

**STAFF REPORT**

**BASIN PLAN AMENDMENTS**

**REVISIONS TO**  
**RECREATIONAL STANDARDS FOR INLAND FRESH SURFACE**  
**WATERS**  
**IN THE SANTA ANA REGION**

**California Regional Water Quality Control Board**  
**Santa Ana Region**

**January 12, 2012**

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## LIST OF ACRONYMS

AGR	Agricultural Supply Beneficial Use
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin-Region 8 (1995, updated 2008 and June 2011)
BIOL	Preservation of Biological Habitats of Special Significance Beneficial Use
BMP	Best Management Practice
CBRP	Comprehensive Bacteria Reduction Plan
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDM	Camp Dresser & McKee, Inc.
CDPH	California Department of Public Health
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
COD	Chemical Oxygen Demand
COLD	Cold Freshwater Habitat Beneficial Use
COMM	Commercial and Sportfishing Beneficial Use
CWA	Clean Water Act
CWC	California Water Code
EIR	Environmental Impact Report
ESA	Federal Endangered Species Act
EST	Estuarine Habitat Beneficial Use
FTP	File Transfer Protocol
FWPCA	Federal Water Pollution Control Administration, predecessor agency to EPA within the Department of Interior
Geomean	Geometric Mean
GWR	Groundwater Recharge Beneficial Use
"I"	"Intermittent" Beneficial Use
IEUA	Inland Empire Utilities Agency
IND	Industrial Service Supply Beneficial Use
LARWQCB	Los Angeles Regional Water Quality Control Board

LSD	Log Standard Deviation
LWRM	Limited Warm Freshwater Habitat Beneficial Use
MAR	Marine Habitat Beneficial Use
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
MHHW	Mean Higher-High Water
MLLW	Mean Lower-Low Water
MSAR	Middle Santa Ana River
MS4	Municipal Separate Stormwater System
MUN	Municipal and Domestic Supply Beneficial Use
MWD	Metropolitan Water District of Southern California
NAV	Navigation Beneficial Use
ND	Negative Declaration
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OAL	Office of Administrative Law
OCFCD	Orange County Flood Control District
OCHCA	Orange County Health Care Agency
OCWD	Orange County Water District
PHS	U.S. Public Health Service
POTW	Publicly Owned Treatment Works
POW	Hydropower Generation Beneficial Use
PROC	Industrial Process Supply Beneficial Use
QAPP	Quality Assurance Project Plan
RARE	Rare, Threatened or Endangered Species Beneficial Use
RCFWCD	Riverside County Flood and Water Conservation District
REC-1	Water Contact Recreation (proposed "Primary Contact Recreation") Beneficial Use
REC-2	Non-Contact Water Recreation Beneficial Use
Regional Board	California Regional Water Quality Control Board, Santa Ana Region
Risk Sciences	Timothy F. Moore, 125 New Dawn Road, Rockvale, TN 37153
RP	Regional Plant
RTE	Rare, Threatened and Endangered
SAWPA	Santa Ana Watershed Project Authority
SBCFCD	San Bernardino Flood Control District
SCF	Statistical Confidence Level Factor
SED	Substitute Environmental Document
SHEL	Shellfish Harvesting Beneficial Use

SPWN	Spawning, Reproduction and Development Beneficial Use
SSM	Single Sample Maximum
STV	Statistical Threshold Value
SWAMP	Surface Water Ambient Monitoring Program
SWQSTF	Stormwater Quality Standards Task Force (Task Force)
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
USEP	Urban Source Evaluation Plan
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
USEPA	United States Environmental Protection Agency
UAA	Use Attainability Analysis
WARM	Warm Freshwater Habitat Beneficial Use
WILD	Wildlife Habitat Beneficial Use
WWTP	Wastewater Treatment Plant
WQBEL	Water Quality Based Effluent Limit
"X"	"Existing or Potential" Beneficial Use

## EXECUTIVE SUMMARY

Staff of the California Regional Water Quality Control Board, Santa Ana Region (Regional Board) and the other members of the Stormwater Quality Standards Task Force (SWQSTF, or Task Force) have been engaged since 2003 in the implementation of a workplan designed to assist the Regional Board in reviewing water quality standards related to recreational use of the Region's inland fresh surface waters. This effort has included consideration of revisions to the bacteria quality objectives currently specified in the Basin Plan (Water Quality Control Plan, Santa Ana River Basin 1995, updated February 2008 and June 2011<sup>2</sup>) to protect the REC-1 (Water Contact Recreation) beneficial use of these waters based on bacteria criteria developed by the U.S. Environmental Protection Agency (USEPA) and published in 1986.

Consideration of the scientific basis of both the existing Basin Plan bacteria quality objectives for inland surface waters and the 1986 bacteria criteria recommended by USEPA led the Task Force to recommend revisions to the definition of the REC1 (water contact recreation) use, and to the development of a recommended narrative pathogen objective. Changes to the current recreation beneficial use designations for specific waters in the Basin Plan have also been considered through the Use Attainability Analysis process, as prescribed by federal regulation.

The Task Force has also developed recommended implementation strategies pertaining to recreational standards, including criteria for the temporary suspension of recreational uses and associated objectives under specified high flow conditions. A monitoring program will be designed and implemented upon Regional Board approval to provide data necessary to determine compliance with the recommended REC1 objectives.

Initiation of the Task Force effort was prompted by concern among stakeholders throughout the watershed that the California Water Code Section 13241 factors, which pertain to the adoption of water quality objectives by the Regional Board, had not been considered in the context of compliance under storm conditions. There was widespread concern about the propriety of both the water quality objectives and beneficial use designations in the Basin Plan as a whole, and the need to assure that public resources are expended reasonably and fairly to achieve and maintain those water quality standards. The first phase of the Task Force effort was focused on recreational standards; other water quality standards in the Basin Plan are expected to be the subject of future work sponsored by the Task Force. The underlying goal of the Task Force is to assure that water quality standards are appropriate, based on the best available science and in accordance with applicable statute and regulation, and that

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<sup>2</sup>These updates to the Basin Plan did not include any substantive changes to the Plan. The purpose of the updates was to incorporate in the text the separate amendments that had been approved subsequent to the re-publication of the Basin Plan in 1995 and to correct typographical and editorial errors.

public resources are expended in the most effective and efficient manner to protect public health and water quality.

While the Basin Plan amendments developed through the Task Force effort relate principally to recreation standards in the inland freshwaters of the Region, the need for and opportunity to recommend other changes was recognized. These other changes include recommendations for the addition of reference to the federal promulgation of new pathogen indicator criteria for coastal waters, including enclosed bays and estuaries, and for the revision and update of the narrative text in the Basin Plan. In addition, certain surface waters not yet included in the Basin Plan are proposed to be added, together with their beneficial use designations. Two reservoirs that are currently identified in the Basin Plan but that no longer exist are proposed to be deleted. Other minor editorial changes are also proposed.

In summary, the following amendments to the Basin Plan are proposed:

1. Rename the REC1 use from “Water Contact Recreation” to “Primary Contact Recreation”. Clarify the current Basin Plan definition of the REC1 use.
2. Delete the current Basin Plan fecal coliform objectives for REC1 and REC2 (non-contact water recreation) and replace with *E. coli* objectives, as follows:
  - a. For waters designated REC1 only or both REC1 and REC2, replace the current Basin Plan fecal coliform objectives with a geometric mean objective of less than 126 *E. coli* organisms per 100 mL (expressed as the geometric mean of at least 5 samples over a 30 day period).
  - b. For waters that are designated only REC2 pursuant to an approved Use Attainability Analysis, identify bacteria quality targets, in conformance with the state antidegradation policy. The targets are intended to provide the basis for assuring that bacteria quality conditions do not degrade.
3. Establish a narrative pathogen objective requiring that waste discharges not cause or contribute to excessive risk of illness from human pathogens.
4. Add expected maximum single sample *E. coli* values for REC1 waters, subdivided into “Tier A,” “B,” “C” or “D” tiers based on known/anticipated intensity of REC1 use (see #5). These values are to be used as an alternative method for assessing probable compliance with the geometric mean *E. coli* objective for REC1 when insufficient data are available to calculate the geometric mean. The principal intended use of these single sample values is for notification and posting purposes, and as a trigger for further investigation of sources contributing to high bacteria indicator densities.
5. Establish tiers of REC1-designated inland surface waters as Tier A, B, C or D for the purposes of assigning expected maximum single sample *E. coli* values. The Tiers reflect differences in known or estimated intensity of REC1 use, from waters that are or may be heavily used (Tier A) to infrequently used (Tier D).

Reach 3 of the Santa Ana River is considered a Tier A water and used as the basis for determining the relative intensity of use for other freshwaters in the Region. More conservative single sample values are assigned to Tier A waters; progressively less conservative values are assigned to Tier B, C and D waters, reflecting differences in expected public health risk. Certain waters in these tiers are in natural condition and are denoted with an “N”. The more conservative single sample values assigned to Tier A waters are also applied to “N” waters.

6. Establish criteria for the temporary suspension of bacteria objectives and recreation beneficial uses for inland surface streams under certain flow conditions.
7. Re-designate specific waters (portions of the Santa Ana-Delhi Channel<sup>3</sup>, Greenville-Banning Channel<sup>2</sup>, Temescal Creek and Cucamonga Creek) to remove the REC1 or REC1 and REC2 uses, based on Use Attainability Analyses. Any such re-designated waters would be reviewed at least once every three years, pursuant to federal requirements for the triennial review of water quality standards, to determine whether conditions had changed such that the designation of REC1 or REC2 was warranted.
8. Incorporate an implementation plan that: includes a requirement to develop, and implement upon Regional Board approval, a surveillance plan to assess compliance with the revised bacteria quality objectives; identifies the criteria for suspension of recreation standards under certain flow conditions; describes the intended application of single sample maximum values in REC1 freshwaters; describes implementation of antidegradation targets for REC2 only freshwaters; discusses controllable and uncontrollable source of bacteria inputs to surface waters.
9. Delete the bacterial quality objective for MUN waters, which was made obsolete by federal and state regulations that require treatment of surface waters prior to distribution to water supply systems.
10. Add specific waters and beneficial use designations, and revise reach descriptions for certain waters. Certain waters not currently listed in the Basin Plan are proposed to be added, and appropriate beneficial uses designated. Where appropriate, the rationale for exception of the water body from the MUN use, per the exception criteria specified in the State Water Board’s Sources of Drinking Water Policy, is provided. Delete two reservoirs (Laguna and Lambert) that no longer exist.

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<sup>3</sup>Neither the Santa Ana Delhi Channel nor the Greenville-Banning Channel is listed in the current Basin Plan. These waters are among those proposed to be added (item #10). Pursuant to federal law and implementing regulation, all waters are presumed to be REC1 unless a Use Attainability Analysis demonstrates otherwise.

11. Editorial changes include:

- a. Revise the current Basin Plan footnote re REC1 and REC2 designations to clarify and correct the intended meaning.
- b. Change the phrase “present or potential” to characterize beneficial use designations in Table 3-1 of the Basin Plan to “existing or potential”. Correct other references in the text of Chapter 3 BENEFICIAL USES regarding “existing” or “present” beneficial use designations.
- c. Update narrative language in Chapter 3 BENEFICIAL USES, Chapter 4 WATER QUALITY OBJECTIVES, and Chapter 5 IMPLEMENTATION to reflect the work of the Task Force and incorporation of the changes identified in items 1-9, above.
- d. In Chapter 4 WATER QUALITY OBJECTIVES, ENCLOSED BAYS AND ESTUARIES, re-name Bacteria, Coliform to Pathogen Indicator Bacteria and add a note regarding the federal promulgation of enterococcus criteria for coastal waters in California, including enclosed bays and estuaries.
- e. Other minor editorial changes, such as correcting misspelled surface water body names, footnote re-numbering and the like.

Requisite analyses of the proposed amendments pursuant to Water Code Section 13241 and the California Environmental Quality Act (CEQA) have been completed. Based on the CEQA analyses, Regional Board staff concludes that the proposed amendments would not have a significant adverse effect on the environment. The proposed amendments conform to state and federal antidegradation policies. Applicable requirements for public participation and external scientific peer review of the proposed amendments have also been met.

If approved by the Regional Water Board, the amendments will be presented to the State Water Board, Office of Administrative Law and U.S. Environmental Protection Agency for approval.

## 1.0 OVERVIEW

This staff report is one part of the Substitute Environmental Document (SED) required pursuant to the California Environmental Quality Act (CEQA) for consideration of the proposed amendments to the Basin Plan to revise water quality standards applicable to inland fresh waters within the Santa Ana Region. The purpose of this report is to describe the proposed amendments in detail, the rationale for them, and the alternatives considered. Requisite analyses, including consideration of California Water Code Section 13241 factors and conformance with California’s antidegradation policy, are included. Technical reports and relevant documents used to guide the development of the proposed amendments are included in the administrative record for these amendments and can be accessed via the Regional Board’s website:

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/recreational\\_standards.shtml](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/recreational_standards.shtml)

Other components of the SED attached to this report include: (1) tentative Resolution No. R8-2012-0001 for consideration of approval of the proposed amendments by the Regional Board, and the draft Basin Plan amendments (attachments 1 and 2 to the tentative resolution) (together, these documents comprise Attachment A); (2) the California Environmental Quality Act (CEQA) checklist and analyses (Attachment C); (3) comments from the external scientific peer reviewers (Attachment D); (4) comments from interested parties/agencies on the proposed amendments (Attachment E); and, (5) the response to comment document (Attachment F). Attachment B contains the CEQA Scoping Meeting Notice, Comments and Responses.

## **1.1 Organization of Staff Report**

The Background section of this staff report (Section 2.0) provides a brief review of water quality standards and the regulatory basis for revising those standards (2.1 Regulatory Framework: Water Quality Standards). The formation of the Stormwater Quality Standards Task Force and the Task Force process and deliberations leading to the recommendations for changes to the recreation standards are then described in 2.2 Triennial Review and Formation of the Stormwater Quality Standards Task Force (SWQSTF) and 2.3 Stormwater Quality Standards Task Force (SWQSTF, or Task Force).

Established Basin Plan water quality standards are described in Section 3.0. Current Water Quality Standards. Section 4.0 discusses the scientific basis of the existing and proposed water quality objectives for recreation beneficial uses. Understanding the scientific basis of these objectives was key to the consideration of appropriate changes to the established standards by the Task Force and, as discussed in Section 2.3.2, led the Task Force to consider changes related to beneficial use designations and definitions as well.

The subsequent Section 5.0 (Recommended Amendments) describes the recommended changes to the Basin Plan in detail. The discussion includes the alternatives considered and the rationale for the selection of the recommended alternative. Because of their length, several subsections (5.6.3, 5.6.4, 5.6.5, 5.6.6 and 5.8) are in separate electronic files that, like this report, can be accessed via the Regional Board's website. Appropriate references to these files are provided herein. Technical reports and applicable guidance and regulatory documents are referenced, as appropriate, and can also be accessed via the Regional Board's website.

Sections 6.0 through Section 10.0 address the analyses and review required for consideration of basin plan amendments, including: Water Code Section 13241 factors; Antidegradation; External Scientific Peer Review and, California Environmental Quality Act (CEQA).

Section 11.0 presents Regional Board staff's recommendation for adoption of the recommended changes to the Basin Plan. The proposed Basin Plan amendments are delineated in attachments 1 (underline/strike-out version) and 2 ("clean" version) to tentative Resolution No. R8-2012-0001 (collectively, these documents comprise Attachment A to the staff report).

References cited in the staff report are listed in Section 12.0. Section 13.0 lists the attachments to this report.

## **2.0 BACKGROUND**

### **2.1 Regulatory Framework: Water Quality Standards**

The Water Quality Control Plan for the Santa Ana River Basin – Region 8 ("Basin Plan") is the basis for water quality control in the Region. The Basin Plan reflects, incorporates and implements applicable portions of state and federal statutes, including the California Water Code (CWC) and the Clean Water Act (CWA)<sup>4</sup>, and the regulations, plans and policies adopted to implement them. These include statewide plans and policies adopted by the State Water Board<sup>5</sup>, and regulations established by the U.S. Environmental Protection Agency (USEPA) in the Code of Federal Regulations (CFR).

Each basin plan must designate or establish for the surface and ground waters within a specified area (1) the beneficial uses to be protected; (2) water quality objectives; and, (3) a program of implementation for achieving the water quality objectives (CWC Section 13050(j)).

The CWA requires states to adopt water quality standards for surface waters (Section 303). Water quality standards are the designated uses of a waterbody, water quality criteria (which are synonymous with state-adopted water quality objectives) to protect those uses, and an antidegradation policy<sup>6</sup>.

There are both state and federal requirements for the review of basin plans. Pursuant to CWC Section 13240, basin plans are to be reviewed periodically and may be revised. The CWA requires States to review standards at least once every three years (a process known as the "Triennial Review") and to revise them as necessary in

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<sup>4</sup> The Clean Water Act is more accurately identified as the "Federal Water Pollution Control Act" (33 U.S.C. Section 1251 *et seq.*)

<sup>5</sup> These include the state's antidegradation policy (Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California") and the Sources of Drinking Water Policy (Resolution No. 88-63, as revised by Resolution No. 2006-0008).

<sup>6</sup> The federal antidegradation policy is specified in 40 CFR 131.12. The State Water Board has interpreted California's antidegradation policy (Resolution No. 68-16) to incorporate the federal antidegradation policy in situations where the federal policy applies (Order No. WQ 86-17).

accordance with applicable regulations (40 CFR 131, the Water Quality Standards Regulations).

The Santa Ana Region Basin Plan designates existing or potential (or intermittent) beneficial uses for the surface and ground waters in the Region (Chapter 3). Water quality objectives intended to protect those uses are established in Chapter 4. (Additional objectives applicable to the waters of the Region were promulgated by the USEPA in the California Toxics Rule.) The state's antidegradation policy (State Water Board Resolution No. 68-16) is incorporated by reference in Chapter 2.

In section 101(a)(2) of the CWA, Congress declared a national goal "that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983." These water uses are typically referred to as "fishable/swimmable" uses. The CWA and implementing federal regulations provide special protection for "fishable/swimmable" uses, including recreation. The statute and regulations create a rebuttable presumption that all waters support these uses.<sup>7</sup> To overcome this presumption, the states must conduct a use attainability analysis (UAA) and demonstrate that attaining the uses is not feasible based on one or more of the six factors identified in federal regulations (40 CFR 131.10(g)). These regulations limit states' discretion to remove or modify uses and require, in part, that downstream uses be considered and protected (see detailed discussion in Section 5.6 Use Attainability Analyses for Specific Waters).

In accordance with the "swimmable" presumption of the CWA, all surface waters in the Santa Ana Region are now designated as "existing or potential" (or, where the flow in the surface water is ephemeral or intermittent, as "intermittent") REC1 (water contact recreation). All surface waters are also currently designated REC2 (non-contact water recreation) (existing or potential or intermittent). Water quality objectives for bacteria indicator organisms are specified to protect these uses (see Section 3.2., below).

## **2.2 Triennial Review and Formation of the Stormwater Quality Standards Task Force (SWQSTF)**

During the 2002 Triennial Review of the Basin Plan, the Regional Water Board (Regional Board) identified as a high priority item the review of the bacterial objectives specified in the Basin Plan for water contact recreation (REC1). This was in response to USEPA's directive to the states to revise their existing fecal coliform objectives based on USEPA's revised national bacteria criteria for primary contact recreation<sup>8</sup>. USEPA's revised criteria are based on the bacteria indicators *E. coli* and enterococcus (see Section 4.0).

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<sup>7</sup> See 40 CFR 131.10(j)(1).

<sup>8</sup> U.S. Environmental Protection Agency, Ambient Water Quality Criteria for Bacteria, 1986.

The Basin Plan triennial review process entails extensive public participation. During the 2002 Review, a large number of stakeholders expressed concern about the economic implications of stormwater compliance with water quality objectives. These parties questioned whether the factors identified in Water Code Section 13241 had been considered when the objectives were established. CWC Section 13241 requires that certain factors, including economics, be considered when objectives are established by the Regional Board.

These stakeholders recommended that the Regional Board assign high priority to the review of all objectives in the Basin Plan, as well as the beneficial uses the objectives were set to protect. The Regional Board's response was that the Regional Board did not have the resources necessary to conduct such a sweeping review, but that this effort could be undertaken, in a phased manner, if the stakeholders committed to providing the requisite support. Certain stakeholders made that commitment, the Regional Board agreed to make this a high Triennial Review priority, and in 2003, the Stormwater Quality Standards Task Force (SWQSTF) was formed. Regional Board staff members have been consistent and active participants in the Task Force effort. In light of the other high Triennial Review priority to consider revisions to the recreational bacteria quality objectives, the first priority of the Task Force has been to review recreational water quality standards for fresh water, including both recreational uses and applicable bacterial quality objectives.

## **2.3 Stormwater Quality Standards Task Force**

### **2.3.1 Membership and Participation**

There are five funding partners to the SWQSTF: Orange County, Riverside County and San Bernardino County stormwater management agencies, Orange County Sanitation District and the Santa Ana Watershed Project Authority (SAWPA). SAWPA also serves as the Task Force administrator. The Regional Water Board is a non-funding member of the Task Force and a signatory to the Task Force agreement. The Task Force contracted with Risk Sciences and Camp Dresser & McKee to provide consultant services.

Public participation is a key element of the Task Force effort. Since its inception, the Task Force has actively sought participation by and comments from a large number of agencies, including the USEPA, State Water Board and Department of Public Health, non-governmental organizations and other parties. Personal invitations were provided to environmental organizations, including Orange County Coastkeeper, Surfrider Foundation, Natural Resources Defense Council and the Center for Biological Diversity both to attend the initial workshops and to participate in the Task Force. Representatives of the Orange County Coastkeeper and Inland Empire Waterkeeper have been consistent and actively engaged participants. USEPA staff consistently participated in early stages of the Task Force effort. The Task Force mailing list includes 125 people representing 54 agencies, organizations and individuals.

The Task Force was committed to transparency: all Task Force meetings were open to the public, with both agendas and meeting notes posted on the SAWPA website. Task Force work products were also e-mailed to interested parties who requested inclusion on the Task Force listserv. Periodic presentations regarding the Task Force work were made before the Regional Board during regularly scheduled Board meetings. Periodic updates were also provided to the State Water Board and USEPA.

### 2.3.2 Task Force Ground Rules, Axioms and Goals

At the outset, the Task Force members committed to be governed by several ground rules:

- **First, the work conducted by the Task Force and the recommendations derived therefrom must be objective.** The work would not be conducted in order to support any desired outcome; it was recognized that any recommendations for changes to recreation standards might result in less stringent or more stringent requirements for affected dischargers.
- **Second, any proposed changes to recreation standards must be based on the best available science.**
- **Third, any proposed changes to recreation standards must comport with existing law and regulation.**

These rules governed the development of all of the proposed Basin Plan amendments presented in the following sections of this report, not just those recommendations related to recreation water quality standards.

