process, but all Regional Boards met the federal requirement to consider all existing and readily available information. Outreach efforts by Regional Boards 1, 3, 5, 8 and 9 to gather data from other sources were particularly thorough in 1998; however, efforts by the other Regions were more modest. Therefore, limitations in the monitoring data coverage and efforts to obtain available data pose a significant challenge for California's water quality assessment effort which will need to be addressed to improve the quality and scope of future State 303(d) assessments.

Although EPA has emphasized the important nature of the 303(d) listing process between 1992-1998, EPA had not directed the State to expend a specific amount of Federal grant funds on this effort. The FY2000-01 federal grant workplans do provide a specific level of staffing support for the next listing cycle (0.5 FTE/Regional Board, with the expectation that additional staff resources will be earmarked in the FY2001-02 workplan to continue the assessment process, *see* Smith and Lorenzato, 2000). As discussed above, funding limitations (Federal and State) have limited the scope of the 303(d) assessment effort. EPA's national guidance on the 303(d) list process has generally been available too late for it to be adequately considered by the State.

The proposed revisions to the federal TMDL regulations would require the State to prepare a detailed 303(d) list methodology prior to the next listing decision. It may be difficult for California to prepare the methodology in a timely fashion since the State will probably have to go through a lengthy formal decision process to adopt the methodology (personal communication with Stefan Lorenzato, SWRCB). However, the State and Regional Boards have already begun developing the methodology for the next listing cycle (*see* SWRCB and RWQCBs, 2000). The EPA has provided limited guidance to date on how to interpret monitoring data and make listing decisions, especially for those pollutants for which EPA water quality criteria have been developed. EPA is currently developing new national listing guidance which is expected to provide detailed guidance concerning several difficult assessment issues (e.g., interpretation of narrative criteria, contaminated sediment, contaminated fish tissue, and other unconventional assessment challenges).

Recommendations

The State Board, in collaboration with the Regional Boards, should develop a set of consistent state-wide guidelines for evaluating water quality data relative to 303(d) listing requirements. The 1998 303(d) guidelines should be expanded or replaced with new decision criteria. These criteria should address:

- minimum data requirements and data quality requirements,
- unacceptable/acceptable number of exceedances of numeric water quality criteria/objectives,

- how data for individual monitoring points should be extrapolated upstream or downstream to identify areal extent of impairment,
- interpretation of narrative objectives (including objectives addressing clean sediment issues, nutrient effects, contaminated sediment, contaminated fish tissue, and protection of wildlife), and
- how priority rankings will be set (including specific priority ranking criteria and guidance on how these criteria will be judged and applied).

Guidelines should be finalized at least one year prior to the public release of draft 303(d) lists from the Regional Boards. The Regional Boards should dedicate more staff to the 303(d) assessment process to adequately address 303(d) list preparation (e.g., one or more FTE apiece may be needed for Regions with many or complex watersheds, e.g. Regions 2, 3, 4, 5, 6, and 9).

The State and Regional Boards should determine a consistent public participation process for the next listing cycle. That process should address:

- when and how data and information will be solicited from the public to assist in the 303(d) assessments,
- when and how proposed 303(d) lists and priority rankings will be publicly noticed, including the length of comment periods,
- provisions for public hearings concerning proposed lists and priority rankings,
- procedures for reviewing and addressing oral and written comments (including the form and content of responsiveness summaries).

State and Regional Board staffs should ensure that Board members are fully briefed on 303(d) listing requirements in advance of the listing decisions. EPA should offer to meet with Board members and/or testify at Board workshops to help explain listing requirements. If possible, Board education about listing requirements should occur prior to the meeting at which the Board is asked to adopt the next 303(d) list.

Several actions are needed to revamp the State's monitoring and assessment effort. The Regional Boards and State Board should develop a consistent approach for soliciting and gathering information to perform 303(d) assessments which should include several attributes:

- a process for soliciting information and data (e.g. hold public workshops specifically to solicit information and data)
- use of STORET or a statewide electronic data management system (which is currently under development),
- mechanisms for ensuring that readily available data are entered into the electronic database (e.g., ambient water quality data from NPDES dischargers, data from waste discharge requirements, data from USGS or DWR monitoring stations, requirements that grantees input data to the State database or STORET),

- efforts to specifically target organizations that conduct water quality and watershed research and monitoring – University of California, Department of Fish and Game, U.S. Geological Survey, established citizen monitoring groups, etc.).

Several additional measures, while not required, would significantly enhance the State's monitoring and assessment process. The State should investigate increasing the level of State funding of ambient monitoring efforts and potentially the level of federal grant funds dedicated to monitoring. Proposed increases in the State and federal budgets for FY2001 are aimed at monitoring and TMDL development, which may prove sufficient to address this need. In addition, the Regional Boards and State Board should work collaboratively with other agencies and organizations to provide additional resources for monitoring efforts. Finally, the Regional Boards should continue and expand their efforts to include ambient monitoring requirements in NPDES permits and other waste discharge requirements (WDRs). Where several dischargers are discharging into the same or neighboring waters, the State should facilitate the design of watershed or regional scale monitoring networks through which dischargers can pool their efforts to support more comprehensive monitoring. The positive experiences with cooperative regional monitoring efforts in San Francisco Bay and Santa Monica Bay provide a model which may work well in other parts of the State.

EPA should help ensure that the 303(d) assessment process is adequately funded by continuing to identify Federal grant funds specifically for this task and/or receiving assurances from the State of sufficient State funding. The EPA should complete and issue the more detailed national listing guidance which is currently being developed. Region 9 staff should continue to work closely with State and Regional Board staff, and to testify when necessary before the Boards, to ensure that EPA and the State have a common understanding of 303(d) listing requirements.

Summary

California has developed 303(d) lists which, with few exceptions, met federal listing requirements. EPA believes California can continue to develop Section 303(d) lists which meet federal requirements; however, several actions are needed to improve the State's monitoring and assessment capabilities. These actions include provision of adequate, continuing staffing for assessment and list development, development of more detailed and precise listing criteria, improvements in public participation, Board education on listing requirements, completion of an electronic database for managing water quality data, and improvements in the extent and depth of ambient water quality monitoring.

3. Schedules and Targets for TMDL Development

Findings

California targeted a significant number of waters for TMDL development in each Section 303(d) list submittal since 1992 (see Administrative Records for 1992 - 1998 Section 303(d) lists). The State initiated work on most of the targeted TMDLs, but adopted and submitted very few of these TMDLs in the timeframes projected in the 1992, 1994, and 1996 schedules (see EPA, 2000b). In 1998, California provided TMDL development schedules for nearly all its listed waters as part of its list submission and associated Watershed Management Initiative planning documents.

Current schedules for TMDL development are found in a number of documents: 1) the 1998 303(d) list; 2) the Watershed Management Initiative (WMI) chapters for each Regional Board; 3) Federal grant work plans; and 4) consent decrees (see Administrative Record for 1998 Section 303(d) list, SWRCB and RWQCBs, 1998, and Consent Decrees listed in references). The schedules prepared as part of the 1998 303(d) list update and contained in the June 1998 WMI chapters generally indicate that the ability to meet the schedules is contingent upon the availability of sufficient resources beyond the immediate 2-5 year planning horizon to complete the TMDLs. The schedules contained in the 1998 303(d) list are fairly evenly balanced over the term of the schedule, but are more heavily weighted to later years (see Table 2). The schedules in the 303(d) list and WMI chapters generally include caveats which indicate the schedule is conditioned on provision of sufficient or additional resources.

Table 2: California TMDL Completion Schedule By Region
(numbers of TMDLs scheduled to be completed by end of specified year)

Year	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8	RB9	TOTAL
1998	4	0	0	0	2	0	0	7	0	13
1999	8	0	3	17	4	31	0	7	0	70
2000	13	0	22	25	6	31	1	9	1	108
2001	17	0	40	44	9	31	2	9	4	156
2002	21	0	40	172	11	31	3	16	4	298
2003	23	24	60	236	11	37	3	16	12	422
2004	29	59	60	277	11	37	3	22	12	510
2005	35	79	66	366	27	37	4	40	13	667
2006	41	79	66	457	27	37	4	40	13	764
2007	43	89	71	517	27	37	5	41	17	847
2008	44	109	71	577	27	38	5	41	26	938

2009	45	109	77	637	27	38	6	41	46	1026
2010	46	145	77	697	27	38	11	41	52	1134
2011	48	145	100	757	161	80	14	64	69	1435
Total*	48	169	100	757^	161	87	16	64	69	1471

* Total includes any unscheduled TMDLs, and, for Region 7, 2 TMDLs scheduled for 2013.

^ Assumes 360 unscheduled TMDLs covered under consent decree are distributed evenly (60/year), beginning in 2006.

Source: 1998 Section 303(d) List and SWRCB and RWQCBs, 1998.

Although some Regional Boards have informally revised their schedules since 1998, the 1998 schedules were the last comprehensive schedules formally submitted to EPA. Therefore this review focuses upon the 1998 schedule. Subsequent revisions to the schedules are relatively minor in most Regions. If the State has formally established a revised schedule at the time of the next EPA review of California's program, EPA will assess the revised schedule at that time.

TMDL development schedules are also provided in grant workplans. The Federal grant work plans are structured to identify specific TMDLs as grant deliverables and generally cover a 1-2 year time horizon. The State and EPA have workplan agreements specifying a minimum number of TMDLs to be completed by each Regional Board during 1999-2001 (at least 2 TMDLs/Regional Board/year) (see Martinson, 1998; SWRCB and RWQCBs, 1999, and SWRCB and RWQCBs, 2000). In addition, the State and EPA allocate grant funds to support TMDL development based on an agreement that the State will complete and deliver at least one TMDL for each \$125,000 of federal funds provided (see Strauss, 1999b; Smith and Lorenzato, 2000). Currently, more than 200 TMDLs are underway in California (see Table 3).

