State Water Resources Control Board

Division of Water Quality
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Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

March 14, 2000

Members and Alternates:

MEETING OF THE AB 982 PUBLIC ADVISORY GROUP

The AB 982 Public Advisory Group (PAG) will meet on Thursday, March 23, 2000 and Friday, March 24, 2000 in the hearing room of the State Water Resources Control Board, 901 P Street, Sacramento.

Please find enclosed the meeting agenda and the documents prepared to support many of the agenda items.

If you have any questions regarding the PAG or the meeting, please call me at (916) 657-1108. You may also call the AB 982 PAG staff liaison, Gita Kapahi, at (916) 657-0883.

Sincerely,

Original Signed by CJWilson

Craig J. Wilson, Chief
Bays and Estuaries Unit
Division of Water Quality

Enclosures

cc: Interested Parties

AB 982 Public Advisory Group

Thursday, March 23, 2000, 10 a.m.

Hearing Room
Paul R. Bonderson Building
901 P Street
Sacramento, California

A G E N D A (DAY 1)

1. *Convene Meeting* – Co-Chairs

2. *March 3, 2000 Meeting Summary*
   - Action Item: Consider approval of Meeting Summary (Attached)

3. *Videotape Recording at Public Advisory Group (PAG) Meetings* – Report by the Co-Chairs

4. *Proposal for the comprehensive surface water monitoring program*
   A. PAG Comments on Monitoring from the afternoon session of its 3/3/00 meeting (Attached)
   B. Proposed Outline (Attached)
   C. Features of the surface water ambient monitoring program (Attached)
   D. Draft implementation strategies (Attached)

5. *Proposed Monitoring Objectives for the Surface Water Ambient Monitoring Program (Attached)*
   - Is it safe to swim?
   - Is it safe to drink the water?
   - Is it safe to eat fish and other aquatic resources?
   - Are aquatic populations and communities protected?
   - Is Water flow sufficient to protect fisheries?

6. *Adjourn Meeting until 9:00 a.m. on March 24.*

AB 982 Public Advisory Group

Friday, March 24, 2000, 9:00 a.m.
Hearing Room
Paul R. Bonderson Building
901 P Street
Sacramento, California

A G E N D A (DAY 2)

7. *Reconvene Meeting* – Co-Chairs

8. *Issues addressing the structure and effectiveness of the SWRCB Water Quality Program as it relates to Clean Water Act Section 303(d) (This is the list of issues developed by the PAG in the morning session of its 3/3/00 meeting.) (Attached)*
   - Monitoring
   - Listing
   - Consistent TMDL Process
   - Consistent TMDL Elements

   Action Item: Consider approval of issue list.

9. *Discussion of Priorities on the Section 303(d) Issues*
   Action Item: Consider establishing priorities on which issues to address first.

10. *Public Forum* (Any person may address the PAG on issues not on the Agenda.)

11. *Adjourn*

Agenda Item 2

AB 982 Public Advisory Group

Meeting Held March 3, 2000
State Water Resources Control Board Hearing Room

Meeting Summary

Convene Meeting: Co-Chair Beckman convened the meeting and declared a quorum.

February 11 Meeting Summary: The summary of the February 11, 2000 meeting was approved.

Revised Public Advisory Group Operating Procedures: The Public Advisory Group (PAG) made three additional changes to the operating procedures: (1) deleted the sentence regarding member compensation (Article III, section 3), (2) clarified the procedures on consensus (Article V, Section 1), and (3) clarified when members and alternates vote and when a proxy is appropriate (Article V, Section 2).

ACTION: The PAG adopted the revised operating procedures.

Unresolved Issue: The PAG discussed the videotaping of its meeting. Some members suggested that the taping prevented an open discussion of issues and that the taping could potentially be used in litigation, legislative or regulatory advocacy. Other members voiced the opinion that the PAG proceedings are public meetings and nothing prevents anyone from quoting members or taping the meeting. The Co-Chairs agreed to discuss ways to resolve the issue and report back to the PAG.

Compensation for PAG members: State Water Resources Control Board (SWRCB) staff discussed their efforts to resolve the issue since the February 11, 2000 meeting. The topics discussed were: (1) SWRCB members support compensating low income PAG members; (2) staff discussed payment limitations including legal issues, contracting limitations, the appearance of a conflict, etc.; and (3) discussed the possibility of the SWRCB supporting a grant application to support low income PAG member participation.

Unresolved issue: Compensation for members that were not being supported to attend the meetings by their employer. Staff and Communities for a Better Environment will continue to work towards resolving the issue.

SWRCB's Approach for Addressing Clean Water Act Section 303(d) Issues: At the February 11, 2000 meeting the PAG asked that the Group begin addressing issues related to TMDLs as well as ambient monitoring. The PAG Co-Chairs developed initial lists of issues to be addressed. SWRCB staff assembled the lists for discussion at the

March 3, 2000 meeting. Each PAG member was given the opportunity to add issues or suggest revisions to the issues brought forward by the Co-Chairs. Several new issues were raised and are included in the March 23 and 24, 2000 meeting agenda package. Members of the PAG asked that the issues be presented in neutral terms.

Plan for Implementing a Comprehensive Program for Monitoring Ambient Surface and Groundwater Quality: SWRCB Staff presented the approach presented in the report to Legislature for developing a comprehensive surface water quality monitoring program, where ambient monitoring fits into the water quality regulatory process, and the features of a comprehensive monitoring program.