These rules also guided the specific tasks performed by the Task Force and the Task Force consultants. The Task Force began its work with a review of the science underlying both the existing bacteria quality objectives in the Basin Plan and those recommended by USEPA in 1986.<sup>9</sup> The Task Force also compiled the federal and state statutes, regulations and guidance that pertain to consideration of modifying both water quality objectives and beneficial uses. A list of 20 axioms for setting or changing water quality standards was developed and used to consider whether or not specific proposals for modifying the Basin Plan could and should be considered.<sup>10</sup> Recreation water quality standards in other states and other regions in California were also identified and evaluated.<sup>11,12</sup>

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<sup>9</sup> CDM, Inc. Memorandum. "Scientific Basis for EPA Recommended Water Quality Objectives for Bacteria", April 10, 2006.

<sup>10</sup> Risk Sciences. 2004. "Axioms for Setting or Changing Stormwater Standards", prepared for Stormwater Quality Standards Task Force.

<sup>11</sup> "Review of State Recreational Uses and Bacteria Objectives", December 12, 2005, Memorandum, CDM

<sup>12</sup> All Task Force documentation is posted at [www.sawpa.org/roundtable-SWQTF\\_IV.html](http://www.sawpa.org/roundtable-SWQTF_IV.html) > Resources

Understanding the scientific basis for existing and recommended bacteria objectives led the Task Force to broaden the scope of potential amendments beyond changes to the bacteria objectives themselves. As reflected in the discussion of the proposed amendments that follows, these included revisions to the Basin Plan name for and definition of Water Contact Recreation (REC1), changes to REC1 and REC2 (Non-Contact Water Recreation) designations for specific waters based on Use Attainability Analyses, and implementation strategies, including a temporary suspension of recreation standards under certain high flow conditions, application of the Single Sample Maximum values recommended as part of USEPA's 1986 criteria, and recommended monitoring and follow-up investigation.

The overall goal of the Task Force was to develop a pathogen control strategy that would not only protect public health and meet statutory and regulatory water quality standards requirements but that would also encourage finite public resources to be invested in prioritized fashion. The strategy should first provide the highest level of water quality and beneficial use protection where people are actually coming into contact with the water. The Task Force recognized that such a strategy would, in part, allow planning agencies to implement more cost-effective regional BMP solutions while continuing to protect public health and downstream uses. The Task Force also recognized that additional BMPs would likely be needed over time to assure that the applicable recreation water quality standards in all inland freshwaters are achieved.

### **2.3.3 Work Conducted**

With an understanding of the scientific basis of the existing and USEPA recommended bacteria quality objectives, and of the law and regulation that governs changes to water quality standards, the Task Force commissioned an extensive array of technical tasks. The tasks were designed to provide the information necessary to assure that any proposed changes to standards would be both scientifically defensible and consistent with applicable legal requirements. In particular, the tasks were designed to provide the technical information necessary to consider: (a) whether and under what conditions a temporary suspension of recreational standards in inland fresh waters would be appropriate; (b) whether de-designation of REC1 and/or REC2 beneficial uses for specific inland fresh waters would be feasible and justified, pursuant to federal requirements regarding existing uses and Use Attainability Analyses (see Section 5.6); (c) reasonably foreseeable methods of compliance with revised water quality standards; and, (d) the economic implications of modifications to the recreation water quality standards, including implementation strategies. (Reasonably foreseeable methods of compliance and economics must be considered as part of the requisite analysis of the factors identified in Water Code Section 13241 (see Section 6.0) and pursuant to requirements implementing the California Environmental Quality Act (CEQA) (see Section 9.0)).

Major tasks included:

*Watershed inventory:* The Task Force developed a comprehensive inventory for fresh receiving waters and watershed, including: mapping; physical characterization of receiving waters, including channel morphology; flow characterization (quantity and quality); and, adjacent land use.

*Recreational Use Surveys: Field and Photographic.* The Task Force conducted field surveys at a number of inland freshwaters with varying types of channel morphology and adjacent land uses to record information regarding the nature of recreational activity observed, if any. Remote cameras were also placed at 16 locations in different areas of the watershed to document recreational use and physical characteristics. The cameras were set to capture images at 15 minute intervals during daylight hours over a total of four years. Over 500,000 photographs were obtained and evaluated for the nature of any recreational activity observed. **To Board staff's knowledge, this type of photographic record, and its magnitude, are unprecedented.** Further, the camera surveys were coupled with periodic field visits at the camera locations for observation verification and equipment maintenance purposes. The Summary of Camera Locations and Recreational Use Survey Reports can be found at the Santa Ana Watershed Project Authority website at [http://www.sawpa.org/roundtable-SWQTF\\_IV.html](http://www.sawpa.org/roundtable-SWQTF_IV.html) resources tab (under the heading Recreational Use Surveys and Use Attainability Analysis and Technical Reports).

*BMP Evaluation and Economics Analyses:* The Task Force reviewed available literature and examples of BMP implementation, including effectiveness, reliability and cost requirements. An inventory and analysis was conducted of existing major control programs and structural measures that directly or indirectly affect waterborne bacteria and pathogens. Alternatives for compliance with revised recreation standards were evaluated and economic analyses were performed.

As noted previously, the Task Force work products are posted on the SAWPA website and are included in the administrative record for these amendments.

### **3.0 CURRENT WATER QUALITY STANDARDS**

#### **3.1 Beneficial Uses Applicable To Surface Waters**

Beneficial Uses designated for the surface and groundwaters in the Santa Ana Region are listed in Chapter 3 BENEFCIAL USES, Table 3-1 of the Basin Plan.

Consistent with the “fishable/swimmable” goal of the federal Clean Water Act and the rebuttable presumption that these uses are supported, all surface waters in the Region, including ocean waters, bays and estuaries and inland freshwater streams, lakes and wetlands, are currently designated REC1 and REC2. In most cases, the uses are identified with an “I”, which indicates that the use occurs or may occur only intermittently, when surface flow is present. In most cases, the uses are denoted as “X”,

which is intended to indicate that the use is existing or potential. (It is important to note that “X” is currently defined in Table 3-1 as “present or potential”. This definition is confusing and inconsistent with the terminology intended and generally applied in the text of Chapter 3. The proposed amendments would correct this situation (See Section 5.8).

In accordance with the State Water Board’s Sources of Drinking Water Policy (Resolution No. 88-63, as revised by Resolution No. 2006-0008), most surface waters within the Region are designated MUN (municipal and domestic supply). Specific surface waters have been excepted from this designation, pursuant to criteria identified in the Sources of Drinking Water Policy.

The REC1, REC2 and MUN beneficial uses are currently defined as follows:

“Water Contact Recreation (**REC1\***) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs.”

“Non-contact Water Recreation (**REC 2\***) waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting sightseeing and aesthetic enjoyment in conjunction with the above activities.”

Municipal and Domestic Supply (**MUN**) waters are used for community, military, municipal or individual water supply systems. These uses may include, but are not limited to, drinking water supply.”

The language referred to by the asterisk denoted in the REC1 and REC2 definitions reads as follows:

“\* The **REC 1** and **REC 2** beneficial use designations assigned to surface waterbodies in this Region should not be construed as encouraging recreational activities. In some cases, such as Lake Matthews and certain reaches of the Santa Ana River, access to the waterbodies is prohibited because of potentially hazardous conditions and/or because of the need to protect other uses, such as municipal supply or sensitive wildlife habitat. Where **REC 1** or **REC 2** is indicated as a beneficial use in Table 3-1, the designations are intended to indicate that the uses exist or that the water quality of the waterbody could support recreational uses.”

### **3.2 Water Quality Objectives Applicable To Inland Surface Waters**

Chapter 4 WATER QUALITY OBJECTIVES of the Basin Plan includes the following for Inland Surface Waters:

## "Bacteria, Coliform

Fecal bacteria are part of the intestinal flora of warm-blooded animals. Their presence in surface waters is an indicator of pollution. Total coliform is measured in terms of the number of coliform organisms per unit volume. Total coliform numbers can include non-fecal bacteria, so additional testing is often done to confirm the presence and numbers of fecal coliform bacteria. Water quality objectives for numbers of total and fecal coliform vary with the uses of the water, as shown below.

### Lakes and Streams

- MUN**      *Total coliform: less than 100 organisms/100mL*
- REC-1**      *Fecal coliform: log mean less than 200 organisms/100mL based on five or more samples/30 day period, and not more than 10% of the samples/30 day period, and not more than 10% of the samples exceed 400 organism/100mL for any 30-day period*
- REC-2**      *Fecal coliform: average less than 2000 organisms/100 mL and not more than 10% of samples exceed 4000 organisms/100 mL for any 30-day period*

## 4.0 SUMMARY OF THE SCIENTIFIC BASIS FOR PATHOGEN INDICATOR BACTERIA CRITERIA

As discussed previously (Section 1.0 Overview; Section 2.3 Stormwater Quality Standards Task Force), one of the early tasks initiated by the SWQSTF was an investigation of the scientific basis of the fecal coliform bacteria objectives now specified in the Basin Plan to protect recreation uses, and of the *E. coli* (and enterococcus) criteria recommended by the USEPA in 1986. A fundamental understanding of the science underlying both the existing objectives and USEPA recommended criteria was key to the consideration of appropriate changes to the established objectives by the Task Force and led the Task Force to consider other recreation standards changes. To provide appropriate context for the specific recommendations discussed in the next section, the following is a summary of the salient facts<sup>13</sup>.

Pathogenic organisms, including bacteria, viruses and protozoa, in waters used for water contact recreation have the potential to increase the risk of illness among people recreating in those waters. While a variety of illnesses affecting the eye, ear, skin and respiratory tract can be contracted from contact with water in which pathogens are present, the most common health effects of recreating in such waters are illnesses of the gastrointestinal tract (gastroenteritis). The main route of exposure to illness-causing organisms in recreational bathing waters is through accidental ingestion of water.

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<sup>13</sup> Detailed discussion is provided in U.S. Environmental Protection Agency, Ambient Water Quality Criteria for Bacteria, 1986; CDM Memorandum "Scientific Basis for EPA Recommended Water Quality Objectives for Bacteria" April 10, 2006; and, the preamble to the BEACH Act Rule (69 FR 67217, November 16, 2004).

Detection and enumeration of all of the pathogens of concern is impractical, for a number of reasons. In particular, at present, there are not readily available and affordable methods to detect each and every microorganism that may be pathogenic to humans. As a result, USEPA recommends using surrogate indicators to determine whether ambient water quality poses unacceptable risk to swimmers and bathers. Epidemiological studies that formed the basis for federal criteria recommendations indicated that the density of certain bacteria at recreational beaches is strongly correlated with the incidence of gastrointestinal illness among those who were exposed to prolonged and intimate water contact where immersion and ingestion were likely to occur (i.e., primary contact recreation). Therefore, USEPA found that these bacteria can serve as a reliable means of assessing whether water quality will protect public health and water contact (primary contact) recreational uses (REC1 uses). Surrogate bacterial indicators have formed and continue to form the basis for federal recommendations for ambient water quality criteria to protect primary contact recreational uses.

#### **4.1 REC1 Objectives/Criteria**

##### **4.1.1 Basin Plan Fecal Coliform Objective for REC1 Waters**

As described in Section 3.2, above, the current Basin Plan specifies the following water quality objective to protect water contact (primary contact) recreation (REC-1) activities in freshwater lakes and streams:

*Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples/30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period.*

This pathogen indicator objective was included in the 1975 Basin Plan and has remained unchanged since then. The fecal coliform objective was based on the best available scientific information at the time and was consistent with EPA's recommended water quality criteria for pathogen indicator bacteria that were published in 1976.<sup>14</sup>

A review of the historical record reveals that the fecal coliform criteria were originally developed by the Federal Water Pollution Control Administration (FWPCA, a predecessor agency to EPA within the Department of the Interior).<sup>15</sup> In 1968, four years prior to authorization of the Clean Water Act, the FWPCA recommended that:

*"Fecal coliform should be used as the indicator organism for evaluating the microbiological suitability of recreation waters. As determined by*

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<sup>14</sup> U.S. EPA. Quality Criteria for Water. 1976; pg. 86

<sup>15</sup> See, also, CDM Memorandum "Scientific Basis for EPA Recommended Water Quality Objectives for Bacteria." April 10, 2006.

*multiple-tube fermentation or membrane filter procedures and based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content of primary contact recreation waters shall not exceed a log mean of 200/100 ml, or shall more than 10% of total samples during any 30-day period exceed 400/100 ml.”<sup>16</sup> (emphasis added)*

The FWPCA’s Technical Advisory Committee defined primary contact recreation as:

*“...activities in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard. Examples are wading and dabbling by children, swimming, diving, water skiing and surfing. (Secondary contact sports include those in which contact with the water is either incidental or accidental and the probability of ingesting appreciable quantities of water is minimal.)”<sup>17</sup> (emphasis added)*

The FWPCA relied on three epidemiological studies performed by the U.S. Public Health Service (PHS) in the mid-1940’s and early 1950’s to support its recommendation. According to the Technical Advisory Committee, *“these studies were far from definitive and were conducted before the acceptance of fecal coliform as a more realistic measure of health hazard.”* Nevertheless, the studies showed a detectable adverse effect on human health (e.g. increases in gastroenteritis, diarrhea, nausea or vomiting) when total coliform concentrations reached 2,300-2,700 organisms per 100 mL. Later it was estimated that fecal coliforms probably comprised about 18% of the total coliform at one of the two study locations. Therefore, the FWPCA inferred that detectable health effects may occur when the average fecal coliform levels exceeds 400 cfu per 100 mL (i.e., ~ 18% of 2,300 total coliform).

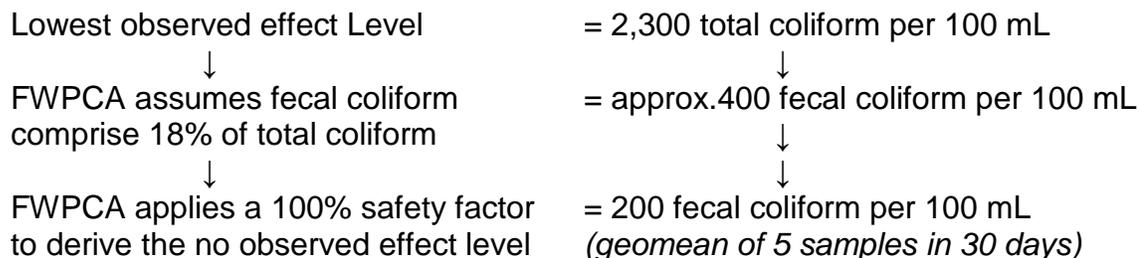
Since measurable adverse health effects were detected when total coliforms reached 2,300 organisms per 100 mL, and this was assumed to be equivalent to 400 fecal coliforms per 100 mL, these levels were deemed the lowest observed effect levels. The FWPCA subsequently estimated the probable no observed effect level by dividing the lowest observed effect level in half. The resulting value of 200 fecal coliform organisms per 100 mL represented the threshold density at which no significant health hazards are expected to occur as a result of water contact recreation activities (see Figure 4.1).

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<sup>16</sup> Federal Water Pollution Control Administration. Water Quality Criteria: Report of the National Technical Advisory Committee to the Secretary of the Interior. 1968. pg.12.

<sup>17</sup> *Ibid*; pg. 11

**Figure 4.1: Historical Basis of EPA’s Recommended Fecal Coliform Criteria**



Based on other studies, FWPCA also found that there will be approximately one virus particle in each milliliter of municipal wastewater following normal secondary treatment. In such water, the ratio of fecal coliform bacteria to viruses is approximately 10,000-to-1. Therefore, a swimmer exposed to 400 fecal coliforms per 100 mL is estimated to ingest approximately one virus particle for every 5 quarts of water swallowed.

In 1972, the Environmental Studies Board of the National Academy of Sciences and the National Academy of Engineering declined to endorse the FWPCA’s recommendation, citing the lack of adequate epidemiological information and a number of design deficiencies in the underlying PHS studies and the FWPCA’s own warning that there was an *“urgent need for research to refine the correlations of various indicator organisms, including fecal coliforms, to water-borne disease.”*<sup>18</sup>

In 1976, EPA reviewed FWPCA’s recommendations, including the related epidemiological data, and found that *“these studies demonstrated that an appreciably higher overall illness incidence may be expected among swimmers when compared to non-swimmers, but the data are inconclusive.”*<sup>19</sup> EPA agreed that, in general, exposure to potential pathogens was more likely for swimmers compared to non-swimmers when fecal coliform densities were elevated above certain levels. However, EPA was unable to establish a correlation describing how illness rates changed in response to increasing fecal coliform density. Therefore, the agency later initiated series of follow-on studies that examined the relationship between swimming-associated acute gastrointestinal illness and the microbiological quality of the waters used by recreational bathers<sup>20</sup>. The results of these studies did not demonstrate swimming-associated gastroenteritis correlated with fecal coliforms and USEPA came to the *“unequivocal conclusion... that the fecal coliform criteria for recreation is (sic) not a reliable indicator of illness to swimmers.”*<sup>21</sup>

<sup>18</sup> Federal Water Pollution Control Administration. Water Quality Criteria: Report of the National Technical Advisory Committee to the Secretary of the Interior. 1968

<sup>19</sup> U.S. EPA. Quality Criteria for Water. 1976; pg. 86-87

<sup>20</sup> The results freshwater studies are reported in Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. Environmental Protection Agency, Cincinnati, OH EPA 600/1-84-004 (sometimes referenced as U.S. EPA. 1984).

<sup>21</sup> U.S. EPA. Water Quality Standards for Coastal and Great Lakes Recreational Waters – Final Rule. 69 FR 220, 67230 (Nov. 16, 2004) [BEACH Act rule].

Based on these findings, in 1986, USEPA published new pathogen indicator bacteria criteria based on *E. coli* or enterococcus in freshwater (and enterococcus in marine waters).

#### 4.1.2 USEPA Ambient Water Quality Criteria for Bacteria – 1986

The 1986 USEPA criteria for freshwaters are presented in Table 4.1.

**Table 4.1 EPA Criteria for Bathing (Full Body Contact)  
Recreational Waters (Freshwater Only)<sup>+</sup>**

*“Based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period), the geometric mean of the indicated bacterial densities should not exceed one or the other of the following:\**

*E. coli 126 per 100 ml; or  
enterococci 33 per 100 ml;*

*no sample should exceed a one-sided confidence limit (C.L.) calculated using the following as guidance:*

*designated bathing beach 75% C.L.  
moderate use for bathing 82% C.L.  
light use for bathing 90% C.L.  
infrequent use for bathing 95% C.L.*

*based on a site-specific log standard deviation, or if site data are insufficient to establish a log standard deviation, then using 0.4 as the log standard deviation for both indicators.*

*\*Note: Only one indicator should be used. The Regulatory agency should select the appropriate indicator for its conditions.”*

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<sup>+</sup> U.S. EPA. Ambient Water Quality Criteria for Bacteria – 1986. EPA-440/5-84-002. 1986. p. 16

As shown in this table, the criteria include recommended geometric mean values and “Single Sample Maximum”<sup>22</sup> values that are calculated using the following equation<sup>++</sup>:

Single sample maximum = geometric mean \* 10<sup>^(confidence level factor \* log standard deviation)</sup>, where the confidence level factor is: 75%: 0.68; 82%: 0.94; 90%: 1.28; 95%: 1.65

<sup>++</sup> U.S. EPA. Water Quality Standards for Coastal and Great Lakes Recreation Waters; Final Rule. 69FR 67174. November 16, 2004 [BEACH Act Rule], p. 67242). [Based on equation in U.S. EPA. Ambient Water Quality Criteria for Bacteria – 1986. EPA-440/5-84-002. 1986. Table 4, p.15]

The calculated Single Sample Maximum values are as follows:

	<i>E. coli</i> per 100 mL	Enterococci per 100mL
Designated beach area (upper 75% C.L.):	235	61
Moderate full contact recreation area (upper 82% C.L.):	298	78
Lightly used full body contact recreation area (upper 90% C.L.):	409	107
Infrequently used full body contact rec. area (upper 95% C.L.):	575	151

These Single Sample Maximum value calculations assume that: (1) the steady state geometric mean densities are 126 (*E. coli*) and 33 (enterococci); and, (2) the log standard deviation is 0.4 (a default value observed from USEPA epidemiological studies; see Table 4.1).

As indicated in Table 4.1, USEPA did not specify the averaging period for the geometric mean values in the 1986 criteria document. Relevant guidance is provided in the BEACH Act rule, which states that USEPA concluded that it is appropriate to allow states the discretion to determine how to apply this averaging period. However, USEPA recommends that the averaging period be applied as a “rolling” or “running” average. USEPA recognizes that it would be technically appropriate to apply the averaging period on a set basis such as monthly or recreation season<sup>23</sup>.

The 1986 criteria document makes clear that the recommended bacteria criteria, like the prior fecal coliform criteria, were intended to protect people engaged in full body contact recreational activities where there is the likelihood of ingestion of water. USEPA

<sup>22</sup> USEPA recently recommended changing the nomenclature from “Single Sample Maximum” (SSM) values to “Statistical Threshold Values” (STVs) to avoid misinterpretation and misapplication of the concept. This recommendation may be reflected in revised bacteria quality criteria for recreational waters that USEPA expects to publish by the end of 2012. This report employs the established SSM nomenclature.

<sup>23</sup> U.S. EPA. Water Quality Standards for Coastal and Great Lakes Recreational Waters – Final Rule. 69 Fed. Reg. 220, 67224 (Nov. 16, 2004) [BEACH Act rule].

affirmed the proper application of the 1986 criteria when it promulgated pathogen indicator bacteria criteria for the Great Lakes pursuant to the BEACH Act.<sup>24</sup>

*"In 1986, EPA published Ambient Water Quality Criteria for Bacteria-1986. This document contains EPA's current recommended water quality criteria for bacteria to protect people from gastrointestinal illness in recreational waters, i.e. waters designated for primary contact recreation or similar full body contact uses. States and Territories typically define primary contact recreation to encompass recreational activities that could be expected to result in the ingestion of, or immersion in, water, such as swimming, water skiing, surfing, kayaking or any other recreational activity where ingestion of, or immersion in, the water is likely."<sup>25</sup> (emphasis added)*

The 1986 criteria were developed based on the epidemiological studies noted above (Dufour 1984 (U.S. EPA. 1984)) that evaluated exposures incurred during swimming with head immersion. In these studies, the swimming-associated gastrointestinal illness rate was determined by subtracting the gastrointestinal illness rate in non-swimmers from that in swimmers. Non-swimmers were those who either did not go in the water (non-bathers) or who went in the water but did not get their head or face wet (waders). Persons who reported that they got in the water for less than ten minutes were classified as non-swimmers regardless of whether they got their head or face wet, in view of their short exposure time. Swimmers were those who did swim or otherwise get their head or face wet.