Table 3: TMDLs Currently Being Developed In California

Regional Board	Waterbody	Pollutant
1	Navarro River Ten Mile River Gualala River Albion River Big River Trinity River Main Fork Eel River	sediment, temperature sediment sediment sediment sediment sediment sediment, temperature
2	San Francisco Bay (1 reach) San Francisco Bay (8 reaches) Napa River 35 Urban Creeks Tomales Bay	copper, nickel mercury, exotic species, PCBs sediment diazinon pathogens

3	Morro Bay (3 reaches) San Lorenzo River (4 reaches) San Luis Obispo Creek Llagas Creek Nacimiento Res., Las Tablas Ck, Pajaro River	sediment, pathogens, nutrients, toxics sediment, pathogens, nitrate nitrate sediment metals nutrients, sediment, toxics
4	Calleguas Creek Santa Clara River Los Angeles River (~10 reaches) Santa Monica Beaches (~35) Malibu Creek and Lagoon San Gabriel River Ballona Creek	chlorides, nutrients chlorides, nitrogen nutrients, pathogens, trash, toxics pathogens nutrients, pathogens trash, nutrients, metals trash, pathogens
5	Clear Lake Cache Creek San Joaquin River (~3 reaches) Sacramento R./Delta (3 reaches) Feather River	mercury mercury Se, diazinon, chlorphyrifos, DO, Bo metals, diazinon, chlorphyrifos diazinon, chlorphyrifos
6	Indian Creek Reservoir Heavenly Valley Creek Pine Creek Squaw Creek/Truckee River Blackwood Creek Crowley Lake Haiwee Reservoir	phosphorus sediment habitat alteration sediment sediment nutrients copper, nutrients
7	Alamo River Salton Sea New River	siltation, selenium nutrients bacteria, sediment
8	Upper Newport Bay Lower Newport Bay San Diego Creek (2 reaches) Lake Elsinore/Canyon Lake Big Bear Lake	pesticides, metals, toxicity pesticides, metals, toxicity pesticides, metals, toxicity sediments, toxicity nutrients, metals, sediments
9	Rainbow Creek San Diego Bay (5 reaches) Chollas Creek	nitrogen, phosphorus copper, zinc, toxicity, metals diazinon, metals

Source: Lorenzato, 2000.

Consent decrees provide specific dates for delivery of certain TMDLs, specify minimum TMDL completion pace commitments, and require the EPA to establish TMDLs if the Regional Board cannot meet the dates specified (see consent decrees in *Pacific Coast Fishermen's Association, Defend the Bay*, and *Heal the Bay*, and TMDL schedule developed pursuant to *Pacific Coast Fishermen's Association*). These consent decrees

identify schedules for completion of almost half the TMDLs needed in California (as counted by listed waterbody reach/pollutant combinations). EPA coordinated closely with State Board and the individual Regional Boards affected by each of these lawsuits. Most of the work associated with the TMDLs required under the *Defend the Bay* and *Heal the Bay* consent decrees is being performed by the State, and EPA's role is to establish the TMDLs developed by the State only if the State is unable to complete the adoption process in time to meet consent decree deadlines. For the TMDLs required under *Pacific Coast Fishermen's Association*, EPA and the Regional Board have a worksharing arrangement through which EPA and the State are each developing about half the required TMDLs (see EPA and North Coast RWQCB, 1997).

Prior to 1998, EPA was modestly successful in working with the State to ensure that a significant number of waters were targeted for TMDL development, and that TMDLs for targeted waters were initiated. EPA was less successful in working with the State to bring TMDLs to timely completion and adoption by the State. In 1998, EPA was successful in working with California to establish comprehensive schedules for TMDL development consistent with EPA's national policies (see Table 2).

For this program review, EPA carefully evaluated the State's current TMDL schedule to determine whether it is reasonable and consistent with existing federal statutory and regulatory requirements as well as national policies concerning TMDL scheduling. EPA considered the following criteria in assessing the State's schedule:

- Does the schedule cover all listed waters?
- Would all TMDLs be completed within 8-13 years of the 1998 listing?
- Are TMDLs scheduled consistent with their priority rankings?
- Are TMDL completion dates evenly spread across the time frame of the schedule?
- Does the schedule provide reasonable amounts of time to develop and adopt TMDLs, considering the technical, informational, practical, and administrative factors which influence the overall difficulty of completing the TMDLs?

Does the schedule cover all listed waters?

California's schedule includes projected completion dates for more than 98% of the listed waterbody-pollutant combinations (schedules have not been provided only for 7 combinations in the Lahontan Region and for 8 segments of San Francisco Bay listed by EPA for dioxins and furans). Schedules have been provided for all waters listed by the State and for almost all the waters added to the list by EPA. EPA finds that for all practical purposes, the State's TMDL schedule is comprehensive in its coverage.

Would All TMDLs be Completed Within 8-13 Years?

With the exception of 2 waterbody-pollutant combinations in the Colorado River Regional Board and the few segments for which schedules were not provided, the State

has scheduled completion of all TMDLs required for listed waters within the 8-13 year period. More than half the TMDLs would be completed within 8 years. EPA finds that the State's schedule is consistent with the national policy that all TMDLs should be completed within 8-13 years, or slightly longer for more complex TMDLs (see Perciasepe, 1997).

Are TMDLs scheduled consistent with their priority rankings?

Almost all the TMDLs are scheduled consistent with priority rankings. In a few cases, lower priority waters are scheduled for early TMDL development because they:

- will be done concurrent with waters in the same watershed which are of higher priority, thus taking advantage of the opportunity to complete TMDLs for neighboring waters at the same time, and/or
- analytical work necessary to complete the TMDL is already underway in connection with other water quality planning priorities, and the TMDL will be improved through its coordination with related activities.

It is reasonable for some TMDLs to be done out of step with their priority rankings if most TMDLs will be done in accordance with these rankings, and the benefits of addressing the lower priority TMDLs earlier outweigh the opportunity costs of addressing some other TMDLs later in the schedule. In deciding to do this, California made sound judgments to consider the practical benefits of developing TMDLs at a watershed scale, lower TMDL development costs by building upon related ongoing analytical efforts, and improving the likelihood of successful TMDL implementation by developing TMDLs concurrent with implementation planning efforts (see State listing guidelines, in Administrative Record for 1998 Section 303(d) List). EPA therefore finds that the schedule is consistent with the priority rankings.

Are TMDL completion dates evenly spread across the time frame of the schedule?

In the process of developing its TMDL schedule, California noted the difficulty of developing precise schedules before having the benefit of several years developing and adopting large numbers of TMDLs. Overall, California's TMDL schedule is designed to gradually increase the annual pace of TMDL completion during the first 3 years after 1998, sustain a high rate of TMDL completion during the next 4 years to begin making up for the initial slower rate of completion, generally level off the pace during the remaining years of the schedule (see Table 4). The last year (2011) calls for completion of 301 TMDLs, of which 173 are in Regions 5 and 6.

Table 4: Scheduled Annual Pace of TMDL Development (# of TMDLs to be completed)

'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11

13	57	38	48	142	124	88	157	97	83	91	88	108	301
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Source: 1998 California Section 303(d) list and SWRCB and RWQCBs, 1998.

Different Regional Boards adopted somewhat different approaches to addressing scheduling uncertainty. Most Regional Boards adopted a balanced TMDL development pace, following 2-4 years in the beginning during which the pace gradually increases. As mentioned above, Regional Boards 5 and 6 took a different approach, committing to completing a relatively large number of TMDLs in 2011-- the last year of the schedule. Both of these Regional Boards intend to complete many of these TMDLs earlier, but were not comfortable committing to earlier completion dates in the 1998 schedule given their concerns about TMDL funding, technical complexity, and practical difficulties of adopting TMDLs (see, EPA, 2000b, e.g., Program Reviews for Regional Boards 2, 5, and 6). Regional Board 4 also had a significant number of formally unscheduled TMDLs; however, by the terms of the consent decree in the *Heal the Bay* case, EPA is required to ensure that a minimum annual pace of TMDL completion is met such that it would be infeasible to delay completion of a larger number of unscheduled TMDLs until the last year covered by the decree. Therefore, it was reasonable to assume, for purposes of this analysis, that the unscheduled TMDLs in the Los Angeles Region will be developed at a fairly even pace over the last half of the decree.

Each Regional Board developed its schedules with limited guidance from State Board and EPA. As a result, it is not surprising that the schedules vary from Region to Region in terms of start-up and annual completion pace. Variability among Regions is reasonable as long as the State's overall pace of TMDL development remains fairly even.

Several Regional Boards scheduled a large number of TMDLs for completion in the last 1-3 years of the schedule. For example, Regions 5 and 6 scheduled more than half their TMDLs for completion in the last year of the schedule.

EPA is somewhat concerned that some Regional Boards did not establish an even pace of TMDL development in their schedules and elected instead to "backload" their schedules. However, we recognize that this was a reasonable decision in light of the situation at the time of the 1998 listing and scheduling decisions. First, EPA's 1997 national policy concerning TMDL schedules did not address the pacing of TMDL development, stressing instead the importance of completing all TMDLs within 8-13 years (see Perciasepe, 1997). States have substantial flexibility to develop priority rankings and schedules consistent with their needs, capabilities, and constraints. Generally, California's schedule provides a fairly even annual pace of TMDL completion, consistent with existing national policy. Second, a large proportion of the TMDLs scheduled for completion in the last years of the schedule are expected to be relatively simple in comparison with the other TMDLs California must develop (i.e., are for less complex waterbodies, for pollutants which are expected to be easier to analyze, or are expected to be less controversial). This finding is based on EPA's analysis of the pollutants, sources, and waterbody sizes of waters scheduled for later TMDL completion, as reported in the 1998 Section 303(d) list.