Many comments were received from the PAG members. The comments are listed in the agenda package for the March 23 and 24, 2000 meeting. SWRCB staff discussed the $3.6 million proposed in the State budget and the statements in the Legislative Report that this level of funding is just the start of what might be requested.

Staff committed to move forward in developing the mandated monitoring proposal and to bring additional information before the PAG at its next meeting. The PAG agreed that materials supporting the meeting could be sent less than ten days before the meeting.

Adjourn: The PAG confirmed that its next meeting is on March 23-24, 2000.

AB 982 Public Advisory Group

Discussed March 3, 2000

Draft Comments on the Plan for Implementing a Comprehensive Program for Monitoring Ambient Surface and Groundwater Quality

At the March 3, 2000 meeting the Public Advisory Group (PAG) had several comments on the State Water Resources Control Board's report to the Legislature titled: Plan for Implementing a Comprehensive Program for Monitoring Ambient Surface and Groundwater Quality. The comments on ambient surface water monitoring presented below are listed in the order they were made at the PAG meeting.

The funding level for the monitoring efforts is inadequate ($3.6 million in contracts) given the scope of the Plan.

Need to include Cooperative efforts and available data because of compatibility issues. Typically available information not brought together or analyzed. Need to assess how to make the data out there useful.

Need to include pollution prevention monitoring.

Focus on where nonpoint source and stormwater have impacts (non-permitted activities).

Standardize sampling methods and data management.

Beneficial use protection question too limiting.

Antidegradation with respect to nonpoint source pollution needs to be addressed in the monitoring program.

Antidegradation Tier 2 and 3 waters also need to be addressed.

Collect data where we have data gaps such as nonpoint source sites.

First priority should be to use existing data.

Be sure to collect data that accurately characterizes water quality.

Find receiving water impacts such as impacts on aquatic organisms.

Need a better process for the State to organize and standardize data that is out there.

Need to identify monitoring programs that are out there.

Find concerns and develop a monitoring program to address.

Compliance monitoring can lead to environmental problems. Need tie in to ambient monitoring.

Need to focus types of pollutants that should be monitored.

Use existing information to develop monitoring protocols.

Funding resources need to be taken into account for monitoring program design.

Need more factual monitoring information to make monitoring decisions (such as funding already spent, other state programs, ideas on the “best program”).

Summarize the approach to use instead of beneficial use protection questions.

Estimate what overall needs are.

PROPOSAL FOR A COMPREHENSIVE SURFACE WATER QUALITY MONITORING PROGRAM

Surface Water Ambient Monitoring Program

O U T L I N E

I. Title page

II. Executive summary

III. Table of Contents

IV. Introduction

V. Background

VI. Plan goals

VII. Features of the monitoring program

VIII. Strategy for implementing the comprehensive surface water program

IX. Monitoring Approaches (Objectives, strategy, indicators, etc.)
- A. Swimming
- B. Fish and shellfish consumption
- C. Drinking water
- D. Aquatic life
- E. Fish migration
- F. …

X. Costs related to each monitoring approach

XI. Strategy for setting priorities and allocation of funding

XII. Potential funding mechanism(s)

FEATURES OF THE SURFACE WATER AMBIENT MONITORING PROGRAM

Adaptability

California has a huge diversity of natural resources with a variety of surface water resources. The State's water resources include streams, rivers, lakes, estuaries, coastal lagoons, enclosed bays, and coastal waters. The optimal monitoring approach will allow adaptation to each of these systems because the scale, dimension, and environmental resources vary so greatly.

Cooperative efforts

Monitoring can be expensive due to the scale of the monitoring and the costs of analysis. The most cost-effective efforts are those that bring together all stakeholders to jointly design and implement the ambient monitoring program. The SWRCB and RWQCB watershed management initiative and SWRCB Strategic Plan emphasize full participation of affected parties. This type of cooperative planning initially helps identify redundant efforts and areas in need of monitoring activity and ultimately reduces costs. Cooperative efforts also help the SWRCB and RWQCBs identify where they can rely on existing information to serve the need for monitoring information. If another organization is performing monitoring that serves the purposes of the SWRCB, then we can direct scarce resources towards other priorities.

Clear Objectives

Because environmental monitoring can be costly, it is important to clearly define the information most useful to resource agencies to better protect water quality and safeguard resources. Clear monitoring objectives are essential if the ambient monitoring program is to produce meaningful and useful information.

Use Available Information

Once monitoring objectives are established, useful information may already be available. All sources of information should be used if it serves the SWRCB's intended purpose(s). Sources of available information include: compliance monitoring data, regional monitoring efforts already underway, or other monitoring by Federal, State and local agencies. These types of data should be assembled before any new monitoring is undertaken.

Scientifically sound monitoring design

All monitoring programs should be based on solid, defensible scientific design. Solid scientific information provides a sound basis for changes in water quality programs, policies, and standards set to protect the environment. This will assist in comparing results among programs.

Meaningful indicators

The ambient monitoring program should use the best available condition and response indicators of the environmental system. These indicators should be scientifically valid and practical, and they should address the needs of the water quality programs.