In the 1986 criteria, USEPA did not recommend a change in the stringency of its bacteria criteria for recreation waters. The criteria shown in Table 4.1 above correspond to an estimated "acceptable" gastrointestinal illness rate of 8 per 1000 swimmers. This is the rate of gastrointestinal illness that is anticipated to occur above the "background" level in non-swimmers. No studies were done to determine what constitutes the "acceptable" illness rate. Instead, USEPA evaluated the fecal coliform data and estimated the gastrointestinal illness rate associated with the prior fecal coliform criteria recommendations (200/100mL). [Note that the fecal coliform criteria were developed long before USEPA calculated the corresponding estimated illness rate.] The equations derived from the freshwater epidemiological studies (Dufour 1984) were used to identify the *E. coli* and enterococcus densities that roughly correlate to this estimated illness rate. The 1986 criteria document acknowledges that while the chosen level of acceptable risk "was based on the historically accepted risk, it is still arbitrary insofar as the historical risk was itself arbitrary" (USEPA 1986, p. 10). It should be emphasized that the chosen risk level of 8/1000 is an approximation, based

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<sup>24</sup> U.S. Environmental Protection Agency. October 10, 2000. Public Law 106-284. Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000.

<sup>25</sup> U.S. EPA. Water Quality Standards for Coastal and Great Lakes Recreational Waters – Final Rule. 69 Fed. Reg. 220, 67220 (Nov. 16, 2004) [BEACH Act rule].

on USEPA's best estimate of the historically accepted illness rate for fecal coliform.

It should also be noted that the epidemiological studies used to develop the 1986 freshwater criteria were performed during non-stormwater conditions. The *E. coli* and enterococcus criteria presented above are for steady state, dry weather conditions.

USEPA has taken the position that States may adopt ambient criteria based on bacteria indicators other than *E. coli* or enterococcus in freshwaters provided that it is demonstrated that these criteria are at least as protective of human health as USEPA's 1986 criteria<sup>26</sup>. This is consistent with Congressional intent (through Clean Water Act Section 303(c)) to give States "the paramount role in weighing any available credible information for establishing water quality standards that are protective of the designated uses of their waters."<sup>27</sup> As a practical matter however, the level of epidemiological and other investigation needed to support the use of alternative bacteria indicators far exceeds the resources available to the States, including California, and the Santa Ana Regional Board. Accordingly, revised bacteria quality objectives for primary contact recreation waters that are based on USEPA's 1986 bacteria criteria are proposed as part of these Basin Plan amendments (see Section 5.2).

As shown in Table 4.1, both *E. coli* and enterococcus criteria for freshwaters are identified in USEPA 1986 criteria document. USEPA recommends that the states select one of these surrogate indicators to express water quality objectives. The 1986 criteria were based on findings of statistically-significant correlations between *E. coli* and enterococcus densities and gastrointestinal illness among swimmers. However, the correlation coefficient for enterococci is weaker than that identified for *E. coli* (0.74 vs. 0.80, respectively). For this reason, and considering bacteria objective decisions by other regional boards in California and other states, the Stormwater Quality Standards Task Force recommended and the proposed amendments specify revised bacteria objectives for REC1 waters that are based on *E. coli* (see Section 5.2).

In November 2003, USEPA published draft implementation guidance for its 1986 bacteria criteria<sup>28</sup>. The draft guidance indicates that while the 1986 criteria document recommended the use of *E. coli* or enterococcus densities based on a risk level of 8 illnesses per 1000 swimmers in freshwaters, USEPA believes that it is appropriate for states to exercise their risk management discretion when protecting their recreational waters. Accordingly, the draft guidance

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<sup>26</sup> U.S. EPA. Water Quality Standards for Coastal and Great Lakes Recreational Waters – Final Rule. 69 Fed. Reg. 220, 67231 (Nov. 16, 2004)[BEACH Act rule].

<sup>27</sup> *Ibid.* p. 67231.

<sup>28</sup> U.S. EPA. Implementation Guidance for Ambient Water Quality Criteria for Bacteria. November 2003 Draft. EPA-823-B-03-XXX.

recommended that states select a risk level from 8 to 10 per 1000 swimmers when adopting state bacteria objectives for their primary contact waters. For *E. coli*, this means that states should select geometric mean densities from 126/100mL (8 illnesses/1000 swimmers) to 206/100 mL (10 illnesses/1000 swimmers). The range acknowledges not only state discretion but also the approximate nature of the risk levels associated with the 1986 criteria.

In 2006, USEPA published a Fact Sheet<sup>29</sup> to provide guidance to states regarding the selection of appropriate risk levels. The Fact Sheet provides answers to questions regarding what USEPA considers to be appropriate in the context of USEPA's promulgation of bacteria criteria in the BEACH Act Rule (69, FR 67217, November 16, 2004) and what USEPA recommended in the 1986 criteria. The Fact Sheet states that in considering whether to include a state in the BEACH Act rule, USEPA considered states that adopted objectives based on an illness rate of 10/1000 swimmers or less for freshwaters to have criteria as protective of human health as the 1986 bacteria criteria. Therefore, USEPA did not promulgate bacteria criteria for these states. The Fact Sheet thus reinforces the 2003 draft Implementation Guidance.

The Stormwater Quality Standards Task Force considered the substantive direction provided by the 2003 draft guidance, the BEACH Act rule, and the 2006 Fact Sheet in formulating recommendations for changes to the REC1 objectives. The Task Force elected to recommend bacteria objectives based on the more restrictive risk level (8 illnesses/1000 swimmers) (see Section 5.2). It is noteworthy that the USEPA is in the process of reviewing and revising its recommended bacteria criteria. It is not yet definitive whether and to what extent USEPA's recommendation in the draft guidance/Fact Sheet for state discretion to select alternative risk levels/corresponding bacteria values will remain a part of USEPA's future criteria recommendations.

As shown in Table 4.1, the 1986 criteria include recommended geometric mean densities for *E. coli* (and enterococcus) and "Single Sample Maximum" (SSM) values in freshwaters. As discussed in the Fact Sheet published by USEPA regarding SSMs<sup>30</sup>, the geometric mean "is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality. The geometric mean is generally more relevant because it is usually a more reliable measure of long term water quality, being less subject to random variation, and more directly linked to the underlying studies upon which the 1986 bacteria criteria were based." However, USEPA acknowledged the need for more rapid assessment of the quality of recreational waters than would be allowed by collecting multiple samples, e.g., monthly or over a recreation season, needed to

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<sup>29</sup> U.S.EPA. Water Quality Standards for Coastal Recreation Waters, *Considerations for States as They Select Appropriate Risk Levels*, EPA-823-F-06-012, August 2006)

<sup>30</sup> U.S. EPA. Water Quality Standards for Coastal Recreation Waters, *Using Single Sample Maximum Values in State Water Quality Standards*, EPA-823-F-06-013. August 2006. ("SSM Fact Sheet")

calculate a geometric mean. Therefore, USEPA developed SSMs, which are statistical constructs designed to assess the likelihood that water quality is not meeting the geometric mean objective when there are insufficient data available to calculate a geometric mean.

The principal purpose of the SSMs is to allow decision makers to make timely decisions to open or close beaches based on small data sets. An SSM identifies the highest *E. coli* (or enterococcus) density one would expect to see in a single sample when the true geometric mean is meeting the water quality objective. Put another way, SSMs provide an assessment of when a single value measured in a waterbody may be part of a bacterial density with a geometric mean density higher than an established geometric mean objective.

USEPA expects that SSMs will be used to make beach notification and closure decisions, and that States will employ discretion regarding the application of SSMs for other Clean Water Act purposes, e.g., NPDES permits, Total Maximum Daily Loads (TMDLs)<sup>31</sup>. The SSM Fact Sheet (p. 6) suggests that states could elect to employ SSMs as part of the state's adopted bacterial quality objectives. For example, states that elect to include a minimum sample set size as part of their geometric mean objectives (e.g., five samples/30 days) would also need to specify an alternate method for assessing compliance with that objective when the available data do not meet the minimum sample size requirement. USEPA's SSM Fact Sheet and the preamble to the BEACH Act rule make clear that the SSMs are not intended as acute criteria, nor are they intended to provide any greater protection of public health than that afforded by the geometric mean criteria. The SSMs provide a statistical procedure for making a probabilistic assessment of compliance with the geometric mean objective using more limited data. There is no need to use SSMs where there are sufficient data to calculate a representative geometric mean.

The 1986 bacteria criteria document identified default SSM values for *E. coli* and enterococcus based on the 75, 82, 90 and 95% confidence levels, using the equations shown above and a default log standard deviation (0.4) derived from USEPA's epidemiological studies (see further discussion of log standard deviation assumptions below). The calculated default numeric values are shown above. As shown, the selection of the confidence level and corresponding SSM is contingent on the known or expected intensity of primary contact recreational use. A lower confidence level (75%) is applied to protect designated beach areas, where primary contact recreational use is known or expected to be high, while a higher confidence level (95%) is applied to calculate SSMs for waters that are known or expected to be used only infrequently for such recreational use. USEPA defined the four different categories of primary contact recreational use intensity in the BEACH Act rule (p. 67242). States have discretion to identify

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<sup>31</sup> *Ibid*, p. 2; BEACH Act rule, p. 67224-5.

other pertinent factors when distinguishing among their surface waters for the purposes of assigning an appropriate confidence level and corresponding SSM.

The principle underlying this tiered SSM approach is that greater caution and conservatism should be applied when deciding whether or not to close beaches that are heavily used for primary contact recreation. Application of the 75% confidence level to these designated beach areas results in a lower SSM value (as shown above, assuming a geometric mean of 126/100mL *E.coli* and a standard deviation of 0.4, the calculated SSM is 235/100mL). The result is a statistically less certain but more conservative approach to beach closure and notification decisions. In contrast, for waters that are infrequently used for full body contact recreation, a less cautious approach is acceptable. For these waters, use of the 95% confidence level results in a higher SSM ((assuming a geometric mean of 126/100mL *E.coli* and a standard deviation of 0.4, the calculated SSM is 575/100mL). There is a higher level of certainty, but less conservatism. At such locations, where fewer people are at risk, greater certainty regarding non-compliance with the geometric mean objective is acceptable when deciding whether or not to close a beach to full body contact recreation activities.

The other confidence levels (85%, 90%) and corresponding SSMs identified by USEPA (and shown above) fall between these extremes. However, USEPA has made clear that states need not apply to their surface waters all four of the categories of full body contact recreational use intensity identified in the 1986 criteria document.<sup>32</sup> But, in order to assure that the states have adopted criteria that are at least as protective of USEPA's 1986 criteria, USEPA expects that states will first identify portions of their waters as designated bathing beaches (to which the more stringent SSM based on the 75% confidence level would be applied), and then categorize their remaining waters based on their intensity of use relative to the designated bathing beaches.

As described above, the SSMs are calculated using equations for *E. coli* and enterococcus that rely on assumed geometric mean densities of these indicators and the log standard deviation of data. As shown in Table 4.1, the 1986 bacteria criteria document recommends that the SSMs be calculated "based on a site-specific log standard deviation, or if site data are insufficient to calculate a log standard deviation, then using 0.4 as the log standard deviation for both indicators." As stated previously, the 0.4 value was derived from the USEPA epidemiological studies upon which the 1986 criteria recommendations rely. This value is considered the default to be applied when there are insufficient site-specific data to calculate an appropriate log standard deviation. USEPA's BEACH Act rule provided explicit guidance regarding the determination of a site-specific log standard deviation: "States may use a site-specific log standard deviation to calculate a single sample maximum for individual coastal<sup>33</sup>

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<sup>32</sup> BEACH Act rule, p. 67226

<sup>33</sup> While the BEACH Act rule addresses the Great Lakes and coastal recreation waters (as defined in the rule), USEPA staff have advised Regional Board staff that the rule provides the most explicit and accurate

recreation waters, but must use at least 30 samples from a single recreation season to do so.”<sup>34</sup>

As noted above, USEPA is in the process of reviewing and revising its recommended bacteria criteria. USEPA staff have advised Regional Board staff that the tiered approach to deriving SSMs is likely to change, such that only SSMs based on the 75% confidence level will be employed in the future. Further, USEPA staff anticipates that the equations used to calculate SSMs, with allowances for derivation and use of site-specific log standard deviations, will no longer be included as part of the criteria document.<sup>35</sup> These revisions to the 1986 criteria have not yet been published in final form. The recommendations for revised objectives and application of SSMs described in Section 5.2 and Section 5.3 rely on applicable, established guidance and regulation.

## **4.2 REC2 Objectives/Criteria**

### **4.2.1 Basin Plan Fecal Coliform Objective for REC2 Waters**

As described in Section 3.2. above, the current Basin Plan specifies the following water quality objective to protect non-contact water recreation (REC-2) activities in freshwater lakes and streams:

*Fecal coliform: average less than 2000 organisms/100 mL and not more than 10% of the samples exceed 4000 organisms/100 mL for any 30-day period.*

“Non-contact Water Recreation” (REC2) is essentially equivalent to “secondary contact” recreation in federal parlance. The important distinction between REC2 and REC1 activities is that during REC2 activities, people have little if any direct contact with water and the ingestion of water is thus unlikely.

As for the fecal coliform objectives adopted to protect REC-1, recommendations regarding fecal coliform objectives for REC-2 uses were derived directly from FWPCA’s 1968 Report and have not been changed since 1975. In 1968, the FWPCA’s Technical Advisory Committee made the following recommendation to the U.S. Secretary of the Interior:

*“Surface waters should be suitable for use in ‘secondary contact’ recreation – activities not involving significant risks of ingestion – without*

guidance now available regarding USEPA’s expectations of actions by states to adopt and implement the 1986 criteria for their waters.

<sup>34</sup> *Ibid*, p. 67243. 40 CFR 131.41(c)(3).

<sup>35</sup> It should be noted that the BEACH Act rule includes both default SSMs and the equation used to calculate site-specific SSMs, which may include using site-specific log standard deviations.

*reference to official designation of recreation as a water use. For this purpose, in addition to aesthetic criteria, surface waters should be maintained in a condition to minimize potential health hazards by utilizing fecal coliform criteria. In the absence of local epidemiological experience, the Subcommittee recommends an average not exceeding 2,000 fecal coliforms per 100 ml and a maximum of 4,000 per 100 ml except in specified mixing zones adjacent to outfalls... This level of fecal coliforms could be expected when concentrations of viral and other pathogens in receiving waters have been reduced to less than infectious levels for casual water contact by humans, with the risk considered to be one-tenth that for primary contact recreation. Further research will be necessary to arrive at precise criteria for secondary contact recreation activities.*<sup>36</sup>

No evidence was cited by the FWPCA to support the claim that the risk related to secondary contact recreation, where the risk of ingestion of water was not considered significant, was “one-tenth that for primary contact recreation (REC1). A review of the historical scientific literature reveals that this appears to be an undocumented assumption made by the Technical Advisory Committee<sup>37</sup>.

USEPA did not endorse FWPCA’s recommended criteria for secondary contact recreation in the water quality criteria document published in 1976.<sup>38</sup> However, EPA allowed state authorities to continue relying on the FWPCA's guidance until such time as more appropriate federal water quality criteria could be developed to protect secondary water contact recreation activities.

Most states (including the majority of the regional water boards in California) simply multiplied the fecal coliform objective for REC-1 by ten to derive a REC-2 standard - just as the FWPCA had done. However, as discussed in the preceding section, USEPA has disavowed bacteria quality criteria for REC1 waters that are based on fecal coliform. The Basin Plan REC2 objectives based on fecal coliform are not only arbitrary, but also unsupported by available science regarding protective pathogen indicators.

#### **4.2.2 USEPA Recommendations Re REC2 Objectives**

USEPA explicitly declined to recommend federal water quality criteria for secondary contact recreation when it published the new *E. coli* and enterococci criteria in 1986:

*"EPA explored the feasibility of scientifically deriving criteria for secondary contact waters and found it infeasible for several reasons. In reviewing the data generated in the epidemiological studies conducted by EPA that formed the basis*

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<sup>36</sup> Federal Water Pollution Control Administration. Water Quality Criteria: Report of the National Technical Advisory Committee to the Secretary of the Interior. 1968; pgs. 8-9.

<sup>37</sup> CDM Memorandum "Scientific Basis for EPA Recommended Water Quality Objectives for Bacteria." April 10, 2006.

<sup>38</sup> U.S. EPA. Quality Criteria for Water. 1976

*for its 1986 recommendations, EPA found these data would be unsuitable for development of a secondary contact criterion. Secondary contact recreation activities generally do not involve immersion in the water, unless it is incidental (e.g. slipping and falling into the water or water being inadvertently splashed in the face). While the main illness likely to be contracted during primary contact recreation is gastrointestinal illness, illness contracted from secondary contact recreation activities may just as likely be diseases and conditions affecting the eye, ear, skin, and upper respiratory tract. Because of the different exposure scenarios and the different exposure routes that are likely to occur under the two different types of uses, EPA is unable to derive a national criterion for secondary contact recreation based upon existing data."<sup>39</sup>*

To date, USEPA has not yet established bacteria criteria for activities involving only incidental exposures where the risk of immersion and ingestion is relatively low. Nevertheless, USEPA continues to encourage states to adopt numeric water quality objectives for pathogen indicator bacteria in REC2 waters. As noted above, USEPA is engaged in a review of its recommendations in the 1986 criteria document. These criteria focus on full body contact (REC1) recreation. USEPA expects to publish new criteria recommendations by the end of 2012. It is not clear whether and how this new guidance will address the protection of REC2 uses. The application of any new USEPA guidance, for REC1 and/or REC2 protection, will need to be considered as part of the normal triennial review process.

## **5.0 RECOMMENDED BASIN PLAN AMENDMENTS**

The following subsections describe the proposed Basin Plan amendments, the rationale for the recommendations, and alternatives considered<sup>40</sup>. The proposed amendments are shown in the attachment to tentative Resolution No. R8-2012-0001 and listed below.

- 5.1 Changes to REC1 Beneficial Use Name and Definition
- 5.2 Changes to Bacteria Quality Objectives for REC1 and REC2 Fresh Waters; Identify Bacteria Quality Targets for REC2 only Freshwaters
- 5.3 Application of Single Sample Maximum Values
- 5.4 Addition of a Narrative Pathogen Objective
- 5.5 High flow suspension of REC1 and REC2 Standards
- 5.6 Use Attainability Analyses: Recommended Re-designation of certain surface waters
- 5.7 Delete coliform objective for MUN use

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<sup>39</sup> U.S. EPA. Implementation Guidance for Ambient Water Quality Criteria for Bacteria [Draft]. May, 2002; pg. 39; draft document was cited by EPA in the BEACH Act rule (69 FR 220, 67218 (Nov. 16, 2004))

<sup>40</sup> The meeting notes and related documents included in the administrative record for these amendments document the extensive consideration of the need for and nature of the proposed amendments, including a variety of alternatives, by the Stormwater Quality Standards Task Force. These deliberations led to the recommendations presented herein.

5.8 Changes to Table 3-1 BENEFICIAL USES and Table 4-1 WATER QUALITY OBJECTIVES

5.9 Changes to Chapter 5 Implementation

5.10 Editorial changes

**5.1 Changes to REC1 Beneficial Use Name and Definition (Basin Plan, Chapter 3)**

**5.1.1 Summary**

As discussed in Section 3.0 of this staff report, the beneficial uses recognized in the Santa Ana Region include REC1, "Water Contact Recreation", which is defined in the Basin Plan as follows:

"Water Contact Recreation (**REC1\***) waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing and use of natural hot springs."

This beneficial use is recognized statewide in all Basin Plans and the definition was agreed upon as part of a comprehensive statewide update of all Basin Plans in the early 1990s.

Changes to the nomenclature are proposed to clarify this definition and to assure that it properly reflects the nature of the recreational activity and exposure to water that was assumed in establishing bacteria indicator objectives to protect this use. Specifically, the proposed modifications are: (additions are underlined; deletions are in strike-out type)

~~Water Contact Recreation~~ Primary Contact Recreation (**REC 1\***) waters are used for recreational activities involving deliberate water body contact, especially by children, with water where ingestion of water is likely to occur ~~reasonably possible~~. Examples of REC1 activities ~~These uses~~ may include, but are not limited to, swimming, ~~wading,~~ water-skiing, ~~skin and scuba diving,~~ surfing, whitewater rafting activities, float tubing, bathing in natural hot springs, skin diving, scuba diving and some forms of wading and fishing. ~~fishing and use of natural hot springs.~~ Brief incidental or accidental water contact that is limited primarily to the body extremities (e.g. hands and feet), is not generally deemed Primary Contact Recreation because ingestion is not likely to occur.

For clarity, in final form, the proposed revised definition would read as follows:

Primary Contact Recreation (**REC 1\***) waters are used for recreational activities involving deliberate water contact, especially by children, where ingestion is likely to occur. Examples of REC1 activities may include, but are not limited to, swimming, water-skiing,

surfing, whitewater rafting, float tubing, bathing in natural hot springs, skin diving, scuba diving and some forms of wading and fishing. Brief incidental or accidental water contact that is limited primarily to the body extremities (e.g. hands and feet), is not generally deemed Primary Contact Recreation because ingestion is not likely to occur.

As shown above, the current Basin Plan REC1 definition (and the REC2 definition in the Basin Plan) includes an asterisk, which refers to a footnote in the Basin Plan that qualifies these designations. Editorial changes to this footnote are proposed and discussed later in this report (see Section 5.10).

### 5.1.2 Discussion

The recommended changes to the REC1 definition are based largely on careful consideration of applicable USEPA guidance and terminology. In particular, the proposed changes are intended to reflect accurately the underlying scientific basis of USEPA's Ambient Water Quality Criteria for Bacteria – 1986 (national bacteria quality criteria, or national criteria), both past and present, which were developed to protect full body contact recreational uses. These criteria formed the basis for the bacteria quality objectives for REC1 use protection established in the current Basin Plan. The revised, 1986 national criteria form the basis for recommendations for revised bacteria quality objectives as part of these Basin Plan amendments (see Section 5.2). The scientific basis of the existing fecal coliform objectives and the 1986 national criteria is discussed in Section 4.0 of this report, and extensively in USEPA guidance and regulation<sup>41</sup>. The proposed revisions also reflect careful consideration of use of recreational waters by children, as recommended by USEPA.

USEPA (and many of the states) employs the term “primary contact recreation” to identify full body contact recreational activities that could be expected to result in the ingestion of water or immersion. Per USEPA, these activities include swimming, water skiing, surfing, kayaking and any other activity where contact and immersion in the water are likely. These types of activities are comparable to those identified in the Basin Plan definition of REC1 (see above).