Third, the State expects to improve the efficiency with which it develops and adopts TMDLs as it gains more experience with TMDL development (see EPA, 2000b). Fourth, several Regional Boards with relatively “backloaded” schedules (e.g., Regions 2, 4, 5, and 9) have indicated their desire to develop many TMDLs ahead of schedule or to revise their schedules to provide a more balanced annual pace development (see EPA, 2000b). Finally, most Regional Boards were concerned in 1998 that sufficient resources may not be available to support timely completion of all required TMDLs, and were conservative in their scheduling plans.

EPA expects that schedules will be revised significantly in the next listing cycle, and this will provide the opportunity to establish earlier schedules for many waters now scheduled for completion in the final years of the schedule. Therefore, EPA finds the annual pace criterion has been met.

Does the schedule provide reasonable amounts of time to develop and adopt TMDLs?

Section 6 of this Review provides an analysis of prospective TMDL development costs in California and compares these costs to available resources. That analysis concludes that currently available resources are sufficient to support completion of all TMDLs scheduled for the next 3-5 years consistent with existing minimum legal requirements. Additional resources may be needed in the next 3-5 years if more in-depth monitoring, more sophisticated modeling analysis, and/or more intensive public involvement opportunities are judged to be vital to development of effective TMDLs for a significant portion of waters. In the middle and later years of the schedule, additional resources are also likely to be needed to address the higher numbers of TMDLs scheduled for completion in those years development (see EPA, 2000b). Actual future TMDL development costs remain uncertain because it is difficult to assess the level of analytical rigor which will be needed for many TMDLs and the degree to which the State will increase the efficiency of its TMDL development efforts as the Regional Boards gain more experience.

EPA believes it is feasible for California to meet its TMDL completion schedule; however, EPA agrees with the State’s judgement that it would be infeasible to significantly shorten its TMDL completion schedule and still produce scientifically valid TMDLs. Although both the proposed federal and State budgets for FY2000-01 earmark increased funds for TMDL development, adoption, and implementation (approximately a 25% increase in federal grant funds and up to 50% increase in State funds) EPA does not expect increases in California’s water quality program budget to match the increases of the past 3 years, or that TMDLs would necessarily be the highest priority for new resources if they become available. Even if increased TMDL program resources were made available, several technical and institutional factors present in California suggest that a more rapid TMDL completion schedule would be difficult to attain:

Shortages in Water Quality Monitoring Data Insufficient historical water quality monitoring data are available for the vast majority of listed waters to support even a simplistic approach to TMDL estimation or to validate listing decisions. As mentioned above, sufficient data to support monitored assessments were available for only about 15% of California's waters (see SWRCB, 1999a). Therefore, followup monitoring data will be needed to further assess water quality problems, standards exceedances, and pollutant sources for TMDL development purposes (see EPA, 1999c and EPA, 1999d). In order to provide valid data for these purposes, several years of monitoring data will be needed for several hundred water bodies. Given the rarity and unpredictability of rainfall, runoff, and stream flow in many watersheds which California TMDLs will address (particularly in Southern California and the Central Valley), it is likely to take several years in some cases to obtain sufficient data to complete TMDLs for many California waters.

Difficulty of TMDLs for Nonpoint Sources EPA's analysis of reported sources for waters listed on the 1998 Section 303(d) list found that more than 97% of waterbodies present on California's 1998 Section 303(d) list are impaired partly or solely due to nonpoint sources of pollutant inputs. Nonpoint sources are particularly difficult to estimate based on monitoring or modeling due to their dependence on a complex combination of factors, including soil and topographic characteristics, land use management changes, and rainfall/runoff patterns (see EPA, 1999c, EPA, 1999d, Reid and Dunne, 1996, and MacDonald, et al., 1991). Few existing nonpoint source estimation models have not been reliably validated for use in most California watershed settings (personal communication with Dr. Leslie Shoemaker, Tetra Tech, Inc.). Therefore, existing models will often require time-consuming calibration and validation before they can be reliably applied to estimate nonpoint source loadings in California watersheds. New tools, including new models and monitoring methods will also need to be developed to support analysis of nonpoint sources for many California TMDLs.

Difficulty of TMDLs for Western Water Settings TMDLs involve estimation of pollutant assimilative capacity, which is a function of the amount of water present in the waterbody and the behavior of pollutants after they are discharged to waterbodies. First, many streams and rivers on California's Section 303(d) list are ephemeral or intermittent in some or all of their length and/or are very "flashy" in their flow patterns. Flow in many other listed waters is strictly managed through flow diversions or impoundments which radically alter the natural hydrologic regime, and vary substantially depending upon other water resource demands including irrigation, electric power generation, and flood control. Few water quality models developed at the national level to support TMDL estimation have been reliably validated for use in analyzing water balances, pollutant transport, and pollutant transformations in primarily ephemeral and intermittent waters, "flashy" systems, and managed waters with widely varying flow regimes (see EPA, 1997,

EPA, 1999c). Second, most commonly used water quality models are not set up to analyze some key biological processes which affect pollutant fate in California waters (e.g., the dominant role of attached plants and algae in affecting nutrient cycling) (see Chapra, 1997, EPA, 1997). Finally, few of the listed waters in California are gauged or have lengthy historical flow records (based on EPA review of gauging station data coverages reported on USGS web site (ca.water.usgs.gov) and California 1998 Section 303(d) list). Therefore, substantial work will be needed to develop new modeling and data analysis tools which account for unusual “Western water” settings, and to acquire actual flow data, in order to account for the behavior of California’s waters.

California’s Lengthy Adoption Process As discussed in greater detail in the following section, California must obtain approvals from the Regional Water Board, State Water Board, and Office of Administrative Law in order to adopt a TMDL (personal communication with Shelia Vassey, Esq., SWRCB). In addition to TMDLs, many other water quality management decisions, including water quality standards, NPDES permits, compliance actions, and other water quality planning processes, are subject to the same administrative process and thereby compete for scarce agenda time before the Regional Boards and State Board. Even after TMDLs are drafted, it can take several months before the Regional Board hears and approves them, and several months more for the State Board to hear and approve them. For example, the Garcia River TMDL was initially proposed for adoption by the North Coast RWQCB in 1997, and is still awaiting approval by the State Board. Less controversial TMDLs (e.g., pathogen TMDLs for Newport Bay) have also taken more than 18 months to receive Regional Board, State Board, and Office of Administrative Law approval. At any point in the process, the Regional Board and/or State Board can continue the agenda item and ask for more staff work on the TMDL, and the State Board can remand the TMDL to the Regional Board for additional work. Although EPA is recommending that the State investigate ways to streamline its lengthy approval process, that process is set by State regulation and statute, and cannot be easily shortened.

Virtually all TMDLs will need to be adopted through amendments to the Regional Board Basin Plans (see Vassey, 1999). In order to adopt a TMDL through a Basin Plan amendment, the State must complete a full plan of implementation, an economic analysis of TMDL compliance costs, a peer review process, a comprehensive environmental impact review pursuant to California Environmental Quality Act, an exhaustively detailed administrative record, and other administrative requirements (see EPA, 2000a). These additional analytical requirements add to the work staff must complete before providing a TMDL approval package to the Regional Board and State Board for consideration. Overall, the adoption process has commonly taken from 1-2 years to complete.

EPA establishment of TMDLs would defer the workload associated with some aspects of the State's adoption process. The workload would not be avoided, since the TMDLs would eventually have to be incorporated into the State's Basin Plan (Water Quality Management Plan) even if EPA establishes the TMDL (see 40 CFR 130.6). EPA establishment of TMDLs under existing federal regulations has the disadvantage that EPA does not establish an implementation plan at the time it establishes TMDLs. Therefore, unlike State-adopted TMDLs and implementation plans, it is less clear how provisions of federally-established TMDLs addressing nonpoint sources would be implemented prior to State adoption of TMDLs and implementation plans for those waters. An ongoing practice of having EPA establish TMDLs to shortcut the State's adoption process could prove relatively ineffective in carrying out implementation measures most needed to address the largest cause of ongoing waterbody impairment in California.

Because each of these technical and institutional factors is likely to complicate TMDL development and adoption in California, EPA finds that the State has good reasons to set a 13 year schedule, and that it would not be realistic to set a substantially shorter schedule which would result in scientifically valid TMDLs which can be effectively implemented.

Prior to 1996-97, EPA had not indicated a readiness to establish TMDLs if the State had failed to. In agreeing to the 3 consent decrees currently in place, EPA agreed that the Agency would establish TMDLs covered by the decrees if the State does not do so within the specified timeframes (see consent decrees listed in references). EPA has established several TMDLs pursuant to these decrees, most based on technical analysis and draft TMDLs developed by the Regional Boards (see table 1).

Beginning in the 1998/99 workplan cycle, EPA and the State also agreed that EPA will establish TMDLs being developed by the State pursuant to federal grant work plans, if the State completes most or all of the planned technical work needed for the TMDLs but is not yet ready to begin the State's lengthy implementation and basin plan approval process (see Strauss, 1999b). EPA and the State agreed that for the next two years (2000-01), it would be appropriate for EPA to establish TMDLs developed by the State in order to place more TMDLs into effect in the State, assist the State in gaining experience in TMDL development without becoming bogged down in the State approval process, and provide more lead time for the State to standardize its process for developing and adopting TMDLs including implementation plans. EPA plans to establish several TMDLs in the summer of 2000 based almost completely on technical work done by the Regional Boards (see Table 6 in following section). TMDL development obligations contained in consent decrees and TMDLs associated with FY1999-00 grant work plans account for 60% of the TMDLs to be completed.

