Proposed Statewide Policy for Biological Objectives in Perennial Wadeable Streams

PUBLIC SCOPING MEETING

INFORMATIONAL DOCUMENT

Introduction

In order to improve protection of aquatic life beneficial uses, the State Water Resources Control Board (State Water Board) is proposing to develop a statewide biological objectives policy for perennial[1] wadeable[2] streams. The proposed policy will address the need for statewide consistent, enforceable, and scientifically rigorous tools for evaluating aquatic life use attainment in these waterbodies.

The State Water Board is required by the California Environmental Quality Act (CEQA) to conduct an environmental impact analysis of the proposed policy. The State Water Board's adoption of a statewide policy for water quality control is a certified "exempt regulatory" program under CEQA. Prior to circulating the draft substitute environmental documents, the State Water Board is required to seek early public consultation that includes one or more scoping meetings. The purpose of the scoping meeting is to solicit input from public members and agencies regarding the range of the proposed policy, potential significant environmental impacts of the proposed policy, cumulative impacts if any, mitigation measures, possible alternatives, and to eliminate from detailed study issues found not to be important..

This document provides background information for the CEQA scoping meeting. It contains (1) an overview of applicable beneficial uses and water quality objectives and a discussion of biology-based monitoring, (2) a description of the proposed process for developing biological objectives for perennial wadeable streams, (3) a review of the regulatory context, and (4) an evaluation of several potential alternatives.

Overview

Aquatic life health is an essential component of water quality. This is recognized by the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), commonly known as the Clean Water Act, and the state Porter-Cologne Water Quality Control Act (Water Code § 13000 et seq.) both of which define water quality in terms of the biological, chemical and physical characteristics of water.[3,4] These laws are implemented in California by the State Water Board (and the Regional Water Quality Control Boards (Regional Water Boards), the state's primary water quality regulatory agencies.

[1] "Perennial stream" means: A stream with the year round presence of flowing surface water during a typical water year. Any stream that does not meet this definition is considered "non-perennial".
[2] "Wadeable stream" means: A stream that can be crossed safely by wading during the standard sampling period (index period).
[3] The Clean Water Act states, "The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (Clean Water Act, § 101(a).)
[4] The state Porter-Cologne Water Quality Control Act defines the quality of water as the "… chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use". (Water Code, §13050(b).)

Each Regional Water Board has a basin plan that assigns beneficial uses[5] to all waterbodies in its region. Aquatic life beneficial uses include warm water habitat, cold water habitat, marine and estuarine habitat, migration, spawning, wetland habitat, wildlife habitat, and preservation of rare, threatened or endangered species. The aquatic life use designations protect plants and animals including fish and other wildlife and aquatic invertebrates. Most, if not all, of the state's waterbodies have one or more aquatic life beneficial uses assigned to them.

Regional Water Board basin plans also contain water quality objectives[6], which are established to protect beneficial uses. Water quality objectives (which are called water quality "criteria" in the Clean Water Act) may be expressed as either narrative statements, or numeric limits, or both. All Regional Water Boards have adopted a narrative water quality objective for toxics; for example, "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life" (CVRWQCB 1998). Some Regional Water Boards also have narrative water quality objectives for wetlands protection, sedimentation, and biostimulatory substances. However, none of the Regional Water Boards' narrative objectives has numeric expressions for biological condition and therefore, are not enforceable in regulatory programs.

Numeric objectives are typically expressed as a threshold value (or range) of a substance that should not be exceeded in a specified time frame. For instance, the San Francisco Regional Water Board's numeric objective for arsenic states that concentrations of arsenic may not exceed 36 µg/L (4-day average) or 96 µg /L (1 hour average) (SFRWQCB 2010). Numeric water quality objectives are derived by means of recognized, scientifically rigorous procedures such as the water quality criteria guidelines established by the United States Environmental Protection Agency (U.S. EPA) (U.S. EPA 1985). The numeric water quality objectives in effect in California are almost exclusively based on chemical, physical or toxicological thresholds. However, these measurements can be poor indicators of aquatic life use attainment (biological integrity) because they are not direct measures of the biological community. Pollutant levels often fluctuate over time and toxic levels may not be detected at the time of sampling. Also, waterbodies often are exposed to multiple chemical and physical stressors (such as toxic chemicals, excess nutrients, habitat alteration, etc.) and it often is difficult and expensive to measure each stressor individually.