As discussed in Section 4.0 of this staff report, the epidemiological studies used by USEPA to derive the national bacteria quality criteria recommendations for primary contact (full body) recreational uses entailed differentiating between “swimmers” and “non-swimmers” based on the duration of contact with the water and evidence of immersion (wet head). The national criteria were derived from data showing increased

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<sup>41</sup> U.S. Environmental Protection Agency, Ambient Water Quality Criteria for Bacteria, 1986; United States Environmental Protection Agency “Water Quality Standards for Coastal and Great Lakes Recreation Waters; Final Rule” (40 CFR 131.41), November 2004 (the “BEACH Act Rule”).

acute gastrointestinal illness among swimmers, who were considered to have immersed themselves and who were therefore considered to have a likelihood of ingestion.

In contrast to the USEPA approach, the Basin Plan currently defines REC1 to include activities where the ingestion of water is “reasonably possible”, rather than likely. The phrase “reasonably possible” is not clearly defined and is subject to a variety of interpretations. However, many of the activities identified in the current Basin Plan definition are those recreational uses where the ingestion of water is expected or at least likely, comparable to USEPA’s expectation of primary contact recreation and the bacteria criteria developed to protect that use.

USEPA defines secondary contact recreation uses as including activities where most participants would have very little direct contact with the water and where ingestion of water is unlikely. Per USEPA, secondary contact recreation activities may include wading, canoeing, motor boating, fishing, and others. This is functionally equivalent to the Non-contact Water Recreation (REC2) use in the Basin Plan. Per the Basin Plan, REC2 waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. Per the Basin Plan, REC2 uses may include picnicking, sunbathing, hiking, camping, boating, and others. As for the Basin Plan definition of REC1, the phrase “reasonably possible” is employed. Again, this phrase is not defined and is subject to interpretative difficulty. However, the nature of recreational uses identified clearly speaks to the expectation that water contact and the potential for ingestion would be incidental and unlikely.

As a matter of clarity, and to assure that the REC1 use definition properly reflects the nature of recreational activities and likelihood of ingestion that are anticipated by USEPA’s national bacteria quality criteria, Regional Board staff recommends that the Basin Plan definition be revised to conform closely to USEPA’s description of primary contact recreation. Specifically, the following changes are proposed:

1. Revise the name of the REC1 use from “Water Contact Recreation” to “Primary Contact Recreation”. This change would conform to USEPA terminology and confirm what has long been understood by the Regional Board (as reflected in the list of recreational activities included in the REC1 definition), that REC1 in the Basin Plan is essentially equivalent to primary contact recreation as described by USEPA and for which USEPA developed national bacteria quality criteria.
2. Insert the word “deliberate” to reflect that the activities included as REC1 are intentional and not merely incidental contact with water (i.e., they are not REC2 type activities).
3. Insert the phrase “especially by children” to recognize that children may have greater likelihood of engaging in one or more REC1 activities and may have greater likelihood of ingestion of water when so engaged.
4. Replace the phrase “reasonably possible” with “likely to occur”. This would provide greater clarity regarding the expectation of ingestion of water and consistency with the exposure assumptions underlying the national bacteria

quality criteria. Again, these criteria form the basis for proposed amendments to revise the bacteria quality objectives in the Basin Plan to protect REC1 uses.

5. Reorganize and revise the list of REC1 activities. In particular, revise the language to recognize that some forms of wading and fishing may result in a likelihood of ingestion, while other forms of these activities would not.
6. Add the statement that brief incidental or accidental water contact that is limited primarily to the body extremities is not generally considered Primary Contact Recreation because ingestion is not likely to occur. This statement would provide clarity by explicitly distinguishing types of contact that do not result in Primary Contact Recreation but that might be better addressed as REC2 activities.

The proposed changes are shown in underline and strikeout format:

~~Water Contact Recreation~~ Primary Contact Recreation (REC 1\*) waters are used for recreational activities involving deliberate water body contact, especially by children, with water where ingestion of water is likely to occur ~~reasonably possible~~. Examples of REC1 activities ~~These uses~~ may include, but are not limited to, swimming, ~~wading, water-skiing, skin and scuba diving,~~ surfing, whitewater rafting activities, float tubing, bathing in natural hot springs, skin diving, scuba diving and some forms of wading and fishing. ~~fishing and use of natural hot springs.~~ Brief incidental or accidental water contact that is limited primarily to the body extremities (e.g. hands and feet), is not generally deemed Primary Contact Recreation because ingestion is not likely to occur.

The administrative record for the proposed amendments documents extensive deliberation by the SWQSTF of the proposed changes to the definition and a variety of alternatives. The wording alternatives considered did not materially affect the underlying determination that it would be appropriate to assure that the definition is consistent with and properly reflects the type of recreational activities and exposure assumptions presumed in the development of the national criteria, since those criteria would form the basis for revised REC1 bacteria quality objectives.

Considerable thought was given to proper treatment of wading and fishing as examples of REC1 activities, since the nature of these activities and the resultant potential for immersion and ingestion of water vary widely. For example, fishing in waders or from float tubes, where the angler is in direct and often prolonged contact with the water, would be considered a REC1 activity. However, fishing from the shoreline or from boats involves very little direct water contact and would be more appropriately identified as a REC2 activity. Shallow wading by children, with their propensity for water play, including dam-building, and for hand-to-mouth contact, would be considered a REC1 activity, while shallow wading by adults would likely be considered incidental and limited to extremities, so that ingestion would be unlikely. As reflected in the recommended language, it was determined that references to wading and fishing should be qualified (i.e., "some forms of wading and fishing") to address this variation. This provides the Regional Board suitable discretion, properly applied in the regulatory context (see below), to determine whether or not a specific type of wading or fishing constitutes a REC1 use.

As discussed previously in Section 2.1 Regulatory Framework: Water Quality Standards, all surface waters are presumed to be REC1 unless a Use Attainability Analysis (UAA) demonstrates that this use has not been attained and is not attainable pursuant to one or more of the factors identified in federal regulations. It should be emphasized that the recommended changes in the REC1 definition would not affect this rebuttable presumption. Surface waters will continue to be designated REC1 unless a UAA demonstrates that the use has not been attained and is not attainable. Once again, the proposed changes to the REC1 definition are intended solely to provide greater clarity and consistency with the exposure assumptions underlying the national bacteria quality criteria.

## **5.2 Changes to Bacteria Quality Objectives for REC1 and REC2 Fresh Waters (Basin Plan, Chapters 4 and 5); Identify Bacteria Quality Targets for REC2 Only Freshwaters**

### **5.2.1 Summary**

Based on review of the USEPA Ambient Water Quality Criteria for Bacteria, 1986 (national bacteria quality criteria or national criteria) and other relevant guidance and regulation, and consideration of the scientific basis of those criteria, the following amendments are proposed:

1. Delete the current Basin Plan fecal coliform objectives for REC1 and REC2 (non-contact water recreation) for the freshwaters of the Region.
2. Replace the fecal coliform objectives with *E. coli* objectives, as follows:
  - a. For freshwaters designated REC1 only or both REC1 and REC2, replace the current Basin Plan fecal coliform objectives with a geometric mean objective of less than 126 *E. coli* organisms per 100 mL (expressed as the geometric mean of at least 5 samples over a 30 day period (rolling average)).
  - b. For freshwaters that are designated only REC2 pursuant to an approved Use Attainability Analysis, identify bacteria quality targets, in conformance with the state antidegradation policy (SWRCB Resolution No. 68-16). The targets are intended to provide the basis for assuring that bacteria quality conditions do not degrade in these waters. Revisions to Chapter 5 (Implementation) are proposed to describe these targets and to identify the follow-up strategy that will be employed should there be credible evidence that the targets are being exceeded (see 5.2.2, item 3).

These recommendations are shown in the proposed Basin Plan amendments in **Table 4-pio-Pathogen Indicator Bacteria Objectives for Fresh Waters** (see revisions to Chapter 4 WATER QUALITY OBJECTIVES) and in Chapter 5, IMPLEMENTATION, Recreation Water Quality Standards, *Antidegradation targets for REC2 only freshwaters and Monitoring Plan for Pathogen Indicator Bacteria in Freshwaters*.

The national bacteria quality criteria also identify a range of Single Sample Maximum allowable densities for *E. coli* (and enterococcus) in freshwaters. These single sample values are statistical constructs designed to inform decision makers about the likelihood that geometric mean values are being exceeded. Detailed discussion of Single Sample Maximum values and proposed amendments to incorporate them in the Basin Plan are presented in Section 5.3.

### 5.2.2 Discussion

Section 4.0 of this staff report provides a detailed discussion of the scientific basis of USEPA's 1986 revised national bacteria quality criteria, which include recommendations for the use of *E. coli* or enterococcus rather than fecal coliform densities to protect full body contact (primary contact or REC1) recreation uses in freshwaters. The 1986 national bacteria criteria based on geometric mean values for freshwaters are summarized in Table 5.1. (See also Section 4.0)

**Table 5.1 USEPA 1986 Criteria for Bathing (Full Body Contact)  
 Recreational Waters  
 (Freshwater)**

	Acceptable swimming-associated gastroenteritis rate per 1000 swimmers	Steady state geometric mean indicator density <sup>1</sup>
<i>E. coli</i> <sup>2</sup>	8	126 per 100 ml
Enterococcus <sup>2</sup>	8	33 per 100 ml

<sup>1</sup> Based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period)

<sup>2</sup> Only one indicator should be used. The Regulatory agency should select the appropriate indicator for its conditions.

(Source: Adapted from USEPA Ambient Water Quality Criteria for Bacteria – 1986 and USEPA “Water Quality Standards for Coastal and Great Lakes Recreation Waters; Final Rule” (40 CFR 131.41), November 2004)(“BEACH Act Rule”))

As described in Section 4.0, USEPA believes that the “acceptable” swimming-associated gastroenteritis rate of 8/1000 swimmers is roughly comparable to the illness rate associated with the fecal coliform criteria upon which the fecal coliform objectives now specified in the Basin Plan were based. However, USEPA acknowledges that this illness rate is also an approximation.

The 1986 national bacteria criteria document does not include recommended criteria for REC2 (non-contact recreation) waters. REC2 uses are essentially the same as “secondary contact” uses, which USEPA defines as including activities where most participants would have very little direct contact with the water and where ingestion of water is unlikely. Per USEPA, these activities may include wading, canoeing, motor

boating, fishing, etc. (these activities are comparable to those identified in the Basin Plan definition of REC2 (see Section 3.1). USEPA was unable to derive a risk-based national criterion for secondary contact recreation because secondary contact activities involve far less contact with water than primary contact activities, and because of the lack of applicable epidemiological studies and data. Nevertheless, USEPA recommends that states adopt a criterion for REC2 waters. USEPA believes that such a criterion provides the basis for establishing effluent limitations and the implementation of best management practices provides a mechanism to assure that downstream uses are protected, and is consistent with the historic practice of most states in implementing fecal coliform objectives. USEPA recommends that states consider adopting a criterion for secondary contact (REC2 waters) that is five times the criterion established for primary contact (REC1) waters. Many states already employ this approach in specifying fecal coliform objectives for secondary contact recreation uses (though in some states, the secondary contact objectives are 10 times those established for primary contact recreation).

The SWQSTF first considered the indicator organism that should be used as the basis for setting new objectives for freshwaters. Given that many states and other regional boards within California had elected to use *E. coli* for this purpose, the Task Force recommended reliance on *E. coli* as well<sup>42</sup>. Given that USEPA had found that fecal coliform densities have weak correlation, if any, to gastrointestinal illness as the result of water contact recreational activity, the Task Force recommended that the current fecal coliform objectives in the Basin Plan be deleted in favor of new objectives based on *E. coli*.

The Task Force then considered what *E. coli* objectives should apply to freshwaters designated REC1 and also to waters designated REC2. Several issues were deliberated extensively:

1. Should the objectives for REC1 freshwaters be based on *E. coli* values calculated using a gastrointestinal illness risk level other than 8/1000 swimmers? That is, should a geometric mean density other than 126 per 100 mL be recommended?
2. How should the recommended *E. coli* geometric mean be expressed, e.g., based on a minimum of a certain number of samples over a specific period, on a seasonal (e.g., wet vs dry, recreational season) basis, or in some other manner?
3. Should the current Basin Plan objectives for REC2 waters, which are also based on fecal coliform, be modified based on the 1986 national criteria recommendations and, if so, in what manner?

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<sup>42</sup> *E. coli* is also the default indicator selected by USEPA in establishing bacteria criteria for Great Lakes recreation waters, unless a Great Lakes state determines that enterococcus criteria should apply. See USEPA "Water Quality Standards for Coastal and Great Lakes Recreation Waters; Final Rule" (40 CFR 131.41), November 2004 (BEACH Act Rule).

The Task Force also considered in detail the manner in which the Single Sample Maximum allowable densities identified in USEPA's 1986 national criteria for full body contact (REC1) waters should be incorporated in the Basin Plan. These deliberations are discussed in Section 5.3.

Task Force deliberation of each of the three questions identified above is described briefly below.

1. Consideration of an alternative gastrointestinal illness risk level

When the Task Force began its deliberation of this question, the USEPA had produced draft guidance on the implementation of the 1986 national criteria ("Implementation Guidance for Ambient Water Quality Criteria for Bacteria", November 2003 Draft). Per the draft guidance, USEPA encouraged states to employ their risk management discretion when protecting recreational waters. Specifically, the guidance states that based on USEPA's review of the studies used to derive the national criteria, USEPA recommends that states select a risk level for swimmers in freshwaters from 8/1000 to 10/1000. The draft guidance includes a table that shows the *E. coli* (and enterococcus) geometric mean densities associated with each of these risk levels. As discussed above, for the 8/1000 risk level, the geometric mean *E. coli* value is 126 per 100 mL. For the 9/1000 risk level, the *E. coli* geometric mean value is 160 per 100 mL; for the 10/1000 risk level, the value is 206 per 100 mL. In a separate document ("Water Quality Standards for Coastal Recreation Waters, *Considerations for States as They Select Appropriate Risk Levels*, EPA-823-F-06-012, August 2006 (Coastal Recreation Waters Fact Sheet re Risk Levels<sup>43</sup>)), USEPA confirmed that states could consider a risk level of up to 10/1000 without any additional data, and indicated that higher risk levels could be considered but would require additional data collection and evaluation<sup>44</sup>. USEPA found that use of *E. coli* values based on a risk level between 8 and 10 per 1000 swimmers would result in water quality objectives as protective of human health and primary contact recreation as the 1986 national criteria. The range of acceptable risk levels and associate *E. coli* densities reflects acknowledged uncertainty and the approximate nature of the gastrointestinal illness rates.

The Task Force reviewed this draft guidance and the Coastal Recreation Waters Fact Sheet re Risk Levels and considered whether a risk level of 8, 9 or 10/1000 should be employed to establish objectives for one or more REC1 freshwaters in the Region,

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<sup>43</sup> This Fact Sheet is intended to answer key questions states may have about what USEPA considers to be acceptable risk levels in the context of what USEPA promulgated in the "Water Quality Standards for Coastal and Great Lakes Recreation Waters" (or BEACH Act) rule (69 FR 67217, November 16, 2004) and what USEPA recommended in the 1986 bacteria criteria document. USEPA has advised Regional Board staff separately that the BEACH Act rule is the best source of information regarding the agency's interpretation of the 1986 criteria for both coastal recreation waters and inland waters.

<sup>44</sup> As noted in Section 4.0 of this staff report, USEPA is reviewing the 1986 bacteria criteria and may elect to remove state discretion to select a risk level higher than 8/1000.

taking into consideration such factors as the generally limited use of freshwaters in the Region for REC1 activity, particularly when compared to ocean beaches. (At that time, USEPA stated that the assumed risk level in specifying criteria to protect ocean beaches was 19/1000 swimmers. There is now apparently some further consideration of the validity of this estimated illness rate.) Relying on USEPA's draft guidance and the information provided by the Coastal Recreation Waters Fact Sheet re Risk Levels, the Task Force was assured that the slightly higher *E. coli* geometric mean values associated with the higher risk levels would ensure the protection of public health and REC1 uses. With REC1 use protection assured, the Task Force then considered the potential implications of compliance with the range of acceptable *E. coli* values, i.e., the structural and non-structural controls that might be needed at the various risk levels, and their associated costs. Based on the evaluation of monitoring data, for certain waterbodies, e.g., Reach 3 of the Santa Ana River, compliance with an *E. coli* objective of 126 per 100 mL may prove to be extremely expensive and highly problematic, while compliance with a higher geometric mean, e.g., 206 per 100/mL, which is associated with the 10/1000 risk level, may be feasible at comparatively reasonable cost<sup>45</sup>.

The Task Force ultimately agreed to recommend *E. coli* objectives for REC1 waters based on the 8/1000 risk level, i.e., a geometric mean density of 126 per 100 mL for REC1 waters. This recommendation recognizes that other Regional Boards that have adopted *E. coli* objectives have set those objectives at 126 per 100 mL. The Task Force did not want to create any perception that the waters in the Santa Ana Region receive any less protection than elsewhere in California, even though such a perception would have no scientific foundation.

However, where the Regional Board finds that the cost and potential environmental impact associated with the construction and operation of structural controls that may be necessary to achieve the 126/100 mL geometric mean in a specific waterbody are unreasonable and unacceptable, then it may be appropriate to seek modification of the geometric mean objective to a less stringent objective for that waterbody. As stated above, current USEPA guidance indicates that USEPA will approve higher geometric mean objectives based on an illness rate of up to 10/1000 illnesses in swimmers without additional data. Higher geometric mean objectives based on illness rates above 10/1000 may be justified but would likely necessitate epidemiological studies, which are costly and time-consuming. Further, scientifically defensible epidemiological studies are potentially infeasible for most if not all of the freshwaters of the Region, given the relatively limited numbers of people who engage in primary contact recreational activity in these waters. Any such site-specific objective would need to be considered through the Basin Planning process, with full opportunity for public participation.

In summary, the Task Force recommended that *E. coli* objectives for REC1 waters be established based on the 8/1000 risk level, i.e., at a geometric mean density of 126 per 100 mL.

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<sup>45</sup> CDM. Middle Santa Ana River Bacterial Indicator TMDL, 2011 Dry Season Report. December 21, 2011.

## 2. Expression of the recommended *E. coli* geometric mean objective

The 1986 bacteria quality criteria leave to state discretion the appropriate method of expressing the selected geometric mean objective. The SWQSTF considered several possible approaches, including specifying the geometric mean on a seasonal basis to reflect potential differences in REC1 activity as the result of cold, wet weather. Some states with pronounced seasonal differences in weather, including snow and freezing conditions, have adopted this approach. However, given the temperate climate in the Region, which generally allows for REC1 activity in freshwaters throughout the year, the Task Force rejected a seasonal approach. Instead, the Task Force recommended that the objective be specified as a geometric mean based on a minimum of 5 samples within a 30-day period (rolling (also known as running) average). This is comparable to the approach taken in the specifying the current fecal coliform objectives in the Basin Plan, and is consistent with USEPA's recommendations in the 1986 criteria (see Table 5.1) and the BEACH Act rule (69 FR 67217, November 16, 2004, p. 67224),

The proposed amendments include these Task Force recommendations for a geometric mean of 126 per 100 mL expressed as the results of a minimum of 5 samples taken over a 30-day period (rolling average). See Attachments 1 and 2 to Resolution No. R8-2012-0001, proposed revisions to Chapter 4, Table 4-pio- Pathogen Indicator Bacteria Objectives for Fresh Waters and related text. [As shown in the Attachments, references to "Bacteria, Coliform" objectives for both enclosed bays and estuaries and inland fresh waters are proposed to be deleted and replaced by the header "Pathogen Indicator Bacteria". This recommended change reflects the use of bacteria such as *E. coli* as surrogate indicators of the presence of pathogens.]

## 3. Consideration of REC2 objectives for freshwaters

As discussed above and in Section 4.0, there is no scientific basis for establishing pathogen indicator objectives for REC2 waters. The current Basin Plan objectives for REC2-designated freshwaters, which are based on fecal coliform, are merely an arbitrary multiplication (10 X) of the REC1 fecal coliform objectives, an approach that has been and is still used in some other states and by other Regional Boards in California. On the other hand, some of the other Regional Boards have simply elected to not specify numeric objectives to protect REC2 uses of their waters since such objectives cannot be correlated with the protection of REC2 uses.

The SWQSTF recognized that all fresh surface waters in the Region that are designated REC1 are generally also designated REC2, and that the more stringent pathogen indicator objectives specified for REC1 waters would govern water quality protection in these waters. In short, the Task Force recognized that the current fecal coliform objectives for REC2 were both unnecessary and unjustified by good science.

Accordingly, the Task Force recommended that the REC2 objectives for fecal coliform be deleted. The Task Force recommended that for waters designated REC1 only, or REC1 and REC2, the new *E. coli* geometric mean objective of 126 per 100 mL should

apply. These recommendations are reflected in the proposed Basin Plan amendments. See Attachments 1 and 2 to Resolution No. R8-2012-0001, proposed revisions to Chapter 4, Table 4-pio- Pathogen Indicator Bacteria Objectives for Fresh Waters and related text.

The Task Force was also cognizant that some waters might be designated only REC2 if justified by a Use Attainability Analysis (UAA). In fact, as described in Section 5.6, the Task Force conducted a number of UAAs for specific waters, resulting in recommendations for the removal of the REC1 designation and, in some cases, both REC1 and REC2 designations. The issue then addressed was whether the Basin Plan would provide adequate protection of the quality of waters designated only REC2 (and downstream waters) if the recommendation described above to delete the REC2 fecal coliform objectives were to be approved. To address this, the Task Force recommended the development of bacteria quality targets for these REC2 only waters based on consideration of ambient quality conditions and application of the antidegradation policy (Resolution No. 68-16)<sup>46</sup>. The purpose of these targets would be to provide a baseline for expected water quality conditions in these waters. If future monitoring indicated that these targets were being exceeded and that quality conditions thus appeared to have declined, then additional monitoring and investigation would be initiated and corrective action taken if and as appropriate. This approach addresses the concerns expressed by USEPA (see discussion above) regarding the need for a numeric basis for setting effluent limitations (other than for POTWs; see Section 5.9.2.3) and triggering the implementation of best management practices. Further, this approach would prevent adverse effects on the quality of downstream waters that might result from degradation of upstream flows.

The “antidegradation” targets for REC2 only freshwaters were calculated as described below. The proposed targets are shown in the proposed amendments to Chapter 5 of the Basin Plan. See Attachments 1 and 2 to Resolution No. R8-2012-0001, proposed revisions to Chapter 5 *Antidegradation targets for REC2 only freshwaters*. A proposed strategy for follow-up in the event that credible evidence is presented that the targets are being exceeded is included in the proposed *Monitoring Plan for Pathogen Indicator Bacteria in Freshwaters* (also in Chapter 5).