Recommendations

The existing State schedule for TMDL development is consistent with EPA's national policy calling for completion of TMDLs for all waters listed under Section 303(d) within 8-13 years of the 1998 listing cycle. The State should continue to pursue funding through the legislature and other sources to ensure that TMDLs are adequately funded and can be completed on schedule. The State should work with EPA to ensure that the TMDL development schedule will be met, and establish a clear procedure and set of actions to be taken if TMDL development dates are not met. This long term schedule and follow-up procedure should be incorporated in annual grant workplans and/or a formal Memorandum of Agreement (MOA) between EPA and the State in order to maintain a high level of ongoing schedule accountability, similar to that provided in the existing State-EPA workplan agreement. To the extent the existing schedule is revised as part of an MOA or in the next listing submission, the revised schedule should include a reasonably distributed pace of TMDL development.

EPA should continue to work with California to further build the State's capacity to plan and execute workable TMDL development schedules. Although EPA has provided individually tailored TMDL training to 6 of the 9 Regional Boards and several Statewide training classes, EPA should continue to work with the State to provide additional training. State TMDL program managers and staff need additional training in TMDL project planning, cost estimation, and project management. This training would assist the State in more confidently scheduling and completing TMDL development and identifying resources needed to support TMDL work. EPA and the State should continue to develop and apply methods for estimating cost and time needed to complete TMDLs for different waterbody and pollutant settings, to assist in effective TMDL scheduling.

The State should ensure that it develops and each Regional Board uses a consistent methodology for establishing revised TMDL schedules as part of the next listing cycle (anticipated to take place in 2002). EPA and the State should incorporate the long term TMDL schedule in an MOA and/or in annual grant workplans in order to ensure continued accountability for development of TMDLs on schedule.

Summary

California has recently increased its TMDL targeting and scheduling commitments and demonstrated its desire and ability to fulfill those commitments. After several years of modest targets and insufficient completion of targeted TMDLs, the State has established a comprehensive and reasonable schedule which is consistent with national policy expectations. Several technical and institutional factors are present in California which suggest that it would be infeasible to substantially reduce the length of the State's TMDL development schedule.

4. TMDL Submissions and Approvals

Findings

At least 46 TMDLs have been submitted by the State and approved by EPA or established directly by EPA (see Table 1 above). Since 1993, 20 TMDLs have been submitted for EPA approval and 7 additional TMDLs have been adopted by Regional Boards and are either awaiting approval by State Board and Office of Administrative Law, or were withdrawn from the approval process (See Table 5). In addition, 33 formal draft TMDLs for targeted waters have been submitted for EPA review and comments (see Table 6).

Table 5: Status of TMDLs Adopted by Regional Boards

(Source: State documents in EPA files)

Region	Waterbody/Pollutant	Date Adopted by Reg. Bd.	Status
1	Stemple Creek- sediment, nutrients Estero de San Antonio- sediment, nutrients	1997	Held at State Board pending clarification of Basin Plan Amendment. Waterbody now meeting standards and expected to be delisted; was therefore withdrawn from process.
1	Garcia River- sediment	1998	Awaiting State Board approval. EPA established similar TMDL to meet consent decree. TMDL may be revised to address State Board concerns.
2	South San Francisco Bay- copper	1993	TMDL based on site specific objective (SSO). State Board remanded SSO and TMDL based on concerns about SSO; TMDL withdrawn by Regional Board and a new SSO is currently under development which may obviate the need for a TMDL.
4	E.F. San Gabriel River-trash	1999	Awaiting State Board approval in 2000.

Source: EPA, 2000b.

Table 6: Status of Draft TMDLs Submitted to EPA by California

2	San Francisco Bay (8 reaches)- Mercury	2000	Submission of complete “technical” TMDL scheduled for 4/00. EPA may establish at State’s request.
2	San Francisco Bay (8 reaches)- exotic species	2000	Submission of complete “technical” TMDL scheduled for 4/00. EPA may establish at State’s request.
3	San Lorenzo River nitrate (also covers 3 tributaries)	1996, 1998, 2000	Scheduled for Regional Board adoption mid-2000.
3	San Luis Obispo Creek nitrate	2000	Submission of complete “technical” TMDL scheduled for 4/00. EPA may establish at State’s request.
4	Los Angeles River nitrogen 5 listed reaches)	1997	TMDL circulated for public review. Regional Board determined additional tributary modeling and source analysis was needed. Further progress delayed by departure of TMDL author. Regional Board and EPA currently developing more comprehensive TMDL for adoption in 2001.
5	San Joaquin River selenium	1997	Regional Board refocused on actions to reduce Se loading and on Salt Slough/ Grasslands Se TMDLs. Scheduled TMDL adoption 2001-02
6	Heavenly Valley Creek sediment	1999	Submission of complete “technical” TMDL scheduled for 6/00. EPA may establish at State’s request.
6	Indian Valley Creek Reservoir phosphorus	1999	Submission of complete “technical” TMDL scheduled for 6/00. EPA may establish at State’s request.
7	Alamo River sediment	1999	Submission of complete “technical” TMDL scheduled for 4/00. Regional Board adoption scheduled for 2000
9	Rainbow Creek nitrogen and phosphorus	1999	Submission of complete “technical” TMDL scheduled for 4/00. EPA may establish at State’s request.
9	Chollas Creek diazinon	2000	Submission of complete “technical” TMDL scheduled for 4/00. EPA may establish at State’s request.

Source: SWRCB and RWQCBs, 1999.

In 1992 and 1994, the State provided very detailed “TMDL Worksheets” for each targeted waterbody which documented work completed and work which still needed to be done for each waterbody-pollutant combination (see Administrative Records for 1992 and 1994 Section 303(d) Lists). In some cases (e.g., tributaries to the Sacramento River impaired by rice pesticides), the actions described in the TMDL Worksheets resulted in attainment of water quality standards prior to completion of the TMDLs, and the TMDLs were therefore no longer needed. In 1996, more conventional lists of targeted waters and projected start and completion dates were provided in the list submittal (see Administrative Record for 1996 Section 303(d) List). In this case, the projected completion dates were for the “technical” aspects of the TMDLs (i.e., they did not provide for the substantial time needed for the State to adopt TMDL basin plan amendments).

Prior to 1997-98, limited Federal or State resources were dedicated to working on those TMDLs. Despite resource limitations, all Regional Boards initiated and (in some cases) completed scheduled TMDLs. Barriers to completion of TMDLs on schedule included:

- difficulties in conducting needed monitoring and modeling analyses,
- limited understanding of the time involved in completing various steps in the TMDL process,
- insufficient contractor support,
- stakeholder resistance and time spent in public involvement processes, and/or
- insufficient management and Board member understanding of TMDL requirements and support for timely TMDL completion.

EPA has established 16 TMDLs (12 of which were later superseded by TMDLs established by the State and approved by EPA) (see Administrative Records for State adopted and EPA adopted TMDLs for Newport Bay). Those TMDLs were established by EPA in response to consent decree TMDL development schedules. In the past, EPA has not acted to establish TMDLs developed, but not yet adopted by the State. EPA has funded past TMDL work with Federal grant funds, but did not indicate what would result from failure to complete and establish TMDLs. In the last two State/Federal grant cycles (FY 98/99 and 99/00), EPA has required specific commitments from the State to complete a specific number of TMDLs as a condition of accepting TMDL development funds. For the TMDL commitments made by the State, EPA has also indicated that it will establish those TMDLs that the State is not able to establish in the specified timeframe (see Strauss, 1999b). For TMDLs being developed by the State, at times the EPA’s expectations in terms of content of the TMDL have not been clear to the Regional Boards (see, e.g., North Coast Regional Board Program Review, EPA, 2000b). This has led to delays in completion of TMDLs and sometimes significant reworking of draft TMDLs in response to EPA’s comments (e.g., Rainbow Creek nutrient TMDLs).

The State has demonstrated, through its recent intensive efforts to develop TMDLs for high priority waters, its commitment and ability to develop TMDLs which are consistent with federal and state requirements (see Martinson, 1998 and Administrative Records for State submitted TMDLs). The State is generally on schedule in its development of TMDLs (see FY1999/00 workplan commitments). The State has hired several dozen new staff to develop TMDLs, and more than 70 FTE are currently dedicated to TMDL development statewide (personal communication with Stefan Lorenzato, SWRCB). It is expected that staff resources for water quality monitoring, TMDL implementation planning, and basin planning will increase further in FY2000-01, which would further enhance the State's TMDL program capacity (personal communication with Stefan Lorenzato, SWRCB).

EPA has demonstrated its commitment to actively working with and overseeing State TMDL development activities. This commitment is demonstrated through several actions by Region 9's TMDL Team (see EPA, 1999e):

- assignment of individual TMDL staff liaisons to work with each Regional Board,
- delivery of several TMDL technical and planning training courses each year,
- participation in workshops and hearings with appointed Board members and legislative committees to build understanding and support among senior decision-makers, and
- detailed review of TMDL workplans and draft TMDL elements at each stage of TMDL development (including meetings and detailed written comments on each draft TMDL).

These oversight and capacity building activities will assist in ensuring that the State staff has the technical capacity to develop TMDLs and fully understands how federal requirements can be met in different watershed and waterbody circumstances.