Comparable methods of sampling and analysis

In order for monitoring information to be comparable between monitoring locations and programs, there must be a measure of consistency in the approaches and analytical methods used, as well as stated minimum detection limits and strict quality assurance requirements. The data produced should be of definable or equivalent quality so both within and between water body comparisons can be made. To the extent possible, all methods should be described, validated, performed competently, compared to a reference, and, to the extent possible, performance-based.

Results evaluation

Monitoring data must be evaluated in order to make meaningful assessments of the status of the environment. Such evaluations are integral in evaluating the effectiveness of and modifying water quality programs. Results evaluation is especially important for implementation of CWA Sections 305(b) and 303(d).

Continual refinement

Monitoring efforts that are driven by clear objectives generate useful information that resource managers need to evaluate the success of their water quality protection efforts. Such information is vital in indicating where resources should be directed to address specific problems, and which policies and programs should be fine tuned. Such refinement of programs and policies makes the monitoring process dynamic and meaningful.

Regular reporting

Although monitoring news may not always be good, assessments of water quality and the changes over time provide needed information for decision makers and the public. Monitoring information is useful in setting priorities. Also, monitoring identifies issues and areas that are not a problem. Such information is useful for long-term planning, enabling us to evaluate changing conditions and in gauging future stresses on environmental resources such as CWA Section 303(d). Additionally, monitoring results are useful for the public to increase public awareness and education on the impacts of their activities on the aquatic environment.

To inform the public, monitoring data and reports should be made available through the SWRCB web site.

Strategy for implementing the comprehensive surface water monitoring program for site-specific problems[1]

Task	Responsible Organization		
	SWRCB	RWQCBs	Contractors
Develop contract(s) for monitoring services.	●		●
Identify waterbodies of concern		●	
Identify locations with potential beneficial use impacts.		●	
Decide if concern is related to objectives focused on location, area, or trends of impacts.		●	
Select monitoring objective(s) based on potential beneficial use impact.		●	
Identify already-completed monitoring and research efforts focused on potential problem and monitoring objective.		●	●

[1] This implementation strategy assumes that a percentage of the monitoring effort will be directed at assessing waterbodies where little information is available. RWQCB may not suspect impacts in some of the waterbodies that are sampled in the monitoring program. These studies would consequently focus on assessing entire waterbodies using regional monitoring objectives.

Task	Responsible Organization		
	SWRCB	RWQCBs	Contractors
Make decision on adequacy of available information.		●	●
Prepare specific study design based on comprehensive monitoring plan objectives, strategies, and indicators.	●	●	●
Implement study design. (Collect and analyze samples.)			●
Track study progress. Adapt study as needed.	●	●	●
Report data through SWRCB web site.	●		●
Prepare written report of data.	●	●	●

Strategy for implementing the comprehensive surface water monitoring program for waterbodies where the State presently possesses little information

Task	Responsible Organization		
	SWRCB	RWQCBs	Contractors
Develop contract(s) for monitoring services.	●		●
Identify waterbodies.		●	
Select regional monitoring objective(s).		●	
Make decision on adequacy of available information.		●	●
Prepare specific study design based on comprehensive monitoring plan objectives, strategies, and indicators.	●	●	●
Implement study design. (Collect and analyze samples.)			●
Track study progress. Adapt study as needed.	●	●	●
Report data through SWRCB web site.	●		●
Prepare written report of data.	●	●	●

Agenda Item 5
DRAFT

March 13, 2000

Staff Report by the
Division of Water Quality

PROPOSED MONITORING OBJECTIVES FOR THE SURFACE WATER AMBIENT MONITORING PROGRAM

Introduction

This staff report presents the objectives that the State Water Resources Control Board (SWRCB) staff proposes to use in the development of the State's Surface Water Ambient Monitoring Program (SWAMP). Also presented is an analysis of the assumptions and expectations associated with each monitoring objective.

The model for developing the monitoring objectives was presented in a recent staff report (DWQ, 2000). The model presented below is slightly modified from the previous version based on comments received.

Model Used to Develop Monitoring Objectives

In developing the SWAMP monitoring objectives, the SWRCB used a modified version of the model for developing clear monitoring objectives proposed by Bernstein et al. (1993). This model is valuable in developing SWAMP in several ways. First, it makes explicit the assumptions and/or expectations that are often embedded in less detailed statements of objectives (as presented in Figure 1 [from SWRCB, 2000]). The model clearly identifies the most important issues (from both management and scientific perspectives) that must be considered, defined, and resolved. Second, the explicit nature of the model makes possible the systematic creation of a variety of alternative objectives and ensures that important issues will not be overlooked. The model also presents key issues in a way that is accessible to both managers and scientists. The model is a series of questions that focus the development of specific monitoring objectives (Table 1).

The following paragraphs briefly discuss the kinds of issues that must be considered in making choices among the characteristics in each category. The categories affect each other. For example, a management need for more precise information will necessarily influence the choice of monitoring strategy.

1. Management Goal—Management goal refers to the guiding policy focused on managing a beneficial use. The choice here depends on numeric and narrative water quality objectives, availability of guidelines for interpreting monitoring information in terms of beneficial use impact, the nature of the impact and the ecosystem's response to it, and what is practical. It also depends on balancing related management goals among several beneficial uses when these overlap, interact or conflict.