If and as future UAAs are conducted that result in REC2-only designations for additional waters, site-specific bacteria quality data will be used to calculate antidegradation targets for those waters, employing the methodology described below.

#### *Methodology for calculation of antidegradation targets for waters designated only REC2*

Routine water quality monitoring for various types of bacteria has been conducted in numerous waterbodies throughout the Santa Ana Region for many years. Data from these monitoring programs reveals that the pathogen indicator bacteria densities vary

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<sup>46</sup> The intent of the antidegradation policy is to prevent water quality degradation, with certain exceptions.

widely over time at all sampling locations. Therefore, it is difficult to select a single numeric value to represent the range of bacteria levels that can occur in a waterbody. If an average density is used then, by definition, half of all subsequent samples will appear to "exceed" that value even where no degradation in water quality has actually occurred. If the degradation threshold is defined by the highest measured value in the historical monitoring dataset, then it is possible for average bacteria levels to increase, causing water quality to degrade, without necessarily exceeding the maximum trigger value.

In order to ensure conformance with the intent of California's antidegradation policy, it is proposed that ambient water quality be described using common statistical parameters to characterize the entire distribution of pathogen indicator bacteria data collected from a REC2 only designated waterbody. At a minimum, this includes the mean, median, standard deviation, coefficient-of-variation, the maximum data value recorded and the number ("N") of samples. It is proposed that these statistical parameters be used to estimate the upper 95<sup>th</sup> percentile value for each dataset.

USEPA has published several guidance documents describing proper application of statistical methods to evaluate water quality data.<sup>47</sup> These manuals provide instruction on how to calculate each of the aforementioned parameters, including advice on when it is appropriate to log-transform the water quality data prior to performing any statistical analysis. USEPA's recommended procedures are commonly used for many other regulatory purposes, including: Reasonable Potential analyses, NPDES permit limit derivation, dilution credits, water quality impairment assessments, TMDL implementation, and criteria development. Staff recommends continued reliance on these methods to describe the range of existing water quality in waterbodies designated REC2 only.

The proposed Basin Plan amendments require stakeholders in the watershed to collect and analyze new samples in accordance with a Regional Board-approved monitoring plan to assess water quality trends in waterbodies designated REC-2 only (Section 5.9.2.2). As new data become available, the data will be compared to the baseline data developed during the UAA. The upper 95<sup>th</sup> percentile density, estimated from the existing data during the UAA, will serve as the trigger threshold, i.e., the antidegradation target, for further investigation and possible corrective action. In general, the following method will be used to estimate the upper 95<sup>th</sup> percentile densities:

- Step 1) Log-transform the existing data
- Step 2) Calculate the mean of the log-transformed data
- Step 3) Calculate the standard deviation of the log-transformed data
- Step 4) Multiply the standard deviation of log-transformed data by 1.65
- Step 5) Add result from Step 4 to the mean value calculated in Step 2

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<sup>47</sup> See, for example, U.S. EPA. Data Quality Assessment: Statistical Methods for Practitioners. EPA QA/G-9S. Feb., 2006 (EPA/240/B-06/003) and U.S. EPA. Technical Support Document for Water Quality-based Toxics Control. March, 1991 (EPA/505/2-90-001).

Step 6) Calculate the anti-log for the value derived in Step 5; this is the 95% Upper Confidence Level.

Where 95% of the data is less than or equal to the antidegradation target, no degradation will be inferred. However, if more than 5% of the sample values exceed the target, additional samples must be collected and analyzed to determine whether the elevated value is an anomaly (verified by formal outlier analysis), or if it indicates a true trend toward water quality degradation.

Using the upper 95<sup>th</sup> percentile confidence level to assess water quality trends is conceptually similar to EPA's recommended approach for using Single Sample Maximums (a term that may be revised in future to "Statistical Threshold Value"), which may be used to evaluate probable compliance with geometric mean pathogen indicator bacteria objectives when there are insufficient data to calculate a true geometric mean.<sup>48</sup> It is also consistent with methods previously adopted by the Regional Board to characterize ambient water quality in groundwater management zones throughout the Santa Ana Region.<sup>49</sup>

The antidegradation targets identified in the proposed Basin Plan amendments are not intended to serve as numeric water quality objectives. Rather, they are intended as a tool to aid in assessing quality conditions and implementing the provisions of the state's antidegradation policy. The natural variability and statistical uncertainty associated with bacteria densities makes such threshold values ill-suited for directly translating an antidegradation target into a numeric water quality objective. However, the target can be used to determine when it is necessary and appropriate to collect additional data in order to perform more detailed analyses of water quality trends. Results from these follow-on studies are expected to be sufficiently robust to assess whether a lowering of water quality has occurred and whether investigation and corrective action may be needed.

For each stream segment (including two tidal prisms) where the proposed Basin Plan amendments recommend reclassifying the waterbody as REC2 only (see Section 5.6), a comprehensive statistical analysis of existing water quality was performed as part of the Use Attainability Analysis. All of the required parameters, including the 95<sup>th</sup> percentile threshold value, were calculated. The results are summarized in the following tables.

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<sup>48</sup> U.S. EPA. Water Quality Standards for Coastal Recreation Waters: Using Single Sample Maximum Values in State Water Quality Standards. August, 2006 (EPA-823-F-06-013) and U.S. EPA. Expression of Criteria: EPA's Current Thinking for New Criteria. PowerPoint presentation by Shari Barash at Stakeholder Meeting on the Development of New or Revised Water Quality Criteria. Sept. 20, 2011.

<sup>49</sup> Santa Ana Regional Water Quality Control Board, Attachment to Resolution No. R8-2004-0001, Chapter 4, Management Zone TDS and Nitrate-nitrogen Water Quality Objectives.

**Table 5- REC2 Only Targets – FW<sup>1</sup>**

REC2 Only Waterbody	<i>E. coli</i> Densities (cfu/100 mL)				
	Mean	Std. Dev.	N	Max. Observed	95% UCL
Temescal Creek, Reach 1b	198	34	119	9,200 <sup>2</sup>	<b>933</b>
Santa Ana Delhi Channel, Reach 2	448	110	63	12,590	<b>5,269</b>

UCL= Upper Confidence Level; **95% upper confidence level is the antidegradation target**

<sup>1</sup> CDM, Inc. Technical Memorandum. Calculation of Antidegradation Targets for REC2 Only Freshwaters. December 30, 2011.

<sup>2</sup> A value of 1,800,000 cfu/100 mL, from the sample collected on 9/8/2007, was excluded as an outlier.

**Table 5-REC2 Only Targets –Other Waters<sup>1</sup>**

REC2 Only Waterbody	Enterococcus Densities (cfu/100 mL)				
	Mean	Std. Dev.	N	Max. Observed	95% UCL
Greenville-Banning Channel, Tidal Prism	116	2041	108	22,000	<b>660</b>
Santa Ana-Delhi Channel, Tidal Prism	1900	4852	65	28,600	<b>6466</b>

UCL= Upper Confidence Level; **95% upper confidence level is the antidegradation target**

<sup>1</sup> Regional Water Quality Control Board. Memorandum. Calculation of Antidegradation Targets for REC2 Only Waters-Tidal Prisms. December 30, 2011

Again, the 95% upper confidence levels identified in these tables would serve as the antidegradation targets for the identified stream and tidal prism segments.

### 5.3 Application of Single Sample Maximum Values<sup>50</sup>

#### 5.3.1 Summary

As discussed in Section 4.0, USEPA's 1986 bacteria quality criteria for full body contact (REC1) waters include both geometric mean values for *E. coli* and enterococcus in

<sup>50</sup> As noted in Section 4.0 of this report, USEPA recently suggested that the term "Single Sample Maximum" be replaced by "Statistical Threshold Value" to avoid misinterpretation and misapplication of the concept. This recommendation may be reflected in revised bacteria quality criteria for recreational waters that USEPA expects to publish by the end of 2012. This report employs the established SSM nomenclature.

freshwaters and Single Sample Maximum (SSM) “allowable densities” for each of these indicators. USEPA’s 1986 bacteria criteria document, the preamble to USEPA’s “Water Quality Standards for Coastal and Great Lakes Recreation Waters” Rule (or BEACH Act Rule) (69 FR 67217, November 16, 2004) and USEPA’s “Water Quality Standards for Coastal Recreation Waters: *Using Single Sample Maximum Values in State Water Quality Standards*”, EPA-823-F-06-013, August 2006 (hereinafter referred to as the “Coastal Recreation Waters Fact Sheet re SSMs”) provide extensive discussion of the derivation of these SSM values and their intended purpose. The following presents a succinct discussion of the salient points and their consideration by the SWQSTF, leading to relevant proposed Basin Plan amendments shown in Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*.

These proposed amendments include:

1. Define tiers of REC1-designated inland fresh surface waters in the Santa Ana Region as Tier A, B, C or D and assign freshwaters to the appropriate Tier. The Tiers reflect differences in known or estimated intensity of REC1 use, from waters that are or may be heavily used (Tier A) to infrequently used (Tier D). Reach 3 of the Santa Ana River is considered a Tier A water and used as the basis for determining the relative intensity of use for other freshwaters in the Region. Certain waters in these tiers are in natural condition and are denoted with an “N”. The proposed Tier assignments are shown in Table 5-REC1-Tiers in the proposed amendments.
2. Incorporate a table of SSM values for *E. coli* and the equation used to calculate them (see Table 5-REC1-ssv, shown below and in the proposed amendments). Identify the variables employed in the equation, including the log standard deviation of *E. coli* data. Show SSM *E. coli* values for Tier A, B, C and D REC1 waters based on the default assumption of a log standard deviation of 0.4 and other assumed log standard deviation values that may be developed for one or more waterbodies. Stipulate that SSMs for freshwaters denoted with an “N” are to be calculated as for Tier A waters.
3. Specify that where it is necessary to make public notification and/or beach closure decisions in the absence of sufficient data to calculate a representative geometric mean for *E. coli*, no single sample shall exceed the default value specified in Table 5- REC1-ssv or an alternative value calculated by using the formula shown in note 2 to Table 5-REC1-ssv (see also table note 5). For all other purposes related to implementing the Clean Water Act, if there are insufficient data to calculate a representative geometric mean for *E. coli*, “X%” of the representative sample data collected over a 30 day period (running average) shall be less than the default value specified in Table 5-REC1-ssv or the alternative calculated value, where X% is the statistical confidence level assigned to a particular waterbody.

4. Specify that where there are sufficient data to calculate a representative geometric mean for *E. coli*, SSMs shall not be used to assess compliance with the proposed *E. coli* geometric mean objective. Add text regarding the anticipated use of SSMs in impairment assessments for Clean Water Act Section 303(d) listing purposes.
5. Add text that explains that the principal intended use of single sample values is for rapid notification and posting purposes, and as a trigger for further investigation of sources that may be contributing to elevated bacteria indicator densities.

### **5.3.2 Discussion**

#### **5.3.2.1 SSM Guidance and Regulation**

Single Sample Maximum values (SSMs) are statistical constructs developed by USEPA to allow decision makers to make informed and timely decisions about posting or closing full body contact recreation areas based on small data sets. SSMs provide a sense of when a single sample result from a waterbody may be part of a bacterial density with a geometric mean that exceeds an established geometric mean objective. Using SSMs, decision makers need not await the collection of the multiple samples typically required to calculate a geometric mean before taking action to protect public health and primary contact recreational use. As described above (Sections 4.0 and 5.2), both the current fecal coliform objectives for REC1 and the proposed *E. coli* geometric mean call for the collection of a minimum of 5 samples over a 30-day period to assess compliance.

The SSMs were not developed as acute criteria, nor were they designed to provide any more protection of public health than that provided by geometric mean objectives. USEPA's expectation is that the SSMs will be used for notification and closure decisions for full body contact (primary contact) recreation areas. States have discretion to employ SSMs in the context of other federal Clean Water Act programs, including water quality assessments for the purposes of identifying impaired waters (per Section 303(d) of the Clean Water Act), Total Maximum Daily Loads and permitting. However, USEPA explicitly recognizes that "Other than in the beach notification and closure decision context, the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality. The geometric mean is generally more relevant because it is usually a more reliable measure of long term water quality, being less subject to random variation, and more directly linked to the underlying studies upon which the 1986 bacteria criteria were based." (Coastal Recreation Waters Fact Sheet re SSMs, p. 1).

Single Sample Maximum allowable densities are calculated using the following equation<sup>51</sup>:

$$\text{SSM} = \text{ECO} * 10^{(\text{SCF} * \text{LSD})}, \text{ where...}$$

**SSM** = Single sample maximum value

**ECO** = *E. coli* objective expressed as a geometric mean

**SCF** = the selected statistical confidence level factor for the given waterbody or group of waterbodies.

**LSD** = the Log Standard Deviation of measured *E. coli* densities.

USEPA's 1986 bacteria criteria document presents default SSMs for *E. coli* in freshwaters that were calculated using this equation, an assumed *E. coli* geometric mean of 126/100 mL, and the log standard deviation (0.4) observed in USEPA's freshwater epidemiological studies that led to the recommended national bacteria criteria. Four different upper confidence levels of *E. coli* data were employed (75%, 82%, 90% and 95%); these correspond to four statistical confidence level factors: 0.675, 0.935, 1.28 and 1.65, respectively. As described further below, these factors vary according to the known or anticipated level of primary contact recreation use. The default SSMs are shown in Table 5.2.

USEPA promulgated these default *E. coli* SSMs for Great Lakes recreation waters in the 2004 BEACH Act Rule and has advised Regional Board staff that this Rule provides the best information concerning the agency's current interpretation of the 1986 bacteria criteria for inland waters (largely freshwaters).

**Table 5.2 Default *E. coli* SSMs\***

Steady state geometric mean <i>E. coli</i> density	Designated beach area (upper 75% confidence level) (SCF=0.675)	Moderate full body contact recreation (upper 82% confidence level) (SCF=.935)	Lightly used full body contact recreation (upper 90% confidence level) (SCF=1.28)	Infrequently used full body contact recreation (upper 95% confidence level) (SCF=1.65)
126 per 100 ml	235	298	409	575

\*log standard deviation (LSD) = 0.4

<sup>51</sup> This is the equation identified in USEPA's 1986 bacteria quality criteria document (see Table 4.1). The nomenclature employed has been modified slightly for clarity; however, there is no mathematical difference.

As reflected in Table 5.2., the selection of the upper confidence level (and thus statistical confidence level factor) to be employed in the SSM equation is contingent on the intensity of full body contact recreational use known or anticipated to occur at each waterbody. A more conservative approach using the 75% confidence level is used for “designated bathing beach” waters and progressively less conservative confidence levels are applied at “moderate” (82%), “light” (90%) and “infrequent” (95%) use REC1 areas. The intent is to use the most conservative approach where use is highest and where the risk to public health is therefore also highest. As shown in this Table, a lower, more conservative SSM results from use of the 75% confidence level (SCF= 0.68) and progressively higher, less conservative SSMs result from the higher confidence levels.

In the 2004 BEACH Act Rule, USEPA defined the different levels of full body contact use in coastal recreation waters<sup>52</sup> as follows:

*“Designated bathing beach waters* are those coastal recreation waters that, during the recreation season, are heavily-used (based upon an evaluation of use within the State) and may have: a lifeguard, bathhouse facilities, or public parking for beach access. States may include any other waters in this category even if the waters do not meet these criteria.”

*“Moderate use coastal recreation waters* are those coastal recreation waters that are not designated bathing beach waters but typically, during the recreation season, are used by at least half of the number of people as at typical designated bathing beach waters within the State. States may also include light use or infrequent use coastal recreation waters in this category.”

*“Light use coastal recreation waters* are those coastal recreation waters that are not designated bathing beach waters but typically, during the recreation season, are used by less than half of the number of people as at typical designated bathing beach waters within the State, but are more than infrequently used. States may also include infrequent use coastal recreation waters in this category”.

*“Infrequent use coastal recreation waters* are those coastal recreation waters that are rarely or occasionally used”.

These definitions were provided as guidance to states to differentiate waters based on the intensity of use for primary contact recreation, and to apply corresponding SSMs appropriately. The definitions presented above provide states discretion to assign waters to different recreation levels. The preamble to the BEACH Act Rule states that USEPA does not expect a state to use all four of the use categories identified above (69 FR 67233, November 16, 2004) to determine and apply SSMs. The key expectations are that states will assign all primary contact recreation waters an appropriate Single Sample Maximum value, and that designated bathing beach waters (heavily-used

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<sup>52</sup> Coastal recreation waters are defined in the BEACH Act Rule as the “Great Lakes and marine coastal waters (including coastal estuaries) that are designated under section 303(c) of the Clean Water Act for use for swimming, bathing, surfing or similar water contact activities.”

waters) will be assigned an SSM based on the upper 75% confidence level (or an even more conservative confidence level). In making these determinations, USEPA expects that states will conduct an intrastate comparison of its freshwaters to assess the relative frequency of primary contact use. The first anticipated step in this process is that states will identify “designated beach” or heavily-used waters and then categorize the remaining waters based on their intensity of use relative to these “designated beach” (heavily-used) areas.

USEPA’s 1986 bacteria criteria document states that each jurisdiction should establish its own standard deviation for its conditions, which would result in varying SSMs (see note in Table 4.1). To do so, USEPA requires that a state collect at least 30 samples in a single recreation season (69FR 67227, November 16, 2004). In the absence of such a specific log standard deviation, USEPA expects states to employ as a default the log standard deviation from the epidemiological studies used by USEPA to derive the bacteria criteria. As stated above, this value is 0.4 for freshwaters.

### **5.3.2.2      *Recommendations re SSMs***

As stated previously, the SWQSTF carefully considered the USEPA guidance and regulation described above in formulating specific recommendations regarding the inclusion of SSMs in the Basin Plan, including strategies for their implementation. These recommendations are reflected in the proposed Basin Plan amendments (Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*).

The Task Force’s first step was consideration of whether and how to differentiate REC1 fresh waters within the Region based on the intensity of known or anticipated REC1 use<sup>53</sup>. The Task Force realized that inland freshwaters within the Santa Ana Region receive very little full body contact recreational use, or, in fact, recreational use of any kind, when compared to ocean beaches within the Region. However, there are some freshwaters within the Region that are used heavily for water contact recreation relative to other freshwaters in the Region. These include Reach 3 of the Santa Ana River, particularly in the hot summer months when people avail themselves of the opportunity to cool off in the water. Some of these people may find travel to designated bathing beaches, such as ocean beaches, difficult and/or too costly. Few, if any, of these relatively heavily used freshwaters can be characterized as “designated beach areas” since they typically do not have facilities such as restrooms, parking and the like to facilitate use of the area for any type of recreation.

Based on these considerations, the Task Force proposed four “Tiers” of recreational use in freshwaters. The definition of each Tier relies largely on the definitions provided

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<sup>53</sup> The Task Force recognized that USEPA expected intrastate comparisons of waters for this purpose. This approach could not be considered by the Task Force, given the scope of the proposed amendments to address freshwaters within the Santa Ana Region. It is not clear that the USEPA approach would be practicable in California, given the structure of regional boards and their responsibilities to adopt water quality standards for waters within their jurisdictions.

by USEPA in the BEACH Act Rule (see preceding discussion), but other factors are considered as well. Specifically, the Task Force proposed the following:

**Tier A REC1 Waters:** includes freshwater lakes and streams that are or may be heavily-used by the public for primary contact recreational activities, relative to other freshwater bodies in the Santa Ana Region. Typical examples of Tier A waters include, but are not limited to: Big Bear Lake, Canyon Lake, Lake Elsinore, Lake Perris, Reach 3 of the Santa Ana River, Reach 2 of Mill Creek (near Redlands) and Lytle Creek (Middle and North Forks). Single Sample Maximum (SSM) values for Tier A waters are calculated using a 75% statistical confidence factor.

**Tier B REC1 Waters:** includes freshwater lakes and streams that are or may be moderately-used by the public for primary contact recreational activities. Moderate use occurs where the number of people accessing the waterbody is approximately half that which generally occurs in Tier A waters. Typical examples of Tier B waters include, but are not limited to: Jenks Lake, Santiago Reservoir, Cucamonga Creek Reach 2, and Reaches 4 and 6 of the Santa Ana River. Single Sample Maximum values for Tier B waters are calculated using an 82% statistical confidence factor.

**Tier C REC1 Waters:** includes freshwater lakes and streams that are or may be lightly-used by the public for primary contact recreational activities. Light use occurs where the number of people accessing the waterbody is less than half that which generally occurs in Tier A waters. Typical examples of Tier C waters include, but are not limited to: Reach 2 of the Santa Ana River, Bear Creek, Chino Creek Reach 1B, Anza Park Drain, and Sunnyslope Channel. Single Sample Maximum values for Tier C waters are calculated using a 90% statistical confidence factor.

**Tier D REC1 Waters:** includes freshwater lakes and streams that are infrequently used by the public for primary contact recreational activities. Infrequent use occurs where people only access the waterbody rarely or occasionally. Typical examples of Tier D waters include, but are not limited to: most concrete-lined storm water channels in the urbanized areas of the watershed and many of the ephemeral streams located in the undeveloped areas of the watershed. Single Sample Maximum values for Tier D waters are calculated using a 95% statistical confidence factor.

As noted in these definitions, each Tier would be assigned a Single Sample Maximum value calculated using one of the four confidence levels (75%, 82%, 90% and 95%) identified by USEPA.

The Task Force also recognized that there are waters within the Region that are in undeveloped areas and are expected to have low natural bacteria levels. The Task Force found that while the use of these waters for primary contact recreation may or may not occur or may be limited by a variety of factors (access, channel characteristics, flow conditions, etc.), it would be appropriate to assure the protection of the high bacteria quality of these waters. Accordingly, the Task Force proposed to apply the most conservative confidence level (75%) in the calculation of SSMs for these waters,

which is the same approach used with Tier A, heavily-used waters. The Task Force proposed to define these “natural condition” waters as follows:

**Natural Conditions (N):** includes freshwater lakes and streams located in largely undeveloped areas where ambient water quality is expected to be better than necessary to protect primary contact recreational activities regardless of whether such activities actually occur in these waterbodies. Single Sample Maximum values for “N” waters are calculated using a 75% statistical confidence factor.

The Task Force prepared a table (shown in the proposed Basin Plan amendments as “**Table 5- REC1-Tiers**”) in which the freshwaters identified in the Basin Plan are assigned to Tier A, B, C or D. “Natural Condition” waters are denoted in this Table with an “N”. (Due to the length of **Table 5- REC1-Tiers**, the reader is asked to refer to the proposed Basin Plan amendments to review this Table (see Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*)).