EPA and the State have also agreed to a work planning process, as reflected in the annual State-EPA grant workplan agreements, which provides a high level of accountability to ensure that the State delivers on its TMDL development commitments for the next 2 years (see Smith and Lorenzato, 2000). Beginning in 1999, the annual workplans account both for TMDLs funded with federal grant funds and TMDLs funded with State funds (see Smith and Lorenzato, 2000). Because EPA is providing a substantial level of grant funding in support of TMDL development each year, EPA retains significant leverage to ensure that each of the State's TMDL commitments are met. If the State fails to complete TMDL development in accordance with grant workplans, federal grant regulations authorize EPA to withhold grant payments and/or reduce future grant funding to the State. EPA has demonstrated its willingness to exercise this authority by including strict grant conditions in the FY1999/00 federal grants to ensure that detailed workplans are provided prior to spending new grant funds and that work is completed in accordance with these workplans (see, e.g., Pettit, 1999a).

Over the next two years, EPA plans to establish TMDLs when the State cannot establish TMDLs in a timely manner (e.g. consistent with consent decree or grant commitments). Table 7 lists TMDLs which EPA expects to establish in 2000 based on State draft TMDLs (assuming the Regional Boards complete the analytical work included in current federal grant workplans). EPA does not plan to establish TMDLs if the Regional Board moves the draft TMDL immediately into its adoption process.

Table 7: Potential TMDLs to Be Established By EPA in 2000

Regional Board	Waterbody	Pollutant(s)	Required By Decree?
1	Navarro River	temperature, sediment	yes
2	San Francisco Bay (8 segments)	mercury exotic species	no no
3	San Luis Obispo Ck.	nitrate	no
6	Indian Creek Res. Heavenly Valley Ck.	phosphorus sediment	no no
7	Alamo River New River	sediment bacteria	no no
9	Rainbow Creek Chollas Creek	nitrogen, phosphorus diazinon	no no

Source: SWRCB and RWQCBs, 1999.

Recommendations

The Regional Boards should continue to develop detailed work plans (budget and tasks) for TMDLs to be developed in the near term (3-5 years) (see Smith and Lorenzato, 2000). Part of the work planning process should include explicit consideration of the degree of stakeholder participation that can be accommodated within the time frame for completing the TMDL. To the extent that the Regional Board can not accommodate the interests of dischargers and other stakeholders, the Regional Board should still meet TMDL adoption obligations.

The Regional and State Boards need further education concerning TMDL process requirements in order to assist them in adopting and submitting completed TMDLs in a timely manner. Additional Board member outreach by EPA and State staff would help reduce the tendency of Boards to remand TMDLs for further work by staff in each instance where the TMDLs or implementation measures are controversial.

At present, California should retain its primary role in developing and submitting TMDLs for the State TMDLs for California because:

- the State has signaled its commitment to completing TMDLs in a timely manner,
- EPA and the State have increased grant and State funding for TMDL development from less than \$1 million/year in 1997 to more than \$7 million/year in 2000, and additional resource increases are projected next year in both federal and State budgets,
- the State has greatly improved its staffing and technical capacity to develop these TMDLs over the past 2 years,
- EPA and the State have established a rigorous work planning and oversight process to ensure a high level of accountability for completing TMDLs on schedule,
- EPA will be establishing a substantial number of TMDLs for California based on State-drafted technical documents in order to avoid near-term procedural delays in adopting TMDLs through the lengthy State adoption process, and
- EPA will continue providing a high level of oversight and technical assistance through the efforts of its Regional Board TMDL Liaisons, its technical and program planning training classes, and its detailed oversight of grant workplans.

If the State is unsuccessful in demonstrating its ability to adopt all completed TMDLs on a timely basis, EPA should consider continuing to establish completed TMDLs beyond the two year period. For the long term, the EPA and State need to identify and address any obstacles to the timely completion of adequate TMDLs. Specific process steps, with milestones, need to be developed to incorporate both State administrative requirements and adequate interaction with EPA during the State's TMDL development process.

Summary

California has submitted and EPA has approved a substantial number of TMDLs. The State has demonstrated its resolve to develop TMDLs for all the waters on its Section 303(d) list, and is building the staffing and technical skills needed to accomplish this substantial task. EPA has demonstrated its commitment to actively assisting and overseeing State TMDL development efforts. EPA has established a substantial number of TMDLs to meet consent decree requirements and is prepared to establish additional TMDLs as needed, both to meet consent decree schedules and to ensure that other TMDLs are put into effect on a timely basis.

5. Content of TMDLs

Findings

EPA reviewed final TMDLs submitted by the State since 1993 and draft TMDLs submitted for EPA review since 1998. The final TMDLs were consistent with federal statutory and regulatory requirements (see Administrative Records for approved TMDLs and EPA, 2000b). EPA found that most TMDL documents were organized in a format which better suits the State's basin planning process than it does EPA's suggested format for organizing TMDLs. In many cases it has been difficult to identify required TMDL elements in the documents submitted. However, EPA was able to clarify where required elements were located in all final TMDL submissions. Each of the TMDLs submitted for EPA approval contained implementation provisions not required under Section 303(d), but which meet the requirements of State law as well as Section 303(e). As a result, these TMDL submittals represent a more robust plan describing specific actions to be taken to attain standards and implement TMDLs, rather than simply providing an identification of maximum allowable pollutant loadings or needed reductions.

Most of the draft TMDLs reviewed by EPA contained one or two primary deficiencies that needed to be addressed to meet federal requirements (see, e.g., Smith, 2000). Significant deficiencies included TMDLs that would not result in standards attainment at all times, and unclear descriptions of the analytical connections between loading capacity, allocations, and estimates of pollutant loadings. In some cases, Regional Board TMDLs were based on overly simplistic approaches to TMDL development which could be improved by use of more sophisticated water quality analysis techniques. Few State staff are experienced in the use of these methods, and most Regional Boards have found it very difficult to contract with expert consultants to provide needed analytical support (see, Regional Board TMDL Program Reviews for Regions 1, 4, 6, and 8 in EPA, 2000b).

In a number of cases, EPA expectations with respect to minimum TMDL requirements were not communicated clearly to State staff (see, EPA, 2000b, e.g., Program Review for North Coast Board). This lack of clarity often led to misunderstandings as to what needed to be included in a TMDLs and the supporting documentation. In the past, EPA issued insufficient guidance and provided insufficient technical training to address this need. EPA has provided some contract and staff technical assistance to help Regional Boards devise TMDL development approaches. Many Regional Boards have not asked for technical assistance because they may have been unaware that it is available. Since 1998, EPA has increased the level of technical assistance it has provided for TMDL development through contractor support and assistance by EPA staff. EPA has provided additional technical training by conducting training classes in Regions 1, 3, 4, 5, 7, and 9 in 1998-99, and two statewide training classes targeted at new State staff in 2000. EPA issued final California Program Guidance in January 2000 to clarify TMDL requirements (see, EPA, 2000a).

Recommendations

The Regional Boards should communicate closely with EPA during the TMDL development process to ensure that minimum federal requirements are being met. EPA and the State should ensure staff receive adequate training on TMDL requirements and methods for meeting each of those requirements. This will likely necessitate the development of more advanced technical training by EPA and the State. The State should streamline its process for contracting with expert consultants to make contractor skills more readily available to the State.

EPA should widely disseminate its California TMDL Program Guidance established in 2000 to ensure that State staff understand minimum legal requirements for TMDLs. EPA should also continue to offer basic TMDL training courses as well as more advanced training classes to help build state understanding of TMDL requirements and the technical capacity to use state-of-the-art technical methods. EPA should continue to provide contract assistance to help devise methods to develop TMDLs for pollutants or waterbody situations which are new to California's TMDL program staff.

Summary

TMDLs submitted by California and approved by EPA met all federal TMDL requirements. Most draft TMDLs had content issues which needed to be addressed before the TMDLs were approvable, but the State has demonstrated the ability to address these concerns on a timely basis. EPA and the State need to continue educating new staff about TMDL requirements. EPA's California TMDL Program Guidance should assist in developing a common understanding of these requirements.

6. State Capacity/Funding for State's Program

Findings

Prior to 1997, the EPA and the State directed few resources to TMDL development. Some 205(j) and 319(h) grant project money was used for TMDLs and the Regional Boards directed staff to spend some time on TMDL development, but there was no directed and concerted effort to obtain funding for the TMDL program. Beginning in 1997, the State and EPA agreed to direct more Federal funds toward TMDL development. In 1998, federal grant funding for TMDL development exceeded \$1 million. In 1999 and 2000, federal grant funding for TMDLs exceeded \$3 million. EPA has also committed about \$1 million in EPA staff time and contract support to develop TMDLs directly and assist the State with TMDL development.

In 1999, the State received an increase in baseline funding from the legislature to address TMDLs (\$3.9 MM), including about \$3 million for staff and about \$1 million for

contract support. Interested parties have also contributed to some aspect of TMDL development in some Regions. The City of San Jose, for example, allocated more than \$2 million to support TMDL analysis for South San Francisco Bay, beginning in 1998.

Sufficient resources are currently being provided for California's TMDL program to complete and adopt TMDLs scheduled for completion in the next 3-5 years which meet minimum federal requirements. Projected increases in both State and federal funding for TMDLs are timely as they will be needed to support near term TMDLs based on more rigorous monitoring and analysis, and adopted through a more inclusive public involvement process. Additional resources will also be needed in the longer term to address the larger number of TMDL scheduled for completion in the middle and later years of the schedule.

These findings are based on a simple TMDL workload analysis and comparison of projected costs with available resources. This analysis was divided into two parts-- an analysis of TMDL activity scheduled for the next 3-5 years (i.e., through 2004) and in the period between 2005-2011. EPA divided the analysis into two periods because (1) the State's integrated planning process (the Watershed Management Initiative) focuses upon a 5 year period (see SWRCB and RWQCBs, 1998).