Bioassessment is a method of measuring the resident aquatic organisms (fish, algae and macroinvertebrates[7]) as indicators of biological integrity. Since these organisms

[5] "'Beneficial uses' of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves." (Water Code, § 13050(f).)

[6] "'Water quality objectives' means the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." (Water Code, § 13050(f).)

[7] Macroinvertebrates are insects, arthropods, and other invertebrates (worms, clams, etc.) that are large enough to be seen with the naked eye.

live in the waterbody they integrate the effects of different stressors over time and provide a record of cumulative environmental impacts (Karr and Chu 1999). Bioassessments rely on using standardized protocols to survey the resident aquatic biota. An evaluation of biological integrity can be made by comparing species composition at a site to that at appropriate reference sites. Bioassessment provides a direct measure of biological condition (USEPA 2002).

Key to using bioassessments for evaluation of biological integrity is the concept of the reference condition. The reference condition is the desired ecological condition against which test sites are compared. As there are very few places with absolutely no anthropogenic stressors, reference conditions will be represented in most cases by "minimally disturbed" conditions.[8] Test sites are compared to pools of reference sites that are similar to the test sites in characteristics such as geology, precipitation, slope, etc. to account for natural variation. So, for example, the species composition in a mountain stream would be quite different from that of a valley floor stream.

There are two common tools for determining numerically whether a test site meets its biological expectations: an Index of Biological Integrity (IBI) or an Observed/Expected Index (O/E). An IBI is a composite of a set of metrics (measures) of the biological community (e.g., taxa richness[9], the percentage of pollution intolerant or tolerant taxa). Appropriate metrics are chosen based on their ability to measure the impact of land use stresses. O/E indices compare the number of taxa observed at a site to the number expected to occur at that site. The expected number is modeled based on the geographic and physical characteristics of each site. Both IBIs and O/E approaches have been used for over 30 years throughout the United States and Europe and are well-accepted (Karr 1981, Wright 1981).

One of the difficulties of defining reference conditions in California is that many waterbodies in the state have been severely altered from their natural condition. Some of these alterations are not a result of controllable environmental factors and thus do not fall under the regulatory authority of Cal/EPA. "Controllable" water quality factors are generally defined in the basin plans as human actions that influence water quality that can be controlled. "Uncontrollable" factors, on the other hand, are either from natural sources or are impacts that cannot reasonably be expected to change (i.e., they would cause widespread economic, social or environmental impact). In highly altered systems where biological conditions are limited by uncontrollable factors, the focus is on expectations for the "best attainable" conditions; that is, the conditions that can be expected even in highly altered areas after best management practices have been implemented to eliminate all controllable factors.[10]

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[8] Working definitions of "reference conditions" and other related terms can be found at the following link (note that these definitions are under discussion and may be refined in the future): http://www.swrcb.ca.gov/plans_policies/docs/biological_objective/presentations/111810/definition_terms.pdf.

[9] "Taxa richness" means: The number of distinct species or taxa that are found in an assemblage, community, or sample. http://www.pca.state.mn.us/index.php?option=com_glossary&letter=T&id=392.

[10] See working definitions footnote (7) above.

History of Bioassessment in California

Bioassessment has been conducted in California by state, federal and university led programs since the early 1990s. At that time, faculty at UC Berkeley, Humboldt State, and UC Santa Barbara began conducting research projects using bioassessment; and federal agencies such as the USGS, U.S. EPA and the USFS also initiated bioassessment monitoring projects. In 1993, the Department of Fish and Game (DFG) opened the Aquatic Bioassessment Laboratory. DFG later developed the California Stream Bioassessment Procedures (Harrington 1999), a bioassessment sampling protocol for benthic macroinvertebrates[11], (BMIs) that was utilized by many organizations, including the Regional Water Boards and citizen monitoring groups. In addition, the California Bioassesment Workgroup (CABW) was created to network and exchange information about bioassessment.