It is important to recognize that the freshwaters listed in the proposed **Table 5-REC1-Tiers** were not assessed comprehensively in detail to determine whether primary contact recreation actually takes place or has taken place in the past, and at what intensity. The recommended assignments to different Tiers are based on Board staff and stakeholder knowledge of the characteristics of these waters, evidence regarding existing or probable future primary contact recreational activity, and anecdotal information, all compiled by the SWQSTF. Therefore, if and as knowledge of each of these waters is obtained in the future, the Tier assignments are subject to change. Further, Use Attainability Analyses may be conducted in the future for one or more of these waters, which may lead to changes in REC1 designations. Inclusion of a waterbody in **Table 5- REC1-Tiers** does not denote a determination that REC1 is, in fact, an existing use for that waterbody. Text reflecting these findings is proposed to be added to the Basin Plan (see Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*).

Further, the Basin Plan attempts to list and designate appropriate recreation (and other) beneficial uses for all the significant inland freshwater bodies in the Region. The Clean Water Act and implementing federal regulations establish the rebuttable presumption that all surface waters support REC1 use and should be so designated (see Section 2.1, above). While surface water bodies in the Region that are not listed in the Basin Plan will be considered REC1 unless and until demonstrated to be otherwise through a Use Attainability Analysis, there is no requisite presumption that all such waters belong to any specific REC1 Tier. Until formal consideration, through the Basin Planning process, of the appropriate Tier for any unlisted inland freshwater bodies in the Region is provided, the Regional Board should employ discretion based on its knowledge of those waters and information provided by interested parties to determine the appropriate Tier for those water bodies for regulatory purposes. Text embodying this strategy is proposed to be added to the Basin Plan (see Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*).

In addition to **Table 5-REC1-Tiers**, the Task Force also prepared a table of SSMs for each of the four proposed Tiers of freshwaters ("**Table 5-REC1-ssv**"; shown below and in the proposed Basin Plan amendments (Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*)).

**Table 5-REC1-ssv: Alternative Method for Assessing Probable Compliance with the *E. coli* Objective in Freshwaters Designated REC1 when Insufficient Data are Available to Calculate a Geometric Mean<sup>1</sup>**

Standard Deviation of Log-transformed <i>E. coli</i> data	Maximum Expected Single Value for <i>E. coli</i> <sup>2</sup> (assuming true geometric mean is >126 organism/mL)			
	Tier A <sup>3</sup> : 75% C.L. <sup>4</sup>	Tier B <sup>3</sup> : 82% C.L.	Tier C <sup>3</sup> : 90% C.L.	Tier D <sup>3</sup> : 95% C.L.
0.10	147	156	169	184
0.20	172	194	227	269
0.30	201	240	305	394
0.40(default) <sup>5</sup>	235	298	409	575
0.50	274	370	550	842
0.60	320	459	739	1,231
0.70	374	569	992	1,801
0.80	437	705	1,332	2,633
0.90	510	875	1,788	3,849
1.00	596	1,085	2,401	5,629
1.10	696	1,346	3,224	8,230
1.20	814	1,669	4,329	12,034

<sup>1</sup>This table shows single sample values calculated using the formula identified in table note 2. Default values for each Tier are calculated using 0.4 as the log standard deviation (LSD). Alternative values calculated using different LSD values are also shown. See table note 5 for discussion of these alternative LSD values. Where it is necessary to make public notification and/or beach closure decisions in the absence of sufficient data to calculate a representative geometric mean for *E. coli*, no single sample shall exceed the default value shown in this table or an alternative value calculated by using the formula shown in table note 2 (see also table note 5). For all other purposes related to implementing the Clean Water Act, if there are insufficient data to calculate a representative geometric mean for *E. coli*, "X%" of the representative sample data collected over a 30 day period (running) shall be less than the default value specified in this Table or the alternative calculated value, where X% is the statistical confidence level assigned to a particular waterbody. Where there are sufficient data to calculate a representative geometric mean for *E. coli*, the default or calculated Single Sample Maximum values shall not be used to assess compliance with the *E. coli* objective in Table 4-pio. The intent of Single Sample Maximum values is to inform public notification decisions and to trigger additional follow-up monitoring.

<sup>2</sup> EPA's recommended formula for calculating the maximum expected single sample value is:

$$SSM = ECO * 10^{(SCF * LSD)}, \text{ where...}$$

**ECO** = *E. coli* Objective expressed as geometric mean of a minimum number of samples; Assumed ECO=126 based on a minimum of 5 samples over a 30-day period (rolling average) (see Table 4-pio).

**SCF** = the appropriate Statistical Confidence Level Factor for the given waterbody; SCF=0.675 corresponds with the 75% confidence level; SCF=0.935 corresponds with the 82% confidence level; SCF=1.28 corresponds with the 90% confidence level; SCF=1.65 corresponds with the 95% confidence level.

**LSD** = the Log Standard Deviation of measured *E. coli* densities.

<sup>3</sup> Single Sample Maximum values for Tier A, B, C or D waters that are also denoted with an "N" in Table 5-REC1-Tiers shall be calculated as for Tier A waters.

<sup>4</sup> **C.L.** = Confidence Level

<sup>5</sup> Variability is calculated as the standard deviation of the log-transformed *E. coli* data. In the absence of adequate representative data to estimate *E. coli* variability, the maximum expected single sample value will be calculated based on the assumption that the LSD = 0.4, as recommended by EPA [40 CFR 131.41 (69 Fed. Reg. 220, 67242; Nov. 16, 2004 ("BEACH Act Rule"))]. Application of an alternative LSD value(s) must be approved by the Regional Board through the normal public notice and comment process. Per USEPA requirements identified in the BEACH Act Rule (69 Fed. Reg. 220, 67227), at least 30 samples must be collected in a single recreation season to calculate a statistically valid site-specific log standard deviation that can be used to calculate a corresponding Single Sample Maximum. Data acceptability shall generally be determined using the guidelines described in the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List [Sept., 2004].

As shown in **Table 5-REC1-ssv**, SSMs were calculated for each of the Tiers based on an assumed *E. coli* geometric mean of 126 per 100 mL (the geometric mean objective now being proposed for freshwaters in the Region) and both the default log standard deviation (0.4) identified by USEPA and other log standard deviation values that may be justified on a case-specific basis. As stated in table note 5, application of an alternative log standard deviation must be approved by the Regional Board through the normal public notice and comment process. Further, per USEPA requirements, at least 30 samples must be collected in a single recreation season to calculate a statistically valid site-specific log standard deviation for consideration by the Regional Board.

As stated in the text proposed to be added to the Basin Plan to describe the application of SSMs (Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum Values in REC1 freshwaters*), and in note 1 to **Table 5-REC1-ssv**, it is proposed that the SSMs not be used to determine compliance with the proposed geometric mean *E. coli* objective where there are sufficient data to calculate a representative geometric mean. This recognizes findings by the USEPA and State Water Resources Control Board (California Ocean Plan, 2009, III.D.1.c.) that geometric mean objectives are the more reliable measure of long-term water body conditions and are thus strongly preferred for use in water body assessment decisions, including the development of the Clean Water Act Section 303(d) list of impaired waters. The proposed amendments also recognize these findings. The proposed amendments include a requirement for the development, and implementation upon Regional Board approval, of a monitoring program designed to assure that sufficient data are collected to determine geometric means in high priority waters (see discussion in Section 5.9.2.2).

However, the proposed amendments also specify that where it is necessary to make public notification and/or beach closure decisions in the absence of sufficient data to calculate a representative geometric mean for *E. coli*, no single sample shall exceed the applicable SSM. This is consistent with the use USEPA intended in identifying SSMs, i.e., for rapid notification and posting purposes where limited data are available. The proposed amendments also specify that for all other purposes related to implementing the Clean Water Act, if there are insufficient data to calculate a representative geometric mean for *E. coli*, then “X%” of the sample data collected over a 30 day period (running) shall be less than the applicable SSM, where X% is the statistical confidence level assigned to a particular waterbody. Finally, the proposed amendments include text that explains that the SSMs will be used as a trigger for further investigation of sources that may be contributing to elevated bacteria indicator densities. (See Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *Application of Single Sample Maximum values in REC1 freshwaters*).

The SWQSTF considered alternatives to the definition of each proposed Tier, the number of Tiers that should be identified, and the assignment of waters to each of the selected Tiers. The proposed amendments shown in Attachments 1 and 2 to Resolution No. R8-2012-0001 reflect the Task Force’s final recommendations and are consistent with relevant, established guidance and regulation (see Summary, above).

## 5.4 Addition of a Narrative Pathogen Objective

### 5.4.1 Summary

The proposed amendments include the adoption of the following narrative pathogen objective for freshwater lakes and streams:

#### *“Lakes and Streams*

*Waste discharges shall not cause or contribute to excessive risk of illness from microorganisms pathogenic to human beings. Pathogen indicator concentrations shall not exceed the values specified in Table 4-pio below as a result of controllable water quality factors (see also Chapter 5, Recreation Water Quality Standards, Controllable and Uncontrollable Sources of Bacteria) unless it is demonstrated to the Regional Board’s satisfaction that the elevated indicator concentrations do not result in excessive risk of illness among people recreating in or near the water. In all cases, the level of water quality necessary to protect existing uses must be maintained. Where existing water quality is better than necessary to protect the designated use, the existing high level of water quality must be maintained unless it is demonstrated that existing or potential beneficial uses would be protected and that water quality consistent with maximum benefit to the people of California would be maintained, as specified in the state antidegradation policy (SWRCB Resolution No. 68-16). The Regional Board may also require recycled water discharged to freshwaters designated REC 1 or REC 2 to comply with other limitations recommended by the California Department of Public Health (CDPH).”*

This proposed objective is comparable to other narrative objectives already established in the Basin Plan. The proposed *E. coli* objectives, shown in Table 4-pio- Pathogen Indicator Objectives (see Attachments 1 and 2 to Resolution No. R8-2012-0001, proposed revisions to Chapter 4 WATER QUALITY OBJECTIVES) and described above (Section 5.2), would be used to interpret this narrative objective, based on the best science available at this time. The proposed *E. coli* objectives are based on USEPA’s 1986 bacteria quality criteria, which are USEPA’s current recommendations based on the best available science. These criteria were derived from epidemiological studies in which gastrointestinal illness rates in swimmers and non-swimmers were compared (see Section 4.0). The criteria are based on acceptable “excess” illness rates, i.e., acceptable illness rates above those observed in the non-swimmer population. USEPA is now engaged in a review of the criteria and may recommend alternative criteria in the future.

The intent of the proposed narrative objective is to provide the Regional Board increased flexibility and authority to take actions necessary to protect recreational uses and public health.

## 5.4.2 Discussion

The Basin Plan specifies a number of narrative objectives applicable to inland fresh surface waters (Basin Plan, Chapter 4). Some of these objectives require that waste discharges not contribute to specific conditions in inland surface waters. For example, the Basin Plan requires that “*Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters*”, and, “*Waste discharges shall not result in increases in COD [chemical oxygen demand] levels in inland surface waters which exceed the values shown in Table 4-1 or which adversely affect beneficial uses.*” Other narrative objectives specify that numeric values for certain constituents not be exceeded in inland surface waters as the result of controllable water quality factors. For example, the Basin Plan specifies that “*The chloride objectives in Table 4-1 shall not be exceeded as the result of controllable water quality factors.*”

An important concept underlying these narrative objectives is that there are or may be factors that affect water quality conditions in receiving waters that are not subject to control by waste dischargers, the Regional Board, or others. This is true of bacteria quality conditions in surface waters, which may be affected by natural sources that cannot be controlled practicably. Further, such sources may have no pathogenic significance, i.e., elevated levels of bacteria in surface waters do not necessarily result in increased illness in those recreating in those waters. It should be emphasized that bacteria levels that exceed established numeric objectives are presumed to have pathogenic significance, unless appropriate investigation demonstrates otherwise.

The proposed Basin Plan amendments include recommendations for numeric objectives for *E. coli* to protect REC1 uses of inland surface waters (see Section 5.2). *E. coli* are used as a surrogate indicator of the presence of pathogens that may cause illness in those engaged in full body contact recreation. As discussed in Section 4.0, direct detection and measurement of all pathogens is not currently practical, nor have water quality criteria been established for each organism that may cause illness. Ongoing studies and advances in analytical technology may identify better pathogen indicators and/or make the detection and enumeration of actual pathogens reasonably feasible in the future. Based on this new evidence/analytical advances, USEPA may recommend revised numeric criteria to protect primary contact recreation in the future.

A narrative pathogen objective is proposed to be incorporated in the Basin Plan (shown in the Summary subsection above). The intended purpose of the proposed narrative objective is to provide the Regional Board greater flexibility and authority in regulating discharges so as to assure the protection of beneficial uses. The proposed numeric *E. coli* pathogen indicator objectives would be used to interpret the narrative objective, based on the best available science now available. However, new science may indicate that reliance on *E. coli* as an indicator of the presence of pathogens is not appropriate or is less effective than reliance on an alternative pathogen indicator, or the pathogens themselves. In this case, the proposed narrative objective would provide the basis for regulatory actions based on those other indicators/pathogens that are deemed necessary to assure the protection of public health and beneficial uses. This is consistent with the Regional Board’s

obligation when establishing waste discharge requirements to impose limitations more stringent than established objectives if such more stringent limitations are necessary to protect beneficial uses.

The last sentence of the proposed narrative objective (“*The Regional Board may also require recycled water discharged to freshwaters designated REC 1 or REC 2 to comply with other limitations recommended by the California Department of Public Health (CDPH).*”) also directly reflects this regulatory obligation. As discussed in more detail in Section 5.9.2.3, the Regional Board issues waste discharge requirements to Publicly-Owned Treatment Works (POTWs) for discharges to surface waters that implement the recommendations of the California Department of Public Health. These requirements include limitations on total coliform bacteria that are more stringent than the established Basin Plan fecal coliform objectives for REC1 waters. These more stringent limitations, based on treatment performance and the expected removal of viruses, are necessary to protect public health and recreation beneficial uses. Nothing in the proposed narrative objective, or in the other proposed amendments, would modify this more stringent approach.

The proposed narrative objective also takes note of established antidegradation policy and the obligation to prevent the lowering of water quality, including bacteria quality, unless specified findings are made.

Finally, the proposed objective accounts for and enables the Regional Board to take regulatory notice of the possibility that case-specific investigation may demonstrate that bacteria levels above the numeric pathogen indicator objectives have no significance with respect to public health and water contact recreational use of surface waters.

As documented in the administrative record for these amendments, the Task Force spent considerable effort considering various wording alternatives for the proposed narrative objective and the concepts that should be addressed in it. The language proposed in the proposed amendments reflects the Task Force consensus recommendations.

## **5.5 High Flow Suspension of REC1 and REC2 Standards**

### **5.5.1 Summary**

The proposed Basin Plan amendments include provisions to temporarily suspend the REC1 and REC2 standards in certain stream segments when unsafe flow conditions preclude attainment of the designated recreational uses for short periods of time.

- \* Pursuant to this set of Basin Plan amendments, the temporary suspension would apply only to freshwater creeks and streams that have been engineered or modified to enhance flood control protection. Engineered streams include all man-made flood control facilities with a box-shaped, V-shaped or trapezoidal configuration that have been lined on the side(s) and/or bottom with concrete or similar channel hardening materials to contain the flow and prevent erosion. Modified channels include once natural streams that have

been re-engineered, using levees, bank stabilization (rip-rap), channel straightening, vegetation removal and other similar practices to facilitate rapid evacuation of urban runoff during storm events.

- \* The temporary suspension would not apply to freshwater lakes, marine beaches or enclosed bays and estuaries. Nor would the temporary suspension of recreational standards modify the continuing obligation of wastewater treatment plants to provide adequate disinfection as defined in regulations established by the California Department of Public Health (Title 22 of the California Code of Regulations) and implemented in the dischargers' NPDES permits.
- \* The temporary suspension would be triggered automatically when: a) stream velocity exceeds eight feet-per-second; or, b) stream velocity times stream depth (depth-velocity product) exceeds 10 ft.<sup>2</sup>/sec. Where representative flow data from a calibrated stream gauge are not available, the temporary suspension would also be triggered when rainfall in the area tributary to the engineered or modified flood control channel is greater than or equal to 0.5 inches in 24 hours.
- \* The temporary suspension would automatically terminate 24 hours after rain ceases to fall in the area tributary to the stream unless flow data indicate that stream flows continue to exceed the threshold values described above. In all cases, the temporary suspension would automatically terminate once stream flows have returned to normal baseline conditions (generally defined as flows at or below the 98<sup>th</sup> percentile as calculated from a calibrated hydrograph for the stream).
- \* The Regional Board may adopt different thresholds to define unsafe flow conditions for individual streams based on site-specific data and analysis. Such determinations would be considered on a case-by-case basis through the Board's normal process of public notice and comment.
- \* The temporary suspension would apply to all engineered and modified channels shown in the map(s) and ArcGIS files included in the draft Basin Plan amendment (Attachment to Resolution No. R8-2012-0001, Appendices VIII and IX). With respect to engineered and modified channels, these Appendices would be updated as part of the annual report to the Regional Board submitted by each of the MS4 permittees in the Region. These updates would provide

documentation of the engineered or modified channels in each of the MS4 permittees' jurisdiction.

- \* The Regional Board may determine that it is appropriate to apply the temporary suspension to additional waterbodies that may not be engineered or modified provided that it is demonstrated that hazardous flow conditions preclude attainment of the use. Such a demonstration requires that a Use Attainability Analysis be performed in accordance with federal regulations.
- \* The temporary high flow suspension will not be applied to Reach 2 of the Santa Ana River, where stream flows may exceed the default trigger even during dry weather conditions, unless the elevated flows are directly related to a recent storm event.

### 5.5.2 Discussion

In many states, recreational uses are designated to occur only during a defined season when warmer air and water temperatures are conducive to such activities.<sup>54</sup> Although the Santa Ana Region's mild Mediterranean climate generally allows aquatic recreation activities throughout most of the year, inclement weather can pose a serious risk of flash flooding that temporarily precludes the opportunity for safe aquatic recreation. This is particularly true where local creeks and streams have been modified by flood control agencies to protect people and property in the more urbanized areas of the watershed.

Engineered flood control channels are characterized by box-shaped, V-shaped or trapezoidal configurations that have been lined on the side(s) and/or bottom with concrete or other similar materials intended to minimize bank erosion. These and other modifications, such as channel straightening, vegetation removal, bank stabilization and levee reinforcement, are designed to convey rainfall runoff out of a community as efficiently as possible but also create life-threatening "swift-water" conditions during and immediately following significant storm events.

Because such storms are relatively infrequent and are not confined to just a few specific winter months, broad application of seasonal uses such as those employed in other states are less appropriate for the Santa Ana Region. However, it is appropriate to recognize that recreational uses are sometimes precluded by short periods of bad weather even in Southern California.

The proposed Basin Plan amendments would suspend recreational beneficial uses in a broad category of engineered or modified flood control channels when wet weather creates unsafe flow conditions. Temporarily suspending recreational uses due to inclement weather is analogous to adopting seasonal uses, though the period of suspension is significantly shorter as compared to the calendar-based approach

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<sup>54</sup> CDM, Inc. Memorandum: Review of State Recreational Uses and Bacteria Objectives; Dec. 12, 2005.

frequently employed by other states. A similar Basin Plan amendment was adopted by the Los Angeles Regional Board and subsequently approved by the State Water Board.<sup>55</sup> Federal guidance recommends applying a categorical approach when different streams share a number of common characteristics and those traits prevent full attainment of the designated use.<sup>56</sup>

Analyses conducted by the Stormwater Quality Standards Task Force demonstrate that engineered/modified flood control channels in the urbanized areas of the Santa Ana Region meet two of the conditions specified in federal regulations for subcategorizing a designated use. Specifically, wet weather creates natural, intermittent water levels (e.g. flash-flooding) that prevent attainment of the use.<sup>57</sup> Hydrologic modifications and common flood control maintenance practices tend to exacerbate the unsafe flow conditions and thereby preclude attainment of recreational uses during periods of wet weather.<sup>58</sup> Such modifications are intended to reduce the risk of flooding and prevent stream erosion. It is not possible to restore the streams to their original condition or operate the modifications in a way that would support aquatic recreation without posing a greater risk to public health and safety by compromising the full functionality of essential flood control facilities during wet weather.

To protect public safety, flood control agencies in the Santa Ana Region, like their counterparts in the Los Angeles Region, secure the channels with fencing, locked gates and signage that prohibit casual public access.<sup>59</sup> In addition, no facilities are provided that would enable or encourage recreational activities in the urban storm water channels.

Although city and county authorities seek to prohibit public access to engineered flood control channels at all times, the proposed Basin Plan amendment would only suspend recreational uses in such facilities when wet weather causes unsafe flow conditions to occur. The proposed amendment specifies several metrics to identify such circumstances.

The Stormwater Quality Standards Task Force considered appropriate triggers for the temporary suspension of recreational standards, and for termination of the suspension, for waters in the Santa Ana Region. This included consideration of the trigger for the suspension of recreation standards previously enacted by the Los Angeles Regional

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<sup>55</sup> LARWQCB Resolution No. 2003-010 and SWRCB Resolution No. 2003-0071

<sup>56</sup> U.S. EPA. Water Quality Standards Handbook. Sept. 15, 1993: "States may also conduct generic use attainability analyses for groups of water body segments provided that the circumstances relating to the segments in question are sufficiently similar to make the results of the generic analyses reasonably applicable to each segment." (pg. 2-9).

<sup>57</sup> 40 CFR 131.10(g)(2)

<sup>58</sup> 40 CFR 121.10(g)(4)

<sup>59</sup> LARWQCB. Staff Report: Amendment to the Water Quality Control Plan for the Los Angeles Region to Suspend the Recreational Beneficial Uses in Engineered Channels during Unsafe Wet Weather Conditions. May 15, 2003.