Near Term TMDL Costing Analysis

For the 5 year period from 2000-2004, EPA calculated the average number of TMDLs scheduled for completion each year during this period. The current total State and EPA budget for FY2000 was assumed to remain constant during this period (although increases in both State and Federal budgets for TMDLs in FY2001 have been proposed). The average funding available per TMDL was then calculated and compared with national estimates of TMDL development costs based on the experiences of several other States

Comparison of Near Term TMDL Workload and Available Funding
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Average TMDLs/year (2000-04) = 88
Available funding/year (State and Federal) = \$8 million
Available funding/TMDL = \$91,000
Estimated national average costs for mid-level TMDLs = \$75,000
Estimated national average costs for complex TMDLs = \$115, 000

(personal communication with Mike Haire, EPA Headquarters).

This analysis suggests that sufficient funds are available in the near term to support development of TMDLs of medium or higher complexity in California. Although some relatively simple TMDLs are currently under development in California, the State has elected to schedule a large number of relatively complex and difficult TMDLs in the next 5 years. In addition, as discussed above, California's adoption process is more complex and resource intensive than the approval processes most State's must implement. Therefore, it is reasonable to project average costs at the high end of the national average range. As discussed above, additional resources would be needed in the near term if scheduled TMDLs demand more sophisticated monitoring, modeling, or public participation approaches. EPA believes that the actual range of TMDL development costs in California will remain uncertain until further experience is gained by the State and Regional Boards.

Longer Term TMDL Costing Analysis

For the longer term period from 2005-2011, EPA calculated the average number of TMDLs scheduled for completion each year during this period. The current total State and EPA budget for FY2000 was assumed to remain constant during this period (although actual available funding several years from now is very difficult to predict). The average funding available per TMDL was then calculated and compared with national estimates of

Comparison of Longer Term TMDL Workload and Available Funding
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Average TMDLs/year (2005-11) = 132 Available funding/year (State and Federal) = \$8 million Available funding/TMDL = \$61,000 Estimated national average costs for simple TMDLs = \$33,000 Estimated national average costs for complex TMDLs = \$75,000
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TMDL development costs based on the experiences of several other States.

This analysis suggests that additional resources will be necessary in the longer term period to support development of TMDLs of medium or higher complexity in California. Unless available resources increase, the available resources per TMDL would fall about

mid way between the estimated national average TMDL costs for simple and mid-level TMDLs. Given the technical and administrative difficulties in TMDL development which California must address in adopting TMDLs (see Section 3), it would be very difficult for the State to develop effective TMDLs for all listed waters if resources do not increase in the future.

EPA believes that the actual range of TMDL development costs in the later years of the schedule is highly uncertain at this time. There is some potential that the cost per TMDL may decline to an unknown degree as the State staff gain experience and TMDL development tools are better established. On the other hand, it appears that waters scheduled for TMDL development in later years tend to have less available monitoring data or other analysis completed which could assist in TMDL development.

Cost Analysis Based on Costs Per Multi-TMDL Study

The State has projected a higher cost per TMDL (up to \$600,000/TMDL) than is used in this analysis (personal communication with Stefan Lorenzato, SWRCB). This projection is based on costs per TMDL study, and assumes most TMDL studies will address multiple waters and listed pollutants. For example, the TMDL schedule developed by the Los Angeles Regional Board organizes more than 750 TMDLs into about 93 individual study units. Although it is unlikely that each Regional Board's TMDL study plans would address so many individual waterbody-pollutant listings on average, each Regional Board is planning to group its 303(d) listed waters for study purposes. By comparison, EPA estimates the cost per multi-TMDL study may average in the range of \$100,000-200,000. This estimate is based on EPA's review of recently developed TMDLs in California and other States. The State's projected cost per TMDL also accounts for implementation planning, for which the EPA estimated costing factors do not account. EPA and State Board staff have roughly estimated that TMDLs for the 1471 waterbody-pollutant combinations would be developed through about 400 studies. At existing annual resource levels, approximately \$240,000/TMDL study would be available, which is at the low end of the range of State and EPA estimates of average study costs. This analysis reinforces the earlier conclusions that existing resources appear sufficient to address the near term TMDL schedule, but may be inadequate to address all waters scheduled in the later years of the schedule.

Because there is significant uncertainty underlying these findings concerning the prospective adequacy of available resources, EPA should regularly reevaluate the State's TMDL resource picture and development capacity in the future to consider the effects of changes in program requirements, resource needs, and resource availability.

Although existing State staffing appears adequate to address many near term TMDL development needs, additional contract funds and access to expert contractors will likely be needed to collect additional water quality information and to support modeling efforts. A number of Regional Monitoring Programs (e.g., in San Francisco Bay and

Santa Monica Bay) show promise for collaborative efforts at information collection to support both assessment and TMDL development efforts. The administrative difficulties of getting State contracts in place may delay the collection of new information or the timely completion of new modeling efforts. Currently, existing State staff do not have the background or training to fully address a number of TMDL related activities, including modeling, GIS/data management, facilitation, project management and education/outreach.

Prior to 1997, the EPA dedicated limited EPA staff resources to TMDL development in California, but currently has about 6 FTE working on California TMDL issues. Current EPA staff assistance is concentrated in those Regions under consent decrees (and is engaged in TMDL development in Regions 1 and 4) and is not necessarily distributed based on number and complexity of TMDLs which need to be done statewide.

Recommendations

The EPA and Regional Boards should work together to identify the skills needed for TMDL development. The Regional Boards should either hire new staff with those skills or provide necessary training to existing staff. To address near term State contracting difficulties, the State should consider allowing EPA to redirect TMDL grant funds to EPA's national TMDL contract. As soon as possible, the State should establish a "master" contract to address 303(d) assessment and TMDL development needs in order to minimize time delays in completing key tasks. The State should continue to work with the discharger community and other interested parties to develop regional monitoring programs to address monitoring data needs. The State should actively seek partners who are willing to contribute to different aspects of TMDL development and 303(d) assessment.

EPA should continue to allocate dedicated grant funding for TMDL development and 303(d) assessment. EPA should work with the State to allocate an adequate amount of resources from both federal and State sources to meet any new EPA requirements for preparation of the 303(d) list and TMDLs which may be reflected in the revised TMDL regulations. EPA should collaborate with the State in establishing Regional Monitoring Programs that will support both 303(d) assessment and TMDL development. EPA should identify the staff resources it has available to help the State address its TMDL development needs. EPA should assist in providing training, especially for project planning, data analysis, and modeling software packages. The EPA should review its current distribution of EPA staff and assign EPA staff based on number and complexity of TMDLs being addressed by the Regional Boards.

Summary

Sufficient resources are currently being provided to support TMDL development over the next 3-5 years consistent with minimum federal requirements.

If proposed resource increases are approved, the State could make badly needed improvements in its capacity to collect needed data and apply more sophisticated TMDL development methods, thereby increasing the likelihood of stakeholder support for TMDL conclusions. In the period between 2005-1011, additional resources are likely to be needed to enable the State to address the larger number of TMDLs scheduled for completion. EPA and the State should continue ongoing efforts to build staff technical capacity and access to expert contractor support.

7. TMDL Implementation/Monitoring

Findings

For most TMDLs developed in California, the State is required under State law to identify implementation measures as part of the State adoption process (see Attwater, 1999). This requirement strengthens the prospective effectiveness of State adopted TMDLs, but may cause some delays in completion of TMDLs.

For those Regional Boards (North Coast, Central Valley, and Santa Ana) that have completed TMDLs, the implementation plans are generally comprehensive and include specific actions to be taken, compliance time frames with interim milestones, schedules for review of the TMDL (for phased TMDLs), and a mechanism to monitor and evaluate progress (see, e.g., Newport Bay pathogen TMDLs, 2000). Some Regional Boards have already developed implementation plans that they expect to result in attainment of standards. For those water bodies and pollutants, the Regional Boards are developing TMDLs to demonstrate the linkage between the adopted implementation plan and attainment of standards.

EPA has not provided clear guidance on how to translate TMDL waste load allocations into effluent limitations in permits. The expectations for determining the adequacy of non-point source management plans with respect to implementation of load allocations are also unclear (e.g. it is not clear how CZARA management measures and practices should be reflected in TMDL implementation plans).

Recommendations

The State should develop a framework for TMDL implementation plans, which describes common characteristics that each plan should contain. Valuable characteristics of TMDL implementation plans that have been adopted include: compliance time frames, interim milestones, schedules for review and revision of the TMDL or standards, a description of the mechanisms to be employed to ensure implementation, and a description of the mechanism to be used to monitor and evaluate progress.

The State should be cautious in making commitments to intensively followup all adopted TMDLs. The Regional Boards should balance the benefits of applying an active adaptive management approach to TMDL review and revision with the costs of spreading available staff too thin across too many followup projects.

EPA and the State should develop clear guidance on how to translate TMDL waste load allocations into effluent limitations for permits. Such guidance is especially critical for those NPDES permits that have not traditionally contained numerical effluent limitations (e.g. general permits and municipal storm water permits). EPA and the State

should also develop clear guidance on how CZARA management measures and nonpoint source management practices should be reflected in TMDL implementation plans.

Summary

California's focus on implementation planning concurrent with TMDL development will enhance the likelihood that TMDLs will be effectively implemented, although this linkage may delay completion of some TMDLs. State implementation plans to date are reasonably detailed. Implementation and monitoring plans would be improved if the State developed and applied a framework for TMDL implementation plans, monitoring plans, and TMDL followup schedules. Additional guidance concerning the relationship between TMDLs and NPDES permitting and nonpoint source control mechanisms would further smooth the transition between TMDL planning and implementation of point and nonpoint source controls.