The management goal will be used to establish the focus of the monitoring objective. The management goal can come from the basin plans, statewide water quality control plans, water quality control policies, and other screening values, agency standards or guidelines (e.g., promulgated EPA criteria, FDA advisory levels, etc.). The management goal should be used as the basis for answering specific questions about the condition of locations, areas or whether conditions are getting better or worse.

2. Monitoring Strategy—Monitoring strategy refers to the approach taken to monitor an impact or change. The choice here depends on the nature of the impact, natural ecosystem characteristics, and available scientific and technical knowledge. The strategy is primarily a scientific question but managers may have an opinion or reason for selecting a particular monitoring strategy.

   For extremely variable beneficial uses or valued ecosystem components (e.g., water column fish populations), it may be more advantageous to qualitatively identify the system condition rather than quantitatively measure parameters with little information content or predictive value. In some instances, an indicator species or an important rate such as reproductive output furnishes better information than a broader range of measurements. In other instances, risk assessment models may have to be used when it is not possible to measure such effects as illness rates.

3. Degree of Measurement Certainty—Certainty is a statement of whether the measurements are right or wrong. The choice here depends on the need for information of a particular quality.

   In some instances, simple qualitative information about whether something has occurred or not occurred may be sufficient. For a wastewater outfall impacts on the soft bottom benthos it might be important to know with a high degree of certainty whether the impacted areas are continuing to shrink. It may also be important to measure with a high degree of certainty whether an impact at a site or in an area persists over time.

   Accuracy or certainty is the difference between a measured value and the true or expected value. Measurement accuracy is determined by comparing a sample to a known value for a standard reference material). Some important measures of animal response or impact may not have standard references (e.g., toxicity tests).

   Not possible to assess certainty—it is impossible to assess certainty of some measurements because there is no standard response.
   Low certainty—qualitative measures
   Moderate certainty—quantitative measures.

High certainty—quantitative measures and comparison to standard reference material, other references, or reference collections.

4. Degree of Measurement Precision—Precision is the degree of agreement among repeated measurements of the same characteristic (is the answer within 2% or 10%?). The choice here depends both on the need for information of a particular quality and the limitations of scientific knowledge and technique.

   Low precision—qualitative measurements.
   Moderate precision—quantitative measurements, written procedures with quantified measures of precision (stated measurement quality objectives), trained personnel.
   High precision— quantitative measurements, written procedures with quantified measures of precision (replicated measurements within a test, stated measurement quality objectives), professional personnel, controlled laboratory conditions and controlled measurements in the field.

5. Reference Conditions—Reference conditions refer to comparisons that are made to determine if impacts or changes are getting larger, smaller, or staying the same. The choice here depends on the structure of the ecosystem and the availability of comparisons as well as on the monitoring strategy selected.

   Where monitoring is focused on identifying trends, the best reference might be to conditions at a previous time. Previous times are also often the best references for water body-wide changes or resources, since there may be no reference locations. When there is natural variability among locations, several reference locations may be needed to protect against mistaking a natural change for a human impact. Where it is not possible to measure the expected impact, such as with many health effects, model estimates of baseline conditions must be used as the reference for predicted illnesses.

6. Spatial Scale—Spatial scale refers to the spatial extent of both management concerns and the monitoring strategy. The choice here depends on the management goal and on the spatial scale of impacts, ecological processes, and natural variability.

   For example, a site-specific scale is appropriate for monitoring the effects of a local dredge disposal site or a particular storm drain. As another example, a combination of spatial scales is needed for monitoring the effects of pollution or contamination due to wastewater outfalls. This is because sediment transport and biological uptake into fish spread contaminants beyond the immediate area of the outfalls.

   Site-specific—refers to a point at a discharge or other high pollution-risk location.

Local area—refers to an area that may be influenced by pollutants. This area is relatively small compared to the water body.
Water body area—refers to areal estimates of the impacts or pollutant concentrations within whole water bodies.
Statewide—refers to areal comparisons between water bodies.

7. Temporal Scale—Temporal scale refers to the temporal extent of both management concerns and the monitoring strategy. The choice here depends on the management goal and on the temporal range of impacts, ecological processes, and natural variability.

   For example, focusing on trends requires a time scale long enough to see meaningful changes. In another situation, periodic processes such as reproduction may need to be monitored several times in a row to detect important changes. Some impacts occur immediately and, in these cases, monitoring can provide answers quickly. In other cases, impacts only become apparent after a lag time and monitoring must stretch over a longer period before information is available.

Monitoring Objectives

We have begun to specify the SWAMP monitoring objectives by focusing first on human health-related beneficial uses including drinking water, contact recreation, and consumption of fish and shellfish. The second priority focuses on aquatic life beneficial uses including: preservation of fish, wildlife, and other aquatic uses and reserves; marine habitat; estuarine habitat; warm water habitat; cold water habitat; inland saline water habitat; and rare, threatened, and endangered species. Monitoring objectives are yet to be proposed for other human uses such as aesthetic condition, industrial supply, agricultural supply, and power generation.

For several of the questions posed in Figure 1, a specific monitoring objective or objectives are proposed. The monitoring objectives are focused on:

1. Local Monitoring: What are the specific locations with problems? Monitoring related to this question can be used specifically for listing sites as required by Clean Water Act Section 303(d).