Most early bioassessment monitoring efforts were small-scale demonstration projects or evaluations of point source impacts. A great amount of data was generated but sampling protocols were often inconsistent between projects, which made comparisons difficult. Also, reference conditions were frequently determined on a project-specific basis, and there was no centralized structure for quality assurance and control or data management.

In 2005 the State Water Board's Surface Water Ambient Monitoring Program (SWAMP) began to support bioassessment monitoring. The SWAMP and the DFG (with support from the U.S. EPA) developed standardized bioassessment protocols for perennial, wadeable streams using BMIs as indicators (Ode 2007). To date, reference conditions have been described for most biogeographic regions in the state (Ode et al. 2005; Rehn et al. 2005; Rehn et al. 2008; Herbst and Silldorff 2009). In 2009 the SWAMP released the *Reference Condition Management Plan* which provides recommendations for developing reference conditions for perennial, wadeable streams in California, and includes a discussion of suggested methods for determining reference conditions in highly altered systems (Ode and Schiff 2009). Efforts are also underway to develop and implement bioassesments using algae (Fetscher and McLaughlin 2008). In addition, the SWAMP oversees the development of quality assurance guidance and data management tools related to bioassessment. These efforts have focused primarily on perennial, wadeable streams, which make up an estimated 24% of stream miles in the state (Ode et.al. In prep). Further work is still needed on other types of waterbodies, such as non-perennial streams, large rivers, lakes and wetlands.

A recent, statewide study concluded that approximately 50% of the State's perennial stream miles have either altered or severely altered biological condition and up to 60% have degraded physical habitat. The study also found that degraded biological condition occurs in areas in which agricultural and urban development are prevalent (Ode et.al. 2011). The population of California is projected to increase to 60 million people by 2050 (up from 34 million in 2000) (State of California Department of Finance

[11] Benthic macroinvertebrates: Animals without backbones, living in or on sediments or other substrates, of a size large enough to be seen by the unaided eye.
http://www.epa.gov/owow/watershed/wacademy/acad2000/rbp/glossary.html

2007), which will only exacerbate these problems in the future. This underscores the need for accurate and consistent measures of biological integrity that are implemented statewide.

Biological Objectives

Biological objectives (or biological criteria) are expressions of desired biological condition that are adopted into a state's water quality standards[12]. They are derived from bioassessment data and may be expressed as either narrative statements or numeric limits (or both). Many states have adopted biological objectives (U.S. EPA 2002).

The State Water Board is proposing to develop a statewide policy for biological objectives. A statewide policy will provide useful measurements of biological integrity as well as a framework for implementing them; ensuring maximum protection for the state's aquatic biological resources. The required characteristics, guidelines and a workplan for a statewide biological objectives policy are discussed below.

Need for Policy

Streams are degraded. For the past 20 years the State Water Board, U.S. EPA, and the DFG have invested significant resources to develop and implement a biological monitoring program in California. Ten years of data show that roughly half of California's perennial stream miles do not support the same diverse biological community as reference[13] streams. Also over half of California's stream miles have some form of habitat disturbance. So despite 40 years of water quality regulation, streams still are degraded.

Furthermore, many of the streams in good condition, including some reference streams, are located in areas of California slated for significant urban development in the next 20 to 50 years . Degradation of those streams is inevitable without strong policies in place to prevent it. In fact, some areas of the state already are so degraded and modified that there are no reference streams available to define desirable biological condition.

Mechanisms for protecting streams are limited. A goal of the federal Clean Water Act is to maintain and restore biological integrity of surface waters. The Clean Water Act's anti-degradation framework and the State Water Board's Policy for Protecting High Quality Waters (Resolution 68-16) could be applied to protect reference streams and streams in good biological condition from future degradation. However, the Water Boards and partner agencies like the DFG lack guidance and consistent tools for using biological assessments for identifying high quality waters and protecting them with uniform, enforceable regulatory requirements under this policy.