Board. In that Region, recreational standards in engineered flood control channels are suspended during and for 24 hours following a ½ inch rain event. Other relevant guidance and information provided by the US Department of the Interior and USGS was also considered. Further, the Task Force sponsored a number of investigations designed, in part, to inform consideration of suspension triggers, and to assess whether and to what extent recreational activity was observed in a number of typical freshwater streams and other inland channels during wet weather events. These studies included:

- Receiving water and watershed inventory mapping<sup>60</sup>:
  - A GIS database was compiled, including the surface waterbodies listed in Table 3-1 of the Basin Plan and other unnamed tributaries, storm drain system information, land use information, and monitoring locations (meteorological, hydrologic, water quality, etc.)
- Hydraulic analyses, including the relationship of rainfall events and depth-velocity products in representative channels<sup>61</sup>.
- Storm event and duration analyses<sup>62</sup>
- Analysis of the force of high velocity channel flow on a person<sup>63</sup>
- Photographic surveys to confirm the absence of any water contact recreation during storm events and high flow conditions<sup>64</sup>. (See also 5.6)

Based on this information and analyses, the Task Force recommended applying any of the following criteria for temporary suspension of recreational standards in engineered and modified flood control channels that have been identified throughout the Region:

- a. Stream velocity exceeds eight feet-per-second; or,
- b. Stream velocity times stream depth (depth-velocity product) exceeds 10 ft.<sup>2</sup>/sec.; or,

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<sup>60</sup> CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force. Technical Memorandum 1: Receiving Water and Watershed Inventory Mapping, January 2005

<sup>61</sup> CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force. Technical Memorandum 3. Flow and Water Quality Data Inventory and Characterization. January 2005; CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force. November 28, 2005.; Risk Sciences/CDM, Inc. Memorandum. Application of the Temporary High Flow Suspension of Recreational Standards in the Santa Ana River, Reach 3. January 10, 2012.

<sup>62</sup> CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005.

<sup>63</sup> CDM, Inc. Technical Memorandum: Force of High Velocity Channel Flow on a Person. Aug. 20, 2010

<sup>64</sup> See, for example, CDM, Inc. Recreational Use Survey Reports. October 2006 – July 2009. The CDM reports for 11 stream locations can be found at [http://www.sawpa.org/roundtable-SWQTF\\_IV.html](http://www.sawpa.org/roundtable-SWQTF_IV.html) resources tab (under the heading Recreational Use Surveys and Use Attainability Analysis and Technical Reports)

- c. There is 0.5" inches or more of rainfall in a 24-hour period in the area tributary to the stream to which the suspension is to be applied.

Finally, the Task Force recommended that the suspension be terminated automatically 24 hours after the rain ceases to fall in the area tributary to the stream, unless flow data indicate that stream conditions continue to exceed the threshold values described above. In such cases, the suspension would terminate once stream flows have returned to safe, baseflow conditions. Baseline conditions are generally defined as flows at or below the 98<sup>th</sup> percentile as calculated from a calibrated hydrograph for the stream. These recommendations are incorporated in the proposed Basin Plan amendments (Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, *High Flow Suspension*).

The recommended suspension criteria are consistent with federal guidance describing "Methods of Assessing Instream Flows for Recreation."<sup>65</sup> This guidance recommends that depth (in feet) multiplied by flow velocity (in feet-per-second) should not exceed 10 to assure safe fishing, wading or swimming. The guidance also states that although safety depends on individual height and weight as well as substrate type, the probability that any of these water contact activities will occur approaches zero when stream velocities exceed three feet-per-second, especially where the depth is greater than four feet. The recommended suspension criteria are also consistent with those previously adopted by the Los Angeles Regional Board and later approved by the State Water Board.

The Storm Water Quality Standards Task Force commissioned CDM, Inc. to prepare an independent scientific analysis of how variations in the volume and velocity of flow affect the forces acting on swimmers and waders.<sup>66</sup> The results are presented in Figure 5.1.

As shown in Figure 5.1, at a velocity of 8 feet-per-second, and a depth of only 1 foot, the stream flow exerts a total physical force of more than 120 foot-pounds on an average person. This is sufficient force to overwhelm most adults and all children. The total force increases dramatically as runoff swells the depth of streams during storm events. Even if flow velocity remains only 8 feet-per-second, the total physical force exerted on the average person is nearly 500 foot-pounds when stream depth rises to 3 feet.

CDM's analysis supports the conclusion found in federal guidance that safe water contact recreation is physically impossible when stream velocities are greater than 8 feet-per-second or the product of stream velocity (ft./sec.) and depth (ft.) is greater than 10. This finding was corroborated in testimony given by "Swift Water Rescue Teams" to the Los Angeles Regional Water Quality Control Board at a hearing to adopt similar

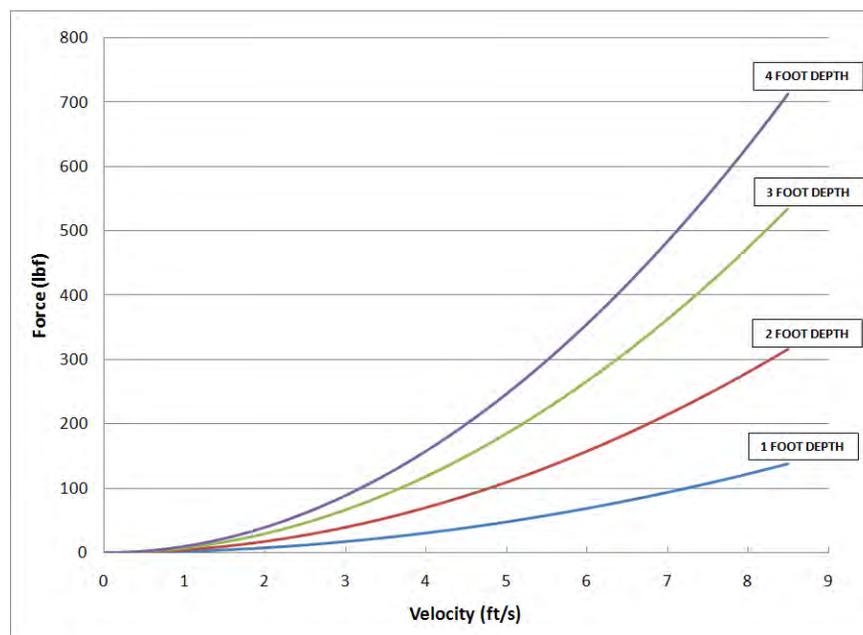
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<sup>65</sup> U.S. Department of the Interior in cooperation with U.S. EPA and U.S. Bureau of Reclamation. Methods of Assessing Instream Flows for Recreation. Instream Flow Information Paper No. 6. FWS/OBS-78/34. June, 1978.

<sup>66</sup> CDM, Inc. Technical Memorandum: Force of High Velocity Channel Flow on a Person. Aug. 20, 2010.

high flow suspensions in 2003. These "First Responders" were emphatic that flows that occur in flood control channels during common storm events create a severe risk of injury or death for anyone entering the water, including the rescue teams themselves.

**Figure 5.1:  
Physical Force (ft.-lbs.) Exerted at a Given Stream Depth and Flow Velocity**



(Source: CDM, Inc. Technical Memorandum: Force of High Velocity Channel Flow on a Person. Aug. 20, 2010. Figure 2)

It should be noted that CDM's force calculations are not dependent on channel morphology or the type of substrate. Thus, in theory, the temporary suspension of recreation standards should apply to any surface water that meets the proposed suspension criteria based on velocity or depth-velocity product, whether the waterway has been modified or not. However, at this time, the proposed amendments only apply the temporary suspension to engineered or modified channels in the Region. This is because CDM's hydraulic, flow characterization, etc. studies were limited to engineered or modified channels. Nevertheless, CDM's analyses confirmed similar studies by the Los Angeles Regional Board that 1/2" of rainfall can create unsafe conditions that prevent the attainment of recreational uses in modified channels. This expectation holds true for all engineered flood control channels in urbanized areas of the watershed. Thus, for these limited circumstances, staff proposes a regional approach that applies the temporary use suspension to a common subcategory of waterbodies under a common set of conditions.

Maps identifying all of the engineered flood control channels in the Santa Ana Region to which the temporary suspension of recreation standards applies are appended to the Basin Plan amendment in both graphic format and as ArcGIS files. (Attachments 1 and 2 to Resolution No. R8-2012-0001, Appendices VIII and IX). The ArcGIS files and high

resolution graphic maps are available for public download at the Regional Board's website:

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA\\_AppIX.zip](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA_AppIX.zip), and  
[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA\\_AppVIII.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA_AppVIII.pdf).

In order to evaluate the effect of application of the proposed suspension criteria and ensure that beneficial uses were not being unduly restricted, the Task Force requested CDM to calculate the frequency and duration with which temporary suspensions were likely to occur, using data and analyses from channels representative of different morphological types (e.g., vertical box, trapezoidal). Figures 5.2a and 5.2b depict representative illustrations from CDM's final report.<sup>67</sup>

Figure 5.2a shows that, in Chino Creek, the 8 foot-per-second trigger would be exceeded approximately 3% of the time. Figure 5.2b shows that the proposed depth-velocity product trigger of 10 would be exceeded less than 1% of time. Thus, in Chino Creek, the recreational use standards would be temporarily suspended on average about 7 days a year. Figures 5.3a & 3b, 5.4a and 4b, and 5.5a and 5b show that the same is true in the Santa Ana Delhi Channel, Temescal Creek and Reach 3 of the Santa Ana River, respectively.

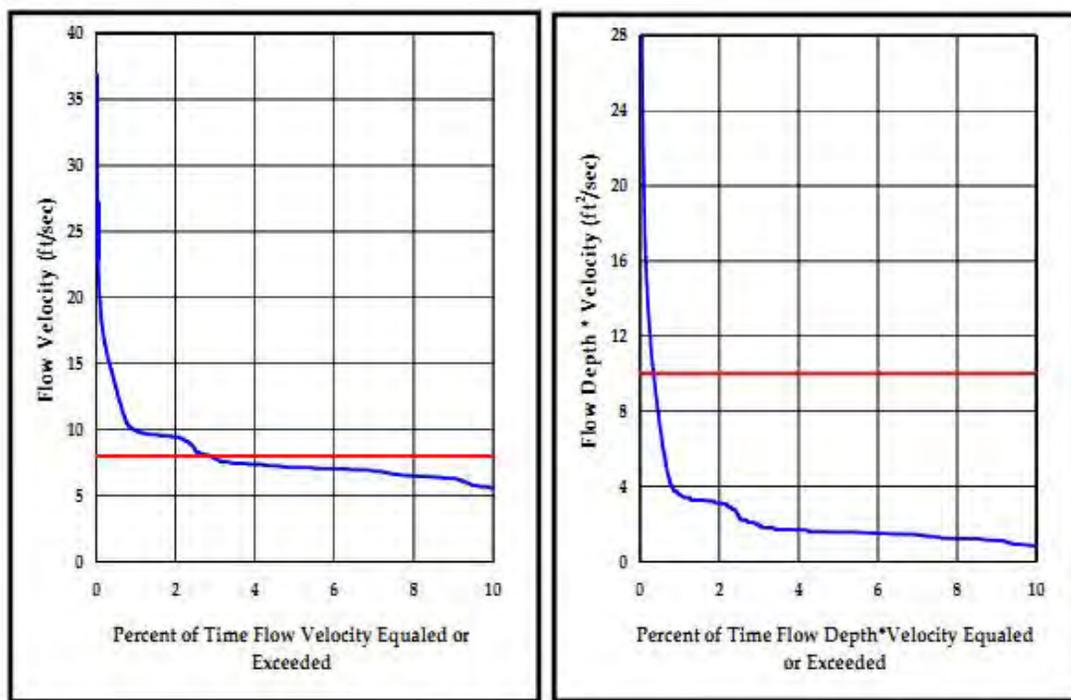


Figure 5.2a: Velocity Trigger in Chino Cr. Figure 5.2b: Depth-Velocity Trigger in Chino Cr. (Source: CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force. Technical Memorandum 3. Flow and Water Quality Data Inventory and Characterization. Jan.2005. Figure 33,34)

<sup>67</sup> CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force . Technical Memorandum 3. Flow and Water Quality Data Inventory and Characterization. January 2005.

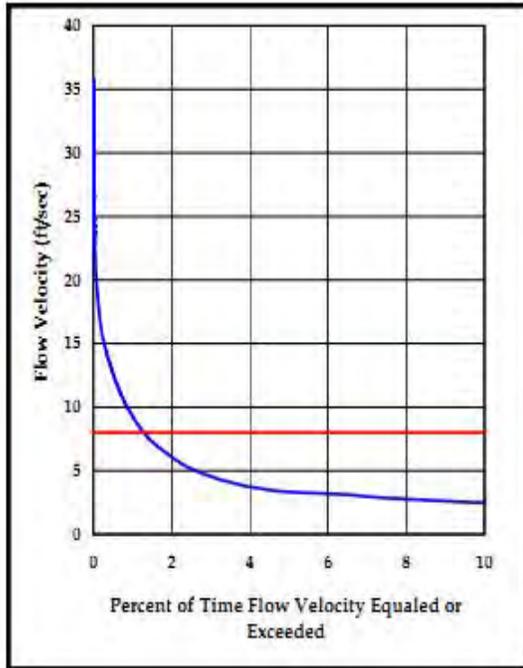


Figure 5.3a: Velocity Trigger in Delhi Channel

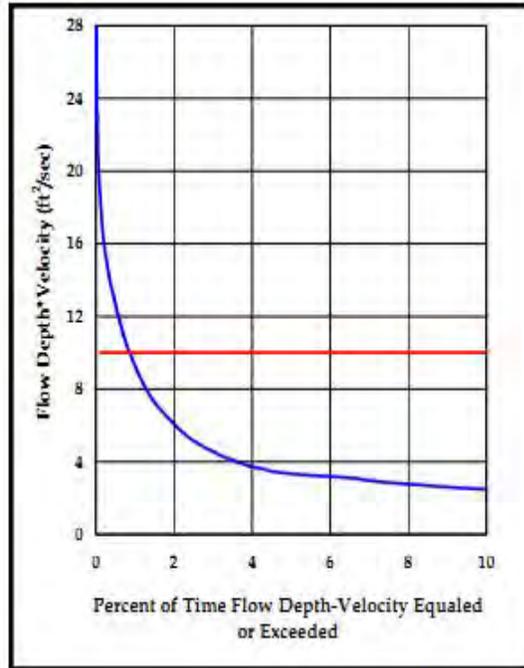


Figure 5.3b: Depth-Velocity Trigger in Delhi Channel

(Source: CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force. Technical Memorandum 3. Flow and Water Quality Data Inventory and Characterization. January 2005. Figure 51, 52)

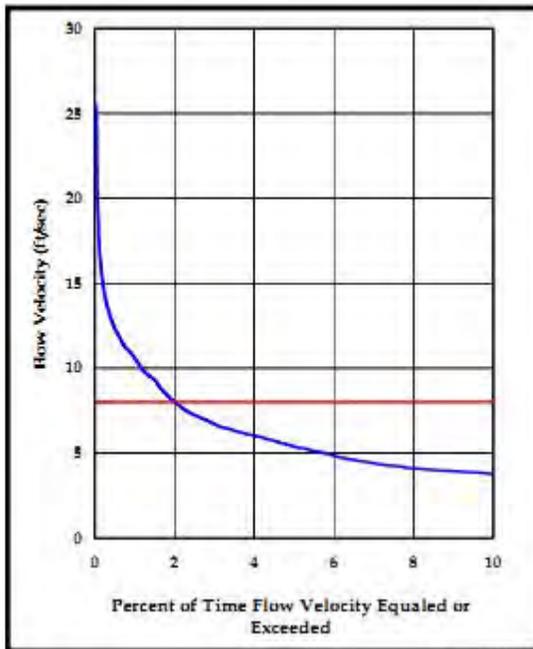


Figure 5.4a: Velocity Trigger in Temescal Cr.

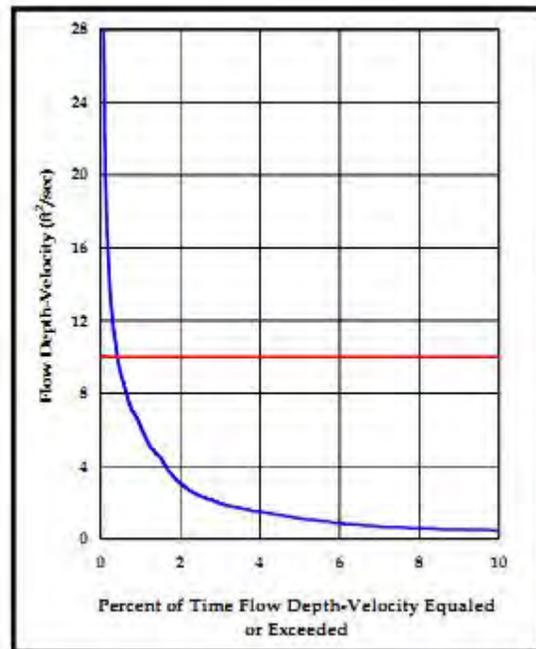


Figure 5.4b: Depth-Velocity Trigger in Temescal Cr.

(Source: CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force. Technical Memorandum 3. Flow and Water Quality Data Inventory and Characterization. Jan. 2005 (Fig. 70,71)

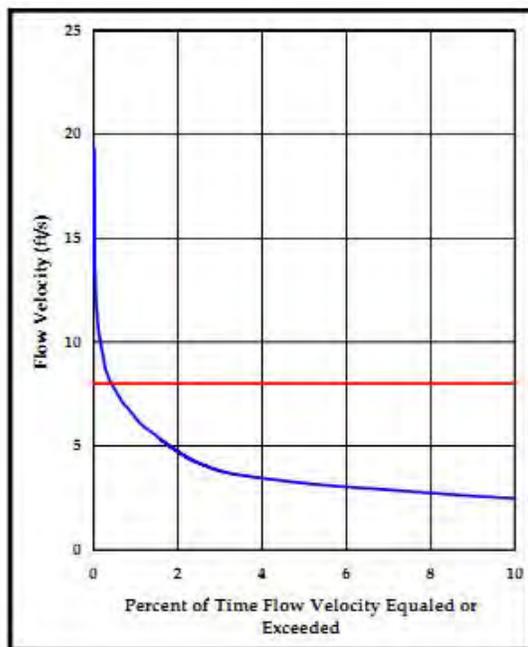


Figure 5.5a: Velocity Trigger in SAR-Reach 3

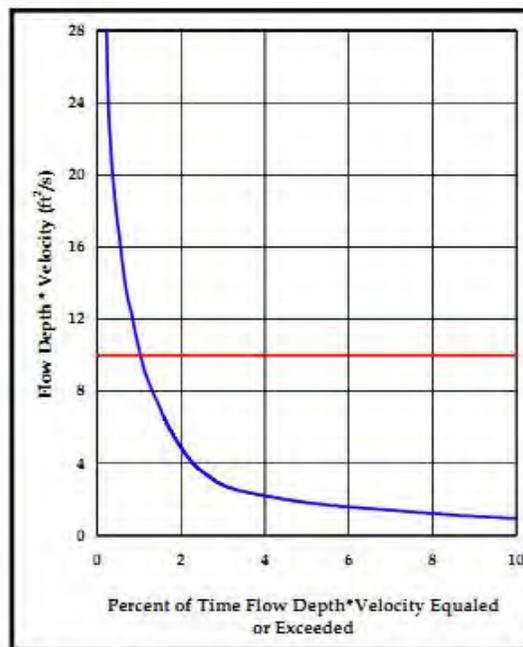


Figure 5.5b: Depth-Velocity Trigger in SAR-Reach 3

(Source: CDM, Inc. Phase 1 Study Report for the Storm Water Quality Standards Task Force. Technical Memorandum 3. Flow and Water Quality Data Inventory and Characterization. January 2005. Figure 96, 97)

Collectively, these analyses demonstrate that temporary suspension of recreational use standards is expected to occur very rarely (approx. 7-10 days/year). Moreover, temporarily suspending recreational standards is not expected to interfere with any existing or probable future beneficial use of inland streams once flows return to the levels that normally occur during dry weather conditions.

The SWQSTF collected an extensive photographic record to ascertain the level of recreational activity, if any, at a number of representative flood control channels throughout the Santa Ana Region. A total of nearly 275,000 images were generated by remote cameras at these locations. Approximately 2% of the images (~5,500 photos) were collected during or immediately following rain events. Because no people are present in any of these images, the Task Force concluded that water contact recreation does not occur when high stream flows make such activities inherently unsafe, regardless of water quality at the time. In short, the evidence indicates that recreational uses are not “existing” uses, as defined by federal regulation, under the high flow conditions identified by the proposed suspension criteria.

In a follow-on analysis, CDM showed that most streams are expected to return to normal baseflow conditions no more than 24 hours after the storm ends.<sup>68</sup> Figures 5.6,

<sup>68</sup> CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005.

5.7 and 5.8 provide hydrographs for a variety of different sized storms at three locations: Santa Ana Delhi @ Irvine Ave., Temescal Wash @ Main St., and Cucamonga Creek at Hellman Avenue, respectively.

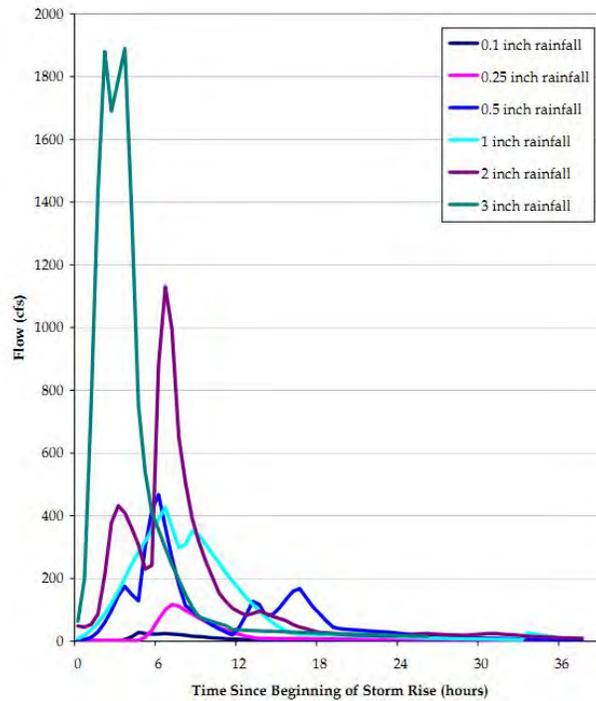


Figure 5.6: Santa Ana Delhi @ Irvine Ave.

(Source: CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005. Figure 16a)

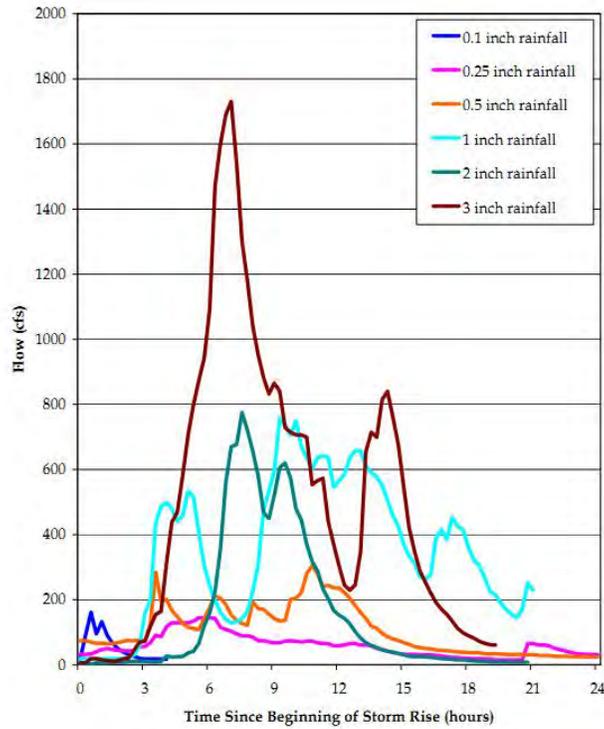


Figure 5.7: Temescal Wash @ Main St.