2. Regional Monitoring: What percentage of an area of interest has problems? Monitoring related to this question may provide information that is applicable to the Section 303(d) listing and can provide substantial amounts of information about waterbodies with little or no information available. This type of monitoring can also provide the status of waterbodies that are considered not impacted.

3. Trend Monitoring: Are conditions getting worse or better? Monitoring related to this question may provide information that would confirm existing

Section 303(d) listings (if focused on points already monitored) or may provide needed information on whether polluted areas are getting larger or smaller.

Draft monitoring objectives are presented in Tables 2 through 6. The tables are organized as follows:

1. The general monitoring question is presented in the table heading.

2. Beneficial use the questions address.

3. Location monitoring objectives

4. Area monitoring objectives

5. Trend monitoring objectives

Under each specific monitoring objective, a table is presented that reports the information that will govern the development the monitoring strategy, indicator selection, sampling design, selection of variables to measure, and quality assurance.

TABLE 1: MODEL USED TO DEVELOP SPECIFIC MONITORING OBJECTIVES.

1. What is the management goal?
• No pollutant greater than a set amount
• No effects from activity or source
• No change from present conditions
• No change greater than natural variability
• Return to pristine conditions
• Conditions show a steady trend of improvement
• Resource or ecosystem remains in a particular condition
• Resource or ecosystem returns to a particular condition after disturbance
2. What monitoring strategy is suitable?
• Measure actual effect
• Use one indicator to represent change or effect
• Use a suite of indicators together to represent change or effect
• Use model predictions or estimates of effects
• Qualitatively identify the resource or ecosystem condition
• Quantitatively measure resource or ecosystem parameters
• Measure key processes or rates
• Focus on key events or disturbances that are of overriding importance
3. What degree of measurement certainty is possible or required?
• Not possible to assess
• Low certainty
• Moderate certainty
• High certainty
4. What degree of measurement precision is possible or required?
• Low precision
• Moderate precision
• High precision
5. What reference conditions are appropriate?
• Reference location(s)
• Reference time(s)
• Reference tests(s)
• Model prediction
• Compliance standards (a kind of model prediction)
• Other populations of the same species
• Similar species or communities
• Analogous situations

1. What spatial scale is appropriate?
▪ Site specific
▪ Local (area)
▪ Entire waterbody (area)
▪ Statewide (area)
2. What temporal scale is appropriate?
▪ Immediate
▪ Months
▪ Year-to-year
▪ Long-term (several years-decades)
Specific Question:

FIGURE 1: AMBIENT SURFACE WATER MONITORING QUESTIONS

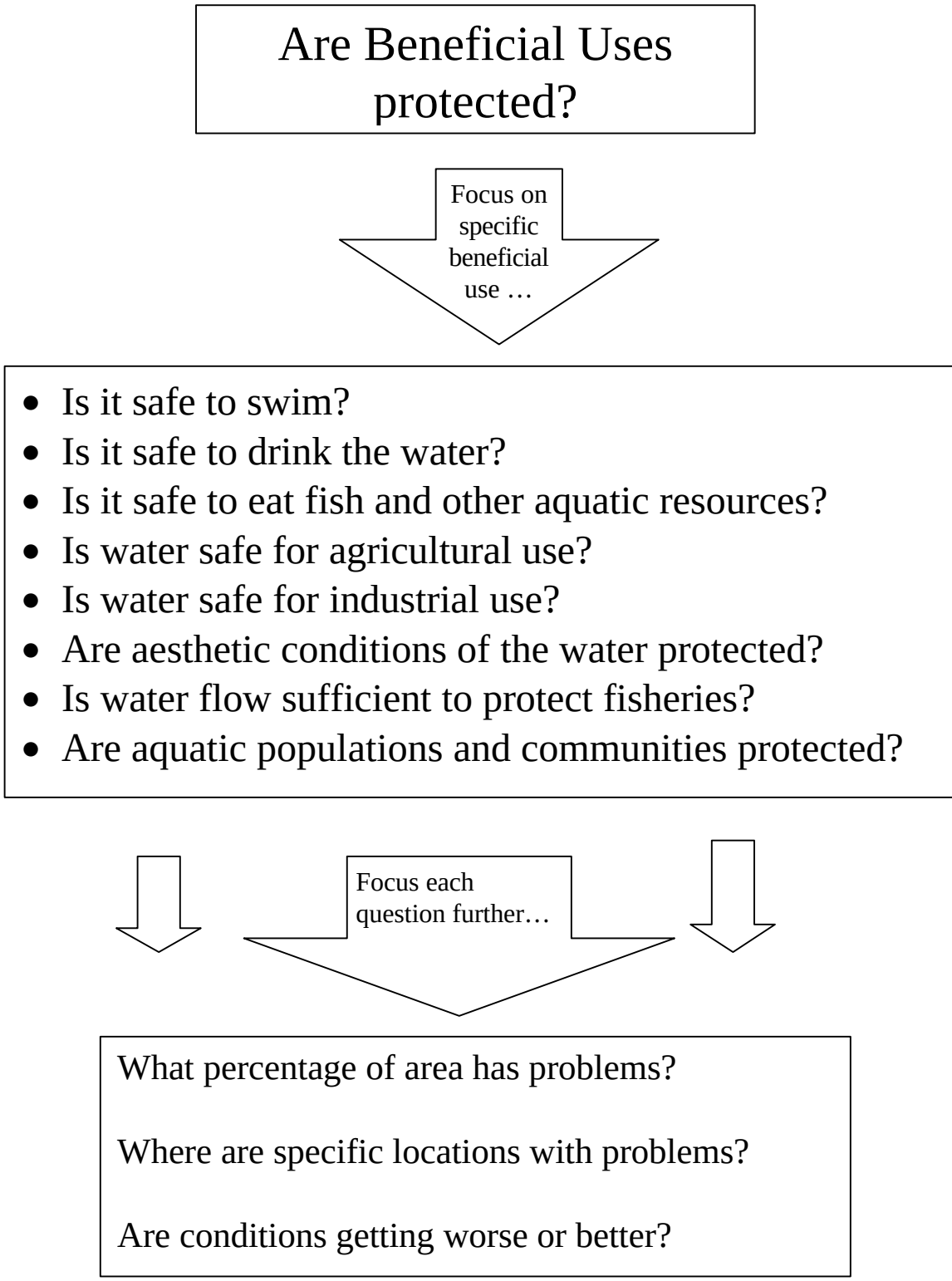

TABLE 2: IS IT SAFE TO SWIM?

Beneficial Use: Water Contact Recreation

Local Monitoring Objective

1. At storm drains, publicly owned treatment works, or sites influenced by nonpoint sources of pathogenic contaminants, estimate the concentration of bacteria or pathogens above screening values, health standards or adopted water quality objectives.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount No effects from source
Monitoring strategy	Use a suite of indicators to represent effect Quantitatively identify the resource parameters
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards Reference locations
Spatial Scale	Site-Specific or local area
Temporal scale	Immediate

Regional Monitoring Objectives

2. Throughout waterbodies that are used for swimming, estimate the concentration of pathogenic contaminants above screening values, health standards or adopted water quality objectives after the influence of storms has passed.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount Resource returns to a particular condition after disturbance
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody area or Statewide
Temporal scale	Immediate

3. Estimate the percent of beach area that pose potential health risks of exposure to pathogens in streams, rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of potential human impact (pathogen indicators).

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Local area
Temporal scale	Immediate

4. Identify impacted areas in streams, rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of potential human impact (pathogen indicators).

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

Trend Monitoring Objectives

5. Throughout waterbodies that are used for swimming, estimate the concentration of bacterial contaminants from month-to-month above screening values, health standards or adopted water quality objectives.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
	Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Months

6. At storm drains, publicly owned treatment works, or sites influenced by nonpoint sources of pathogenic contaminants, verify previous estimates of the concentration of bacteria or pathogens above screening values, health standards or adopted water quality objectives.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
	No effects from source
	Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect
	Quantitatively identify the resource parameters
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
	Reference locations
Spatial Scale	Site-Specific or local area
Temporal scale	Months or year-to-year

TABLE 3: IS IT SAFE TO DRINK THE WATER?

Beneficial Use: Municipal and Domestic Water Supply

Local Monitoring Objectives

1. At specific locations in lakes, rivers and streams suspected to be contaminated, estimate the concentration of microbial and chemical contaminants above screening values, drinking water standards, or adopted water quality objectives used to protect drinking water quality.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards Reference locations
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

Regional Monitoring Objectives

2. Throughout waterbodies, estimate the area of lakes, rivers and streams where the concentration of microbial or chemical contaminants above screening values, drinking water standards or adopted water quality objectives used to protect drinking water quality.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

Trend Monitoring Objectives

3. Throughout waterbodies that are used as a source of drinking water, estimate the concentration of microbial or chemical contaminants from month-to-month above screening values, drinking water standards, or adopted water quality objectives used to protect drinking water quality.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount Conditions show a steady trend for improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Months

4. At specific locations in lakes, rivers and streams suspected to be contaminated, verify previous estimates of the concentration of microbial and chemical contaminants above screening values, drinking water standards, or adopted water quality objectives used to protect drinking water quality.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount Conditions show a steady trend for improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards Reference locations
Spatial Scale	Site-specific or local area
Temporal scale	Months

TABLE 4: IS IT SAFE TO EAT FISH AND OTHER AQUATIC RESOURCES?

Beneficial Uses: Commercial and Sport Fishing, Shellfish Harvesting

Local Monitoring Objectives

1. At specific sites influenced by sources of bacterial contaminants, estimate the concentration of bacterial contaminants above health standards or adopted water quality objectives to protect shellfish harvesting areas.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount No effects from source
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

2. At specific sites influenced by sources of chemical contaminants, estimate the concentration of chemical contaminants in edible aquatic like tissues above advisory levels and critical thresholds of potential human health risk.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount No effects from source
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Model prediction Compliance standards Reference sites
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

3. At frequently fished sites, estimate the concentration of chemical contaminants in commonly consumed fish and shellfish target species above advisory levels and critical thresholds of potential human health risk.[1]

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Model prediction Compliance standards
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

Regional Monitoring Objectives

4. Estimate the area of streams, rivers, lakes, nearshore waters, enclosed bays and estuaries where the concentration of chemical contaminants in edible fish or shellfish tissue exceeds several critical threshold values of potential human impact (screening values or action levels).

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

[1] Adapted from USEPA, 1995.