[12] Water quality standards have four components: 1) designated beneficial uses; 2) water quality objectives (criteria); 3) an antidegradation policy; and 4) an implementation policy.

[13] Reference streams are located in areas of minimal anthropogenic land use disturbance such as agriculture, urban, road density, etc.

Mechanisms for restoring streams are limited. Similarly, the State Water Board's Policy for Developing California's Clean Water Act Section 303(d) List allows consideration of biological data for identifying impaired waters. However, a water body cannot be listed as impaired using biological data alone. The impairment also must be associated with a chemical constituent so that a TMDL can be developed to address the constituent. The resulting TMDL focuses on the "associated" constituent whether or not the constituent is the driver of the biological impairment. As a result, there is no incentive or guidance for identifying other potential causes of the biological impairment and addressing the "associated" chemical through a TMDL may or may not improve biological condition. There is no guidance for setting biological restoration targets for water bodies identified as biologically impaired. Finally, benchmarks for identifying biological impairments and interpreting narrative water quality objectives are not formally adopted in Water Board plans or policies and, therefore, are not readily used as enforceable requirements in Water Board regulatory programs.

Biological monitoring data are not assessed consistently statewide. In addition to the State Water Board's statewide biological monitoring program, several Regional Water Boards conduct biological monitoring to assess attainment of aquatic life uses. The State Water Board and five of the Regional Water Boards include requirements in permits for dischargers to conduct biological monitoring. There also are environmental organizations and other state and federal agencies that conduct biological monitoring using the State Water Board's standardized protocols. There is no consistent set of scoring tools applicable statewide so data collected in one region may be assessed using different scoring methods than in other regions. This inconsistency frustrates the regulated community and some non-governmental organizations and makes statewide assessments or inter-regional comparisons impossible.

Biological objectives are direct measures of biological integrity that will allow the State and Regional Water Boards to:

- Assess aquatic life use attainment and monitor changes over time using direct, objective measures of biological integrity;
- Identify and prioritize high quality waters for protection;
- Set expectations for restoration and measure recovery of the biological community (e.g., numeric targets, mitigation monitoring requirements);
- Prioritize waterbodies for restoration;
- Set numeric targets for incorporating into permits for facilities whose discharge and activities impair biological condition;
- Present biological outcome performance measures that are meaningful and can be communicated to the public;
- Provide incentives and tools for programs and sister agencies to improve physical habitat;
- Integrate water quality with water supply and flow targets.

Required Characteristics

In order for the biological objectives to be effective they must have the following characteristics:

1. *Scientifically rigorous.* To be credible, the biological objectives must be developed through a rigorous scientific process, which utilizes accepted methods and includes independent peer review.

2. *Statewide.* Biological objectives must be applicable statewide. Currently no consistent, statewide framework exists for evaluating aquatic life use attainment. A consistent, statewide methodology would make it possible to compare data within and across regions, as well as provide a picture of the overall statewide condition. The policy must also allow for regional flexibility to take into account the environmental diversity of the state.

3. *Enforceable.* In order for the biological objectives to be used to their fullest potential, they have to be enforceable. That is, they have to be legally established as water quality objectives so that they can be efficiently used as a basis for 303(d) listings, permitting and other regulatory actions.

Guiding Principles

Developing biological objectives is a complex process that requires rigorous scientific and technical input and involves multiple stakeholders. State Water Board staff has developed the following guiding principles for this effort.

1. *The state should have biological objectives for all waterbody types.* There should be biological objectives for all waterbody types, including perennial and non-perennial streams, large rivers, lakes and wetlands.

2. *The state should use multiple indicators for biological objectives.* Biological integrity can be assessed by using indicator organisms such as fish, algae and macroinvertebrates. California should have biological objectives that utilize more than one type of indicator organism.

3. *The state should develop biological objectives with numeric endpoints.* The numeric biological objectives should be based on widely accepted tools for scoring biological integrity (e.g., IBIs or O/E indices).