8. Proposed Action Plan for Implementing Recommendations

Action (reference to program review section)	Outcome	Responsible Entity	Completion Date	Funding Required
1. Updated 303(d) listing guidelines. (Sections 2 and 3)	303(d) listing guidelines that provide for a consistent and more clearly described approach for assessing attainment of water quality standards, identify existing and readily available data, setting priority rankings, and setting balanced schedules.	State Board (lead) with RB and EPA support.	1 year prior to release of draft lists.	\$50-100K if State Bd approval required
2. Brief State and Regional Board members on listing and TMDL requirements ((Sections 2 and 4)	Ensure that Board members are fully aware of federal and state requirements concerning 303(d) list and TMDL adoption in advance of Board actions	State and EPA	~3 months prior to approval date	No
3. Complete State data management system (Section 2)	Complete and implement statewide electronic data management system to assist in storing and analyzing data for 303(d) list assessments and other uses.	State and Regional Boards	6/01	unknown
4. Establish an MOA between EPA and the State on TMDL development schedule and procedures. (Section 3)	An MOA which describes existing TMDL development schedule, TMDL adoption procedures, protocols for State-EPA coordination on lists and TMDLs, and procedures for EPA action if list or TMDL development schedules are not met.	EPA and State Board (lead) with RB support	6/01	No
5. Detailed work plans for TMDLs to be completed in the next 3-5 years. (Section 4)	A clear set of tasks, budgets, and milestones for each TMDL to be completed over the next 3-5 years. A description of the extent to which stakeholder participation can be accommodated.	RB (lead). State Board and EPA support.	5/01 or next grant work plan.	No.
6. Identification of skills required for TMDL development tasks. (Section 5)	An identification by Regional Board of the set of skills that will be necessary to successfully complete development of TMDLs. Identification of which skills will be acquired through hiring versus training.	RB (lead). State Board and EPA support.	9/00	No.
7. Identification of training on use of TMDL development tools from EPA. (Section 5)	A list and description of: training courses that EPA can offer, the amount of post-training support available, and the total budget available for training.	EPA	8/00	No.

8. Provide TMDL project planning and project management training (Sections 3-5)	Provide 2 sessions of new training to State and Regional Boards on TMDL project planning, cost estimation, and management	EPA, with State participation	12/00	\$30,000 (already allotted)
9. Develop TMDL implementation plan framework (Section 7)	Develop framework for TMDL implementation and monitoring plans to guide Regional Board TMDL development.	State and Regional Boards, with EPA help	2/01	Limited
10. Develop guidance for translating TMDLs into NPDES limits	Provide guidance for permit writers to assist in identifying effluent limitations for NPDES permits based on wasteload allocations	State Board with EPA help	6/01	Limited
11. Evaluate TMDL adoption process and identify streamlining options.	Evaluate State TMDL adoption process and identify potential procedures and mechanisms for streamlining the adoption process.	State and Regional Boards	6/01	unknown
12. Implement TMDL tracking system including cost tracking	Establish and implement TMDL tracking system to assist in TMDL workload management and oversight, track TMDL costs to assist in future TMDL program cost estimates and requests for program funding.	State and EPA	12/01	~\$50,000 if based on EPA prototype

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SWRCB and RWQCBs, 2000. Integrated FY 2000-01 Federal Funds Workplan For California TMDL Program Support, April 14, 2000.

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Strauss, 1999b. Letter from Alexis Strauss to Walt Pettit, September 3, 1999.

U.S. Department of Commerce- NOAA and EPA, 2000. Coastal Nonpoint Pollution Control Program: Approval Decision on California Coastal Nonpoint Pollution Control Program. 65 FR 25311, May 1, 2000.

Vassey, 1999. Memorandum from Shelia Vassey to Stefan Lorenzato, 1999.

State Board Documents Containing 303(d) Lists and/or TMDLs

1975 List of Water Quality Segments

1978 List of Water Quality Segments

Water Quality Inventory for Water Years 1978 and 1979, April 1980

Water Quality Inventory for Water Years 1980 and 1981, July 1982

Water Quality Inventory for Water Years 1982 and 1983, June 1984

1986 Water Quality Assessment for Water Years 1984 and 1985, June, 1986

Water Quality Assessment for Water Years 1986 and 1987, July 1988

Regional Board 1

Water Quality Control Plan Report- Klamath River Basin (1A), 1975, (contains WQLS, wasteloading, and TMDL elements)

Water Quality Control Plan Report- North Coastal Basin (1B), 1975, (contains WQLS, wasteloading, and TMDL elements)

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., April 16, 1986, approving basin plans for Klamath River and North Coast Basins.

California Regional Water Quality Control Board, North Coast Region, Resolution 85-10, October 23, 1985 (adopting triennial review priority list)

Letter from EPA Regional Administrator Judith Ayers to Don Maughan, SWRCB, July 21, 1986, approving amendments to North Coast Boards triennial review under authority of Section 303(d), among other authorities, (with staff report)

Regional Board 2

Water Quality Control Plan Report- San Francisco Bay Basin, 1975, (contains WQLS, wasteloading, and TMDL elements)

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., April 16, 1976, approving basin plan for San Francisco Bay Basin.

Letter from EPA Water Management Division Director Frank Covington to Clint Whitney, SWRCB, February 18, 1983 approving basin plan amendments as updates of TMDL/WLA for San Francisco Bay Region.

Regional Board 3

Water Quality Control Plan Report- Central Coastal Basin, 1975, (contains WQLS, wasteloading, and TMDL elements)

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., April 16, 1976, approving basin plan Central Coastal Basin.

Letter from EPA Regional Administrator Judith Ayers to Carole Onorato, SWRCB, August 2, 1984, approving amendments to basin plan for Central Coastal Basin under authority of Section 303(d), among other authorities, with staff report.

Regional Board 4

Water Quality Control Plan Report- Santa Clara River Basin (4A), Part I, II, Vol. I, March 1975, (containing WQLS, wasteload analysis, and TMDL elements) and staff report.

Water Quality Control Plan Report- Los Angeles River Basin (4B), Part II, Vol. II, March 1975, (containing WQLS, wasteload analysis, and TMDL elements) and staff report.

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, April 16, 1976, approving basin plans for Santa Clara River and Los Angeles River Basins.

Letter from EPA Regional Administrator Judith Ayers to Carol Onorato, SWRCB, October 22, 1984, approving basin plan amendments for Santa Clara River Basin and Los Angeles River Basin under Section 303(d), among other authorities.

Regional Board 5

Water Quality Control Plan Report- Sacramento River Basin, Sacramento-San Joaquin Delta Basin, and San Joaquin Basin, Vol. II, 1975, (contains WQLS, wasteload analysis, and TMDL elements).

Water Quality Control Plan Report- Tulare Lake Basin (5D), Part II, III, and IV, August 1975, (contains WQLS, wasteload analysis, and TMDL elements).

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., May 28, 1976, approving basin plan for Tulare Lake Basin

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., June 2, 1976, approving basin plans for Sacramento River Basin, Sacramento-San Joaquin Delta Basin, and San Joaquin Basin.

Letter from EPA Regional Administrator Judith Ayers to Carole Onorato, SWRCB, September 20, 1984 approving amendments to basin plan for Central Valley Basin under authority of Section 303(d), among other authorities.

Regional Board 6

Water Quality Control Plan Report- North Lahontan Basin (6A), 1975, (contains WQLS, wasteload analysis, and TMDL elements).

Water Quality Control Plan Report- South Lahontan Basin (6B), 1975, (contains WQLS, wasteload analysis, and TMDL elements).

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., April 16, 1976, approving basin plan for North Lahontan Basin.

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., June 21, 1976, approving basin plans for South Lahontan Basin

Lake Tahoe Basin Water Quality Plan, January 20, 1983 (containing wasteload analysis)

Letter from EPA Regional Administrator Sonia Crow to Clint Whitney, SWRCB, May 11, 1983 approving amendments to Lake Tahoe Basin Plan and acknowledging the amendment does not affect existing waste load allocations).

Letter from EPA Regional Administrator Judith Ayers to Don Maughan, SWRCB, July 10, 1986, approving amendments to the basin plan for North Lahontan Basin pursuant to Section 303(d) (1)(C), among other authorities.

Regional Board 7

Water Quality Control Plan Report- West Colorado River Basin (7A), 1975, (contains WQLS, wasteload analysis, and TMDL elements).

Water Quality Control Plan Report- East Colorado River Basin (7B), 1975, (contains WQLS, wasteload analysis, and TMDL elements).

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund Brown, Jr., July 7, 1976, approving basin plan for West Colorado River Basin.

Letter from EPA Regional Administrator Judith Ayers to Raymond Stone, SWRCB, September 6, 1985, approving amendments to basin plan for Colorado River Basin under Section 303(d), among other authorities.

Regional Board 8

Water Quality Control Plan Report- Santa Ana River Basin (8) Part 1 and 2, 1975 (contains WQLSs, wasteload estimates, and TMDLs)

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund G. Brown, May 7, 1976 (approving basin plan adopted April 17, 1975, including WQLS and TMDL elements)

Water Quality Control Plan- Santa Ana River Basin (8), 1984 (contains TMDLs for Santa Ana River)

Letter from EPA Regional Administrator Judith Ayers to Carole Onorato, SWRCB, approving basin plan for Santa Ana River Basin pursuant to Section 303(d), among other authorities.

Regional Board 9

Comprehensive Water Quality Control Plan Report- Santa Diego Basin (9), 1975 (contains WQLSs, wasteload estimates, and TMDLs)

Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund G. Brown, July 26, 1976 (approving basin plan adopted March 20, including WQLS and TMDL elements)

Letter from Michael Campos, SWRCB to Judith Ayers, EPA, March 9, 1984, submitting amendment to water quality control plan for San Diego Region, with attachment.