5. Assess the geographic extent of chemical contaminants in selected size classes of commonly consumed target species that exceed several critical threshold values of potential human impact (screening values or action levels).[2]

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Model prediction
	Compliance standards
Spatial Scale	Local area, entire waterbody, or Statewide
Temporal scale	Immediate

Trend Monitoring Objectives

6. At frequently fished sites, verify previous estimates of the concentration of chemical contaminants in commonly consumed fish and shellfish target species above advisory levels and critical thresholds of potential human health risk.[3]

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount
	Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Model prediction
	Compliance standards
Spatial Scale	Site-specific or local area
Temporal scale	Months or year-to-year

[2] Adapted from USEPA, 1995.
[3] Adapted from USEPA, 1995.

7. Throughout waterbodies (streams, rivers, lakes, nearshore waters, enclosed bays and estuaries), estimate the concentration of chemical contaminants in fish and aquatic resources from year-to-year using several critical threshold values of potential human impact (advisory or action levels).

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Model prediction Compliance standards
Spatial Scale	Entire water body or Statewide
Temporal scale	Year-to-year

8. Throughout waterbodies that are used for shellfish harvesting, estimate the concentration of bacterial contaminants from month-to-month above health standards or adopted water quality objectives.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Months

9. Throughout waterbodies that are used for shellfish harvesting, estimate the concentration of bacterial contaminants above health standards or adopted water quality objectives after the influence of storms has passed.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No contamination greater than a set amount Resource returns to a particular condition after disturbance
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Months

TABLE 5: ARE AQUATIC POPULATIONS AND COMMUNITIES PROTECTED?

Beneficial Uses: Cold Freshwater Habitat; Estuarine Habitat; Inland Saline Water Habitats; Marine Habitat; Preservation of Biological Habitats; Rare, Threatened or Endangered Species; Warm Freshwater Habitat; Wildlife Habitat

Local Monitoring Objectives

1. At storm drains, publicly owned treatment works, or sites influenced by nonpoint sources of pollutants, identify specific locations of degraded water in rivers, lakes, nearshore waters, enclosed bays or estuaries using several critical threshold values of toxicity, water column or epibenthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount No effects from source
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

2. At storm drains, publicly owned treatment works, or sites influenced by nonpoint sources of pollutants, identify specific locations of degraded fined-grained sediment in rivers, lakes, nearshore waters, enclosed bays or estuaries using several critical threshold values of toxicity, benthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount No effects from source
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

Regional Monitoring Objectives

3. Estimate the percent of water area in lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of toxicity, water or epibenthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

4. Estimate the percent of degraded fined-grained sediment area in rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of toxicity, benthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

5. Identify the areal extent of degraded fined-grained sediment locations in rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of toxicity, benthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction
Spatial Scale	Local area
Temporal scale	Immediate

Trend Monitoring Objectives

6. Estimate the percent of degraded fined-grained sediment area from year-to-year in rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of toxicity, benthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount Conditions show a steady trend of improvement
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Year-to-year

7. Estimate the percent of degraded water area from year-to-year in rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of toxicity, water column or epibenthic community analysis, and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No change greater than natural variability No pollutant greater than a set amount Conditions show a steady trend of improvement
Monitoring strategy	Measure actual effect Use a suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Year-to-year

Beneficial Use: Spawning, Reproduction and/or Early Development

Local Monitoring Objectives

8. At storm drains, publicly owned treatment works, or sites influenced by nonpoint sources of pollutants, identify specific locations of degraded water or fined-grained sediment in rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of early life-stage toxicity and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No change greater than natural variability No pollutant greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

Regional Monitoring Objectives

9. Estimate the degraded area of water or sediment toxicity associated with toxic pollutants in rivers, lakes, nearshore waters, enclosed bays and estuaries using critical threshold values of early life-stage toxicity and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No change greater than natural variability No pollutant greater than a set amount
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

Trend Monitoring Objectives

10. Estimate the degraded area of water or sediment toxicity associated with toxic pollutants from year-to-year using critical threshold values of early life-stage toxicity and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No change greater than natural variability No pollutant greater than a set amount Conditions show a steady trend of improvement
Monitoring strategy	Use suite of indicators to represent effect Quantitatively measure ecosystem parameters
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Year-to-year

11. At storm drains, publicly owned treatment works, or sites influenced by nonpoint sources of pollutants, verify previous measurements identifying specific locations of degraded water or fined-grained sediment in rivers, lakes, nearshore waters, enclosed bays and estuaries using several critical threshold values of early life-stage toxicity and chemical concentration.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	No change greater than natural variability No pollutant greater than a set amount Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	Not possible to assess to High
Precision	High
Reference conditions	Locations, tests, model prediction, compliance standards
Spatial Scale	Site-specific or local area
Temporal scale	Months to year-to-year

TABLE 6: IS WATER FLOW SUFFICIENT TO PROTECT FISHERIES?