4. *There should be statewide consistency with regional flexibility.* Statewide consistency is necessary for meaningful biological assessments, yet California's biological and geographic diversity make it impossible to develop numeric objectives appropriate for the entire state. Therefore, the biological objectives will likely include a statewide narrative linked to appropriate regional numeric thresholds.

Program of Implementation

The Biological Objectives Policy will include a program of implementation for achieving the objectives as required by Porter-Cologne Water Quality Control Act (Wat. Code § 13242). The implementation program will include a description of the nature of actions expected to be necessary to achieve the objectives; a time schedule for the actions to be taken; and description of surveillance to be undertaken to determine compliance with objectives.

The program of implementation will focus on maintaining and, where necessary, restoring the biological integrity of the state's waterbodies. It will rely on both existing programs and new actions (which will be undertaken as needed). The State Water Board's Compliance Schedule Policy will be consulted to develop a time schedule; although shorter or longer compliance schedules may be considered as part of the Biological Objectives Policy. The surveillance component will be incorporated into SWAMP monitoring as well as other Water Board program monitoring and reporting requirements (e.g., receiving water monitoring required in NPDES stormwater permits).

Regulatory context

The biological objectives will be implemented via a statewide policy. On approval by U.S. EPA, the objectives will have the same regulatory authority as existing chemical, physical and toxicological water quality objectives. The State Water Board will develop the program of implementation that describes how biological objectives will be incorporated into permits and other regulatory actions, such as assessing attainment of aquatic life beneficial uses for 303(d) listing.

The biological objectives incorporate consideration of uncontrollable anthropogenic impacts. In areas where degradation is due to uncontrollable factors, the reference conditions may reflect "best attainable" conditions.

The State Water Board will work to ensure that the Biological Objectives Policy will be well coordinated with other related policies such as the Wetland and Riparian Protection Policy, the Nutrient Numeric Endpoint Policy, the Toxicity Policy, the Sediment Quality Objectives Policy, and the Division of Water Rights efforts to develop instream flow criteria.

Scoping

Scoping is the process for the State Water Board to seek input from the public members and agencies regarding the range of the proposed policy, potential significant environmental impacts of the proposed policy, cumulative impacts if any, mitigation measures, possible alternatives, and to eliminate from detailed study issues fount not to be important. (23 Code Cal. Regs., § 3775.5(b).)

Alternatives

In preparation for the CEQA scoping meeting, three potential alternatives for developing statewide biological objectives have been identified. These alternatives are presented as a starting point for discussion ("scoping") during the meeting.

1. No Action. In this alternative, the SWAMP bioassessment program would continue in its present condition but the information would not be used to develop biological objectives. The current program includes robust measures of biological integrity but they are not consistent statewide (reference conditions have only been defined for a

portion of the state). If statewide biological objectives are not developed, at least two Regional Water Boards (Lahontan and San Diego Regional Water Boards) plan to develop biological objectives on their own. Under this alternative, there would be no statewide guidance for incorporating measures of biological integrity into permits, TMDLs and other regulatory actions. A result of this alternative would be continued inconsistency in the evaluation and protection of aquatic life uses throughout the state.

2. Adopt biological objectives for protecting high quality streams and preventing further degradation of degraded streams. In this alternative, biological objectives would be established for perennial wadeble streams that are currently in biological condition equivalent to reference condition to prevent degradation of those streams. This alternative also would set biological expectations for degraded streams to prevent further degradation of those streams. Under this alternative, targets for restoring degraded streams would not be established.

3. Adopt biological objectives for all perennial, wadeable streams in the state. In this alternative, biological objectives would be developed for all perennial wadeable streams. This alternative would produce effective tools for assessing aquatic life uses in all perennial wadeble streams statewide. It also would supply consistent, statewide guidance for establishing biological targets for restoration, permits and other regulatory actions. This alternative maximizes the efficiency of the extensive pool of bioassessment data now available in California by producing objectives that are applicable to the greatest number of waterbodies possible in the state. It reduces the expenditures of time and resources that are necessary to evaluate aquatic life uses on a case by case basis.

The State Water Board will seek input regarding these alternatives and other important environmental issues identified during the scoping process.

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