Letter from EPA Regional Administrator Judith Ayers to Carole Onorato, SWRCB, June 22, 1984, approving amendments to basin plan for San Diego Basin under authority of Section 303(d), among other authorities, with staff report.

List of Consent Decrees Cited

Pacific Coast Federation of Fishermen's Associations, et al. v. Marcus, entered March 7, 1997.

Defend the Bay, Inc. v. Marcus, entered November 13, 1997.

Heal the Bay, et al. v. Browner, entered March 22, 1999.

List of Administrative Records Cited

1992 Section 303(d) List Proposed Decision

1992 Section 303(d) List Final Decision

1994 Section 303(d) List Final Decision

1996 Section 303(d) List Final Decision

1998 Section 303(d) List Final Decision

Santa Ana River Nitrogen TMDLs (1994)

Laguna de Santa Rosa Ammonia, Nitrogen, and Dissolved Oxygen TMDLs (1995)

Garcia River Sediment TMDL (1997)

Redwood Creek Sediment TMDL (1998)

South Fork Trinity River Sediment TMDL (1998)

Newport Bay/San Diego Creek Sediment and Nutrient TMDLs (EPA Decision) (1998)

Salt Slough Selenium TMDL (1999)

Newport Bay/San Diego Creek Sediment and Nutrient TMDLs (State Decision) (1999)

Noyo River Sediment TMDL (1999)

Van Duzen River Sediment TMDL (1999)

South Fork Eel River Temperature and Sediment TMDLs (1999)

Newport Bay Fecal Coliform TMDLs (2000)

List of Personal Communications Cited

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Telephone calls with Stefan Lorenzato, SWRCB, March 2, 2000 and April 4, 2000.

Telephone call with Dr. Leslie Shoemaker, Tetra Tech, Inc., May 3, 2000.

Telephone call with Shelia Vassey, September 9, 1999.

Appendix A:

Analysis of California Listing and TMDL Actions from 1975-1986

California has addressed Section 303(d) listing and TMDL analysis requirements since the first round of basin planning completed in the mid-1970s. These basin plans were updated periodically in the early and mid-1980s. This appendix summarizes State actions to list water quality limited segments and address TMDL analysis requirements in these early basin planning actions.

Basin Plans From 1975-76

The federal regulations which governed early basin planning efforts (promulgated in 1975) included requirements to:

- list water quality limited segments (40 CFR 131.11(b)),
- develop TMDLs (40 CFR 131.11(f)) and component parts, and
- develop “point source load allocations” (40 CFR 131.11(g)).

EPA reviewed the initial round of basin plans adopted by California in 1975-76, and EPA’s approval actions concerning these basin plans. Each Basin Plan contained a detailed assessment of existing water quality conditions, both point and nonpoint source waste loads,

analysis of which waters were effluent limited or water quality limited, and point and nonpoint source control needs (see Chapter 14 and 15 of each Basin Plan).

EPA issued separate approval letters for each separate basin plan.⁴ In those approval letters, EPA identified basin plan required elements which were met, addressed, or not met. An action indicating that an element was addressed means that the requirement was addressed, “but may require more detailed consideration, or may necessitate future changes as a result of changing conditions and the need to further consider environmental impacts.” (Letter from EPA Regional Administrator Paul DeFalco to Governor Edmund G. Brown, Jr., April 16, 1976, Enclosure 4). Table A-1 summarizes EPA’s decisions with respect to each basin plan approval decision concerning listing and TMDL development.

Table A-1: EPA Actions on Listing and TMDL Components of 1975-76 Basin Plans

Basin/Region	WQLS Listing	TMDLs	Point Source Load Allocations
Klamath River (1A) North Coastal (1B)	addressed no WQLS listed	addressed	addressed
San Francisco Bay Basin	addressed 8 WQLS listed	partially met, partially addressed, partially not met. Basin Plan includes TMDLs for 3 listed segments	not met Basin Plan includes point source allocations for 3 listed segments
Central Coast (3)	addressed no WQLS listed	partially addressed, partially not met	not met
Santa Clara River (4A) Los Angeles River (4B)	addressed no WQLS listed	addressed	addressed
Sacramento River (5A) Sac.-S, Joaquin Delta(5B) San Joaquin (5C)	addressed 8 WQLS listed	partially addressed, partially not met	not met
Tulare Basin (5D)	addressed	addressed	addressed

⁴ Several Regional Board areas were divided into more than one planning area (e.g. Santa Clara Basin (4A) and Los Angeles River Basin (4B) in the Los Angeles Region. Separate basin plans were developed for each planning area, submitted to EPA, and approved by EPA.

	no WQLS listed		
North Lahontan (6A) South Lahontan (6B)	addressed 2 WQLS listed	addressed	addressed
West Colorado (7A)	addressed 3 WQLSs listed	not met	not met
Santa Ana (8)	addressed 1 WQLS listed	addressed 4 TMDLs included for Santa Ana River Reach 3	addressed
San Diego (9)	addressed 8 WQLSs listed	partially met, partially addressed, partially not met. States no assimilative capacity is available for 8 WQLSs	addressed

EPA Actions on State Basin Plans Under Section 303(d) in the 1980s

California regularly updated its basin plans during the late 1970s and early 1980s, often in conjunction with the triennial review process. Most of the revised basin plans retained the original or revised versions of the analyses of WQLS and TMDLs. The federal regulations addressing Section 303(d) had been changed in 1979, and provided less detail with respect to State obligations with respect to this Section (see 40 CFR 35.1511 in effect after 1979). EPA approved the assessment and implementation elements of these revised basin plans pursuant to Section 303(d) in a series of Basin Plan actions in the early 1980s. Each of these approval actions was supported by a brief staff report explaining the basis for the approval under Section 303(d). Table A-2 summarizes these approval actions.

Table A-2: Summary of EPA’s 303(d) Approval Actions Concerning 1980s Basin Plans

Regional Board	Date of EPA Approval	Specific 303(d) Reference in EPA Approval
1	7/21/86	“EPA further acknowledges fulfillment of Section 303(d) of the (Clean Water) Act”
3	8/2/84	“I am also approving Chapter 5, “Implementation” under Section 303(d) of the Clean Water Act, based on my determination that the waste load allocations identified in the plan is consistent with the protection of the quality of the water and the purposes of the Act.”
4	10/22/84	“I am also approving Chapter 5, “Implementation” under Section 303(d) of the Clean Water Act, based on my determination that the waste load allocations identified in the plan is consistent with the protection of the

		quality of the water and the purposes of the Act.”
5	9/20/84	“I am also approving Chapter 5, “Implementation” under Section 303(d) of the Clean Water Act, based on my determination that the waste load allocations identified in the plan is consistent with the protection of the quality of the water and the purposes of the Act.”
6	7/10/86	“I am also approving the amendment to Chapter 5 “Implementation Plan” under Section 303(d)(1)(C) and 303(e)(3)(C) of the Act. This approval is based on my determination that the load allocation determinations and resultant waste discharge prohibition for new development identified in the plan is consistent with the maintenance and protection of water quality and with the purposes of the Act.”
6- Lake Tahoe	9/18/81, reaffirmed 5/11/83	“We also find that the amendment is consistent with the existing basin plan and does not alter our September 18, 1981 approval of the Lake Tahoe Basin Plan. In addition, we acknowledge that the amendment does not affect water quality standards or waste load allocations.”
7	9/6/85	“I am also approving Chapter 6 “Implementation Plan” under Section 303(d) of the Act, based on my determination that the waste load allocation identified in the plan is consistent with the protection of the quality of the water and the purposes of the Act.”
8	4/25/84	“I am also approving Chapter 4, “Implementation”, under Section 303(d) of the CWA, based on my determination that the waste load allocation identified in the plan is consistent with the protection of the quality of the water and the purposes of the Act.”
9	6/22/84	“I am also approving these amendments pursuant to Section 303(d) of the Clean Water Act.”

Because most of the Basin Plans upon which these TMDL approvals were based were revised again in the early to mid 1990's, EPA has not retained copies of each of the Basin Plans and associated State actions referenced in these letters. EPA staff are working with State Board staff to locate copies of these documents in State archives, and this analysis may be revised in the future based on a more detailed review of the underlying State decision documents.

Analysis and Conclusions

The WQLS and TMDL elements of the 1970s basin plans usually do not take the same form as TMDLs developed in the 1990s. Different regulatory requirements pursuant to Section 303(d) were in place at that time. Several of the TMDLs in these basin plans do include calculations of assimilative capacity, allocations to point sources (and by inference, estimates of nonpoint source allocations), consideration of seasonal variations, and margin of safety considerations. The 1975-76 TMDLs for South San Francisco Bay (oxygen demand), Napa River (oxygen demand), Petaluma River (oxygen demand), Santa Ana River (P, N, NH₃, TDS) each share these attributes. In addition, the analysis of 8 WQLSs in the San Diego Region concludes

that no assimilative capacity is available (inferring that the TMDL equals zero). For each Regional Board, the analysis of point and nonpoint source wasteloads and associated water quality assessments is very thorough with respect to conventional pollutants of highest concern at that time. The State clearly devoted substantial resources to the analysis required by Section 303(d). The State clearly took actions pursuant to Section 303(d) and its implementing regulations which were reviewed and either approved or disapproved by EPA.

EPA again reviewed State actions pursuant to Section 303(d) in the context of the basin plan revisions submitted in the mid 1980s. EPA's actions in the mid 1970s and 1980s demonstrated EPA's attention to Section 303(d) and actions to recognize State implementation of these requirements at that time.