Beneficial Use: Migration of Aquatic Organisms; Rare, Threatened or Endangered Species; Wildlife Habitat

Local Monitoring Objectives

1. At specific sites influenced by water diversion or pollution, estimate the conditions necessary for the migration of aquatic organisms, such as anadromous fish, using measures of habitat condition including water flow, watercourse geomorphology, temperature, and biological communities.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No effects from activity or source
Monitoring strategy	Use a suite of indicators to represent effect
Accuracy or certainty	High
Precision	High
Reference conditions	Locations, model prediction, compliance standards, other populations of the same species
Spatial Scale	Site-specific or local area
Temporal scale	Immediate

Regional Monitoring Objectives

2. Throughout waterbodies, estimate the conditions necessary for the migration of aquatic organisms, such as anadromous fish, using measures of habitat condition including water flow, watercourse geomorphology, temperature, and biological communities.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition
Monitoring strategy	Use a suite of indicators to represent effect, quantitatively measure ecosystem parameters
Accuracy or certainty	High
Precision	High
Reference conditions	Locations, model prediction, compliance standards,
Spatial Scale	Entire waterbody or Statewide
Temporal scale	Immediate

Trend Monitoring Objectives

3. At specific sites influenced by water diversion or pollution, verify previous estimates of the conditions necessary for the migration of aquatic organisms, such as anadromous fish, using measures of habitat condition including water flow, watercourse geomorphology, temperature, and biological communities.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No effects from activity or source Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect, quantitatively measure ecosystem parameters
Accuracy or certainty	High
Precision	High
Reference conditions	Locations, model prediction, compliance standards, similar species or communities
Spatial Scale	Site-specific or local area
Temporal scale	Months to year-to-year

4. Throughout waterbodies, estimate the conditions from month-to-month necessary for the migration of aquatic organisms, such as anadromous fish, using measures of habitat condition including water flow, watercourse geomorphology, temperature, and biological communities.

Model Factors	Expected Characteristics of the Monitoring Program to Address Objective
Management goal	Ecosystem remains in a particular condition No effects from activity or source Conditions show a steady trend of improvement
Monitoring strategy	Use a suite of indicators to represent effect, quantitatively measure ecosystem parameters
Accuracy or certainty	High
Precision	High
Reference conditions	Locations, model prediction, compliance standards, similar species or communities
Spatial Scale	Entire waterbodies or Statewide
Temporal scale	Months

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AB 982 Public Advisory Group

Discussed March 3, 2000

Issues addressing the structure and effectiveness of the SWRCB Water Quality Program as it relates to Clean Water Act Section 303(d)

The State Water Resources Control Board (SWRCB) is required to report to the Legislature on the structure and effectiveness of its water quality control program as it relates to Section 303(d) of the Clean Water Act. The Public Advisory Group (PAG) has begun discussions on the issues that should be addressed by the SWRCB in reviewing the State's program. This is a compilation of the issues identified by the PAG. The issues are organized under four headings: monitoring, listing, consistent Total Maximum Daily Load (TMDL) process, and consistent TMDL elements.

Monitoring

Objectives of a Statewide monitoring program
- The right questions
- Ambient vs. TMDL monitoring (source identification and effectiveness monitoring)
- Use monitoring to find problems, to find solutions, and to find the root cause
- Pollution prevention monitoring
- Monitoring in clean waterbodies
- Human health monitoring
- Effectiveness monitoring

Monitoring to support Basin Planning efforts including development of water quality objectives

Setting priorities for monitoring

Monitoring: Who, where, when, how, funding?

Use of available information

Standardized monitoring protocols
- Scientific and statistically significant protocols
- Indicator species
- Accurate indicators
- Biological & physical monitoring
- Indicators in people

Verification of water quality problems
- Confirmation of Impairment
- Update and confirmation of beneficial use determination

Background levels/reference conditions

Data management
- Baseline Protocol for database
- Data accessibility
- What happens to the data?
- Approach for making data accessible

Database review by RWQCBs

Use of Geographical Information System

Funding sources for monitoring

Public involvement in monitoring activities

Voluntary proactive approaches

Integration of monitoring requirements with scientific advisory group

Listing

Listing / Delisting Criteria
- Policy Considerations
- Scientific Considerations

Establishment of "warning levels"

Monitoring program support of listing determinations

Establishment of Minimum Data Requirements for Listing

Setting priorities:
- Within Watersheds
- Regional
- Statewide

Reasonable and credible information sources
- Define
- Use of historical data

Retroactive use of monitoring data

Funding sources for evaluating listing and delisting

Public involvement in listing activities

Consistent TMDL Process

How do State and Federal laws integrate?
Link between Porter-Cologne/CWA

TMDL Development Pace

Look at other State programs dealing with water quality issues
Multi-jurisdictional coordination of agencies and regions

Adaptive Management Process

Implementation Plans

Implementation Schedules

Private sector involvement
TMDL education

- Development
- Implementation

Funding for stakeholder processes
Federal/State buyoff on stakeholder processes

Interim Permit Limits Pending TMDL Adoption

Economic Impact Analysis

Environmental Benefits Analysis

Peer Review

TMDL Enforceability

Legal compliance with other statutes (e.g., CEQA)

Consistent TMDL Elements

Ensure Beneficial Uses adequately protected

TMDL Guidelines and Schedule

Waste Load Allocation

- Methods (data/model/best professional judgement)
- Linkage between water quality control measures, water quality impairment and expected benefits
- Stormwater downstream from sources
- Point, nonpoint, historical, local/global, atmospheric natural sources
- Unregulated sources
- Natural loading

Link between SWRCB NPS program and TMDLs

Point/nonpoint/historical sources

- Source identification
- Watershed Management Approach

The relationship between “watershed management” and TMDLs

Economic impact analysis

Pollution prevention