(Source: CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005. Figure 16b)

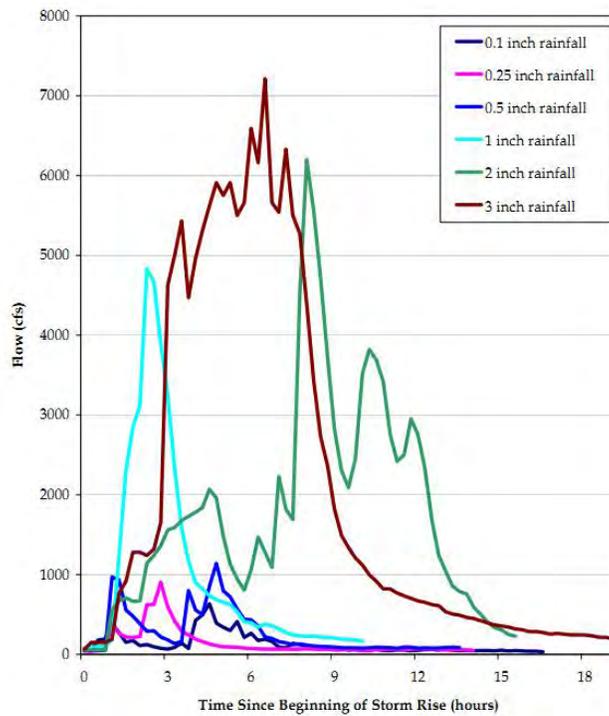


Figure 5.8: Cucamonga Creek @ Hellman Ave.

(Source: CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005. Figure 16c)

Collectively, these data confirm the findings previously published by the Los Angeles Regional Board that it is appropriate to automatically terminate the temporary suspension 24 hours after the rain event ends. However, the Regional Board may make a different determination where site-specific or storm-specific conditions merit further consideration.

Because stream gauges are not always available to determine precise flows, the Task Force developed a surrogate trigger, based on rainfall that is expected to produce unsafe conditions in the engineered or modified flood control channels. Once again, CDM Inc. was asked to evaluate the relationship between rainfall runoff and stream flows at a number of representative locations throughout the Santa Ana Region<sup>69</sup>.

Results from this analysis indicate that there is a high probability that stream flows will exceed one or both of the unsafe flow triggers when at least ½" of rain falls in a 24 hour period. Figures 5.9, 5.10 and 5.11 illustrate the relationship between rainfall and peak depth-velocity product at three different locations. Similar charts showing the relationship between rainfall and stream velocity are also available in the CDM report.

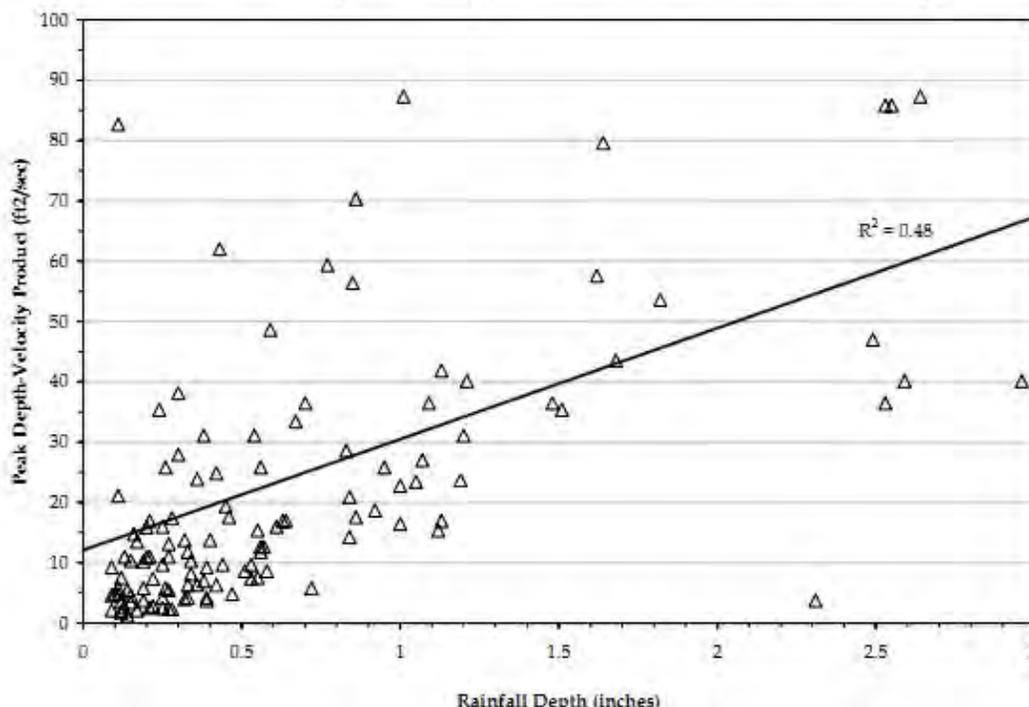


Figure 5.9: Mill-Cucamonga Creek

(Source: CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005. Figure 14c)

<sup>69</sup> CDM. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005.

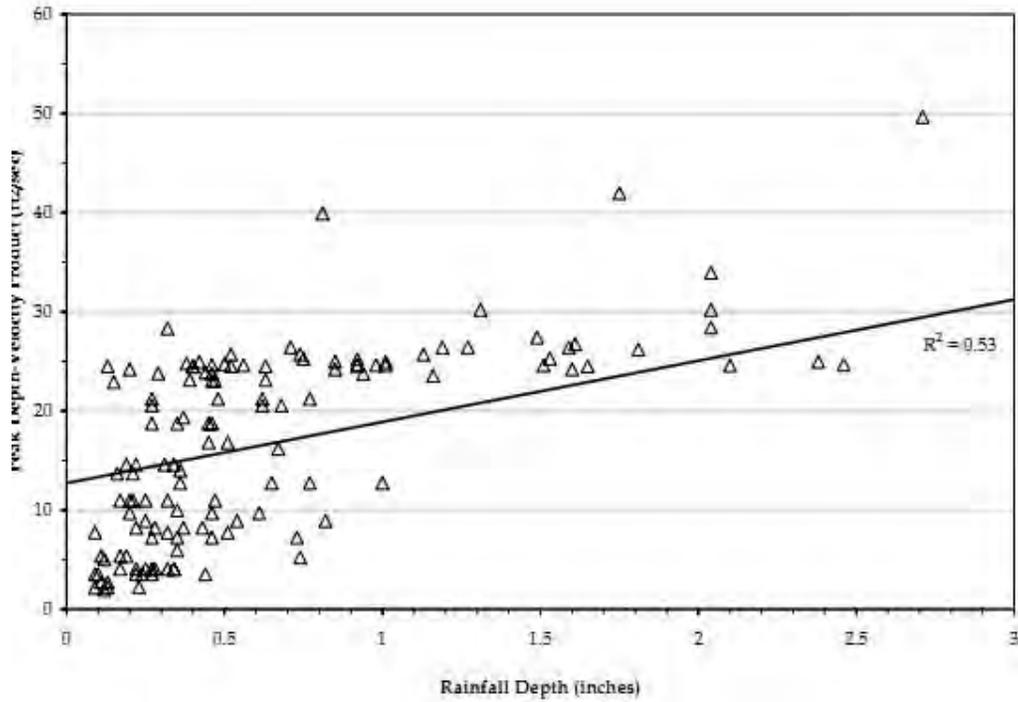


Figure 5.10: Temescal Creek

(Source: CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005. Figure 14b)

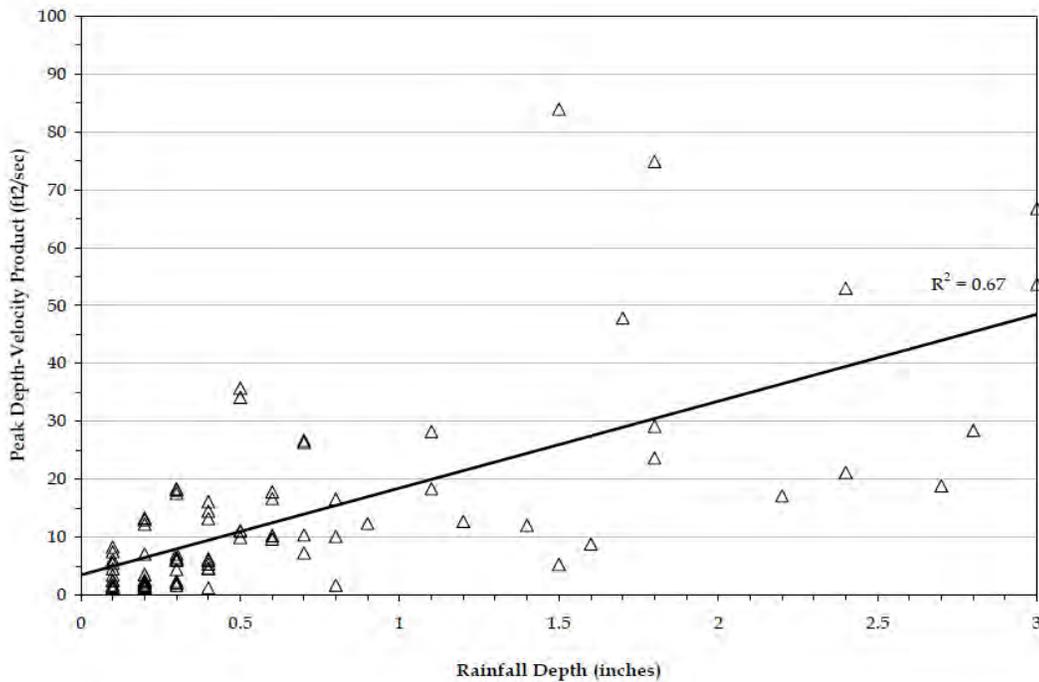


Figure 5.11: Santa Ana Delhi Channel

(Source: CDM, Inc. Technical Memorandum: Flow Characterization (Phase 2 Study Report for the Storm Water Quality Standards Task Force). November 28, 2005. Figure 14a)

It is evident from the preceding graphs that unsafe flows may sometimes occur even when total rainfall is less than ½" in a 24 hour period. The proposed Basin Plan amendment allows interested parties to submit more detailed data and modeling analysis to support a site-specific determination of a more appropriate rainfall trigger for the high flow suspension. However, until then, the ½" threshold provides a conservative default trigger when representative flow measurements are not available.

As already stated, the proposed Basin Plan amendments would not apply the default triggers to natural streams that have not been engineered or modified to serve as urban flood control channels. This is not to say that natural streams present no substantial risk of flash flooding. Rather, the proposed amendments limit default recommendations to the type of channels that were thoroughly investigated and analyzed by the Task Force and its technical consultants. This approach is also consistent with the SWRCB's approval of similar high flow suspension provisions added to the Los Angeles Region's Basin Plan.

However, the Regional Board will employ its discretion to apply temporary recreational use suspensions to non-engineered streams when and where unsafe conditions warrant if adequate data become available to support such a determination. The Regional Board would rely on the normal public notice and comment process prior to making any such decision. Such consideration would need to be accompanied by documentation that recreational uses are not "existing uses" (as defined in federal regulations) during the suspension, and a Use Attainability Analysis showing that hazardous flow conditions and/or other conditions preclude full attainment of the designated instream uses.

Temporarily suspending recreational use standards during extreme high flow conditions does not relieve wastewater treatment facilities from the obligation to continue to provide adequate treatment to reduce pathogens, as required by the NPDES permit issued to all such facilities. Nor does the proposed Basin Plan amendment recommend suspending recreational use standards in freshwater lakes or marine waters. In general, such waterbodies are not subject to the same risk of storm-induced flash flooding commonly seen in local rivers and streams.

Specific discussion is also appropriate regarding the proposed application of the temporary suspension to Reach 2 and Reach 3 of the Santa Ana River. Reach 2 of the River extends from Prado Dam near Corona downstream to 17<sup>th</sup> Street in Santa Ana. Much of this segment of the river has been heavily modified and re-engineered to provide greater flood control protection to the residents of Orange County. Although flow control at Prado Dam minimizes the risk of flash flooding in Reach 2, the volume of water passing through the deep and narrow channel near Featherly Park, just downstream of the Dam, often exceeds the default threshold that triggers application of the high flow suspension.<sup>70</sup> The temporary high flow suspension is intended to apply on a limited basis to transient conditions. It is not

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<sup>70</sup> Wildermuth Environmental Inc., 2008 Santa Ana River Wasteload Allocation Model Report. Prepared for the Santa Ana Watershed Project Authority's (SAWPA) Basin Monitoring Program Task Force. May, 2009 (Historical flows below Prado Dam are charted in Fig. 2-16 of the Report).

intended to de-designate recreational uses where elevated flows represent the normal baseline condition even during dry weather conditions. Consequently, the flow-based threshold will not be used to trigger application of the high flow suspension in Reach 2 of the Santa Ana River. Instead, the temporary high flow suspension will only be applied using the rainfall criteria described above or when the Army Corps of Engineers is releasing excess flows stored behind Prado Dam in response to previous rain events as described in their Standard Operating Procedures.<sup>71</sup>

Reach 3 of the Santa Ana River extends upstream from Prado Dam to Mission Avenue in Riverside. Although much of Reach 3 may appear relatively natural to the casual observer, it has in fact been heavily modified and re-engineered to enhance flood protection. The upper half of the reach has been channelized with reinforced levees armored by rip-rap. Below Van Buren Boulevard, Reach 3 remains largely natural. However, numerous flood control facilities have been constructed/modified in the multiple streams tributary to this area. These changes have modified the natural stream hydrology of the Reach by re-directing and accelerating stormwater runoff from the upper Santa Ana watershed that can create exceptionally hazardous flow conditions in the Reach.<sup>72</sup> If approved, the temporary suspension of recreational standards would apply to this Reach.

As with all water quality standards, the Regional Board will periodically reassess the appropriateness of the temporary use suspensions as part of the normal triennial review process. The principal permittee for each of the area-wide Municipal Separate Stormwater Systems (MS4) will be required to provide updated maps and ArcGIS files identifying the engineered and modified flood control channels within their jurisdiction as part of their annual report. The updated files will be made available for download by the general public via the Regional Board's website.

## **5.6 Use Attainability Analyses: Recommendations for REC1/REC2 Designation/Re-Designation of Portions of the Santa Ana-Delhi Channel, Greenville-Banning Channel, Temescal Creek and Cucamonga Creek**

The proposed amendments include the re-designation of portions of Temescal Creek and Cucamonga Creek to remove the REC1 or REC1 and REC2 uses, based on Use Attainability Analyses (UAAs). UAAs were also conducted for portions of two surface waters (Santa Ana-Delhi Channel and Greenville-Banning Channel) that are not currently listed in the Basin Plan and for which no recreation (or other beneficial use)

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<sup>71</sup> United States Army Corps of Engineers. Water Control Manual: Prado Dam and Reservoir, Santa Ana River, California. 1994.

<sup>72</sup> Risk Sciences/CDM, Inc. Memorandum. Application of the Temporary High Flow Suspension of Recreational Standards in the Santa Ana River, Reach 3. January 10, 2012.

designations have yet been incorporated in the Basin Plan.<sup>73</sup> Based on the UAAs for these two waters, the presumption of REC1 uses for these waters is unjustified (see below and Section 2.1). Accordingly, REC1 or REC1 and REC2 designations are not recommended for these waters.

Section 5.6.1 below summarizes the recommendations to implement the UAA findings; Section 5.6.2 reviews the applicable regulatory framework and the methodology employed by the Stormwater Quality Standards Task Force. Individual UAA reports for each of the waters identified above are found in Sections 5.6.3 – 5.6.6. Due to their size, each of these reports is in a separate file that can be accessed via the Regional Board's website at:

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/recreational\\_standards.shtml](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/recreational_standards.shtml).

### 5.6.1 Summary

This section of the staff report describes regulatory considerations pertaining to recreation use designations, the methodology employed by the SWQSTF to conduct UAAs, the results of those analyses and the recommendations derived from the analyses. In summary, the following is proposed (see also Table 5.3 below):

- Santa Ana-Delhi Channel: (see also 5.8.4.1)
  - Tidal Prism: No REC1 designation; add REC2
  - Reach 1: No REC1 or REC2 designation
  - Reach 2: No REC1 designation; add REC2
- Temescal Creek: (Note: UAA limited to the proposed Reaches 1a and 1b, which are identified in the current Basin Plan essentially as a single reach (Reach 1)(see also 5.8.5)
  - Reach 1: Remove REC1 designation; maintain current Basin Plan REC2 designation
  - Reach 2: Remove REC1 and REC2 designations
- Cucamonga Creek, Reach 1: Remove REC1 and REC2 designations.
- Greenville-Banning Channel: (see also 5.8.4.2 )
  - Tidal Prism: No REC1-designation; add REC2
  - Reach 1: No REC1 or REC2 designation

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<sup>73</sup> See Section 5.8 for discussion of the proposed addition of certain surface waters, including the Santa Ana-Delhi Channel and the Greenville-Banning Channel, and appropriate beneficial use designations to the Basin Plan.

**Table 5.3 Summary - Proposed REC Beneficial Use Designations- UAA Waters**

UAA Waters	Reaches <sup>+</sup>	Reach Boundaries <sup>+</sup>	REC1	REC2	Current Beneficial Use Designations
Santa Ana-Delhi Channel	Tidal Prism	Bicycle Bridge at University Avenue/Upper Newport Bay to 1036 ft. upstream	No	Yes	Not listed In the Basin Plan; Assumed REC1
	Reach 1	Tidal prism to Sunflower Ave. /Flower St.	No	No	
	Reach 2	Sunflower/Flower to Warner Avenue	No	Yes	
Greenville-Banning Channel	Tidal Prism	Confluence with Santa Ana River to Diversion Dam*	No	Yes	Not listed in the Basin Plan; Assumed REC1
	Reach 1	Diversion Dam to California Street	No	No	
Temescal Creek	Reach 1a	Lincoln Street to Arlington Channel confluence	No	Yes	(Listed as Reach 1)
	Reach 1b	Arlington Channel to 1400 ft. upstream of Magnolia Ave.	No	No	REC1, REC2, WARM, WILD
Cucamonga Creek	Reach 1	Confluence with Mill Creek to 23 <sup>rd</sup> Street, Upland	No	No	GWR, REC1, REC2, LWARM, WILD

<sup>+</sup> Reaches and Reach boundaries are proposed for the Santa Ana Delhi and Greenville-Banning channels. For Temescal Creek, Reach 1 is proposed to be subdivided into Reaches 1a and 1b. These recommendations are discussed below and in 5.8.

\* The Diversion Dam is an inflatable dam located approximately .23 mile downstream of the confluence of Fairview Channel and approximately 1.2 miles upstream from the confluence with the Santa Ana River.

## 5.6.2 Background

### 5.6.2.1 Regulatory Framework - UAAs

As described previously (Section 2.1), Section 101 (a)(2) of the CWA states that “it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983”. The CWA and implementing federal regulations provide special protection for these “fishable/swimmable” uses, including recreation. The statute and regulations create a rebuttable presumption that all waters support these uses.

To overcome this presumption, the states are required to conduct a Use Attainability Analysis (UAA) and demonstrate that attaining the use(s) is not feasible based on one or more of the six factors identified in federal regulations (40 CFR 131.10(g)):

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modifications in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses: or
6. Controls more stringent than those required by sections 301 (b) (Effluent Limitations) and 306 (National Standards of Performance) of the Act would result in substantial and widespread economic and social impact.

A UAA is a structured scientific assessment of the factors affecting the attainment of the use(s), which can include physical, chemical, biological, and economic factors as described in 40 CFR 131.10 (g)(1)-(6), above .

Federal regulation at 40 CFR 131.10 (h) prohibits States from removing designated uses if:

1. They are existing uses, as defined in 40 CFR 131.3, unless a use requiring more stringent criteria is added; or
2. Such uses will be attained by implementing effluent limits required under sections 301 (b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

Per 40 CFR 131.3, “existing uses” are those uses actually attained in the water body on or after November 28, 1975 (the date of USEPA’s initial water quality standards regulation), whether or not they are included in the water quality standards. USEPA guidance indicates that an “existing” primary contact recreational use can be established by demonstrating that swimming has actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur, unless there are physical problems that prevent the use regardless of water quality).<sup>74</sup> Suitable water

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<sup>74</sup> USEPA. Questions & Answers on: Antidegradation, August 1985.

quality is demonstrated by consistent, not merely sporadic, attainment of applicable water quality objectives. USEPA has indicated that where there is very limited actual primary contact use and the physical and/or water quality characteristics of the water body do not and are not likely to support that use, then it would be appropriate to conclude the primary contact recreation is not an “existing” use (63 Fed. Reg. 36741-36806 (July 7, 1998) at 36752-53).

In designating the uses of a water body, and in considering changes to those designations, states must take into consideration the water quality standards of downstream waters and ensure that water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters. (40 CFR 131.10(b)).

Finally, decisions to remove or not designate REC1 uses for surface waters are subject to reconsideration as part of the Basin Plan Triennial Review process. Where new information and/or changed conditions warrant the REC1 designation, then the Basin Plan must be amended accordingly.

#### **5.6.2.2 SWQSTF UAA Methodology**

USEPA has provided guidance regarding the factors that should be considered in UAAs to determine whether or not to revise recreational uses. USEPA’s view is that physical factors (such as flow conditions or hydromodification) should not be used by themselves to remove or not designate REC1 uses<sup>75</sup>. Rather, the states should consider a suite of factors such as the actual use (present and historic), existing water quality, potential water quality conditions, access, recreational facilities, location (e.g., proximity to recreational facilities), safety considerations, as well as the physical conditions of the water body in making use attainability decisions. (63 Fed. Reg. 36741-36806 (July 7, 1998) at 36756). Accordingly, the analyses conducted by the SWQSTF considered these factors in conducting UAAs for selected waters and making appropriate recommendations regarding recreational use designations. The UAAs conducted by the SWQSTF were also informed by detailed review and consideration of relevant federal regulation and by examples of other UAAs. In particular, the SWQSTF reviewed a UAA pertaining to recreational standards that was completed for Ballona Creek, located in coastal Los Angeles County. The Los Angeles Regional Water Quality Control Board conducted a UAA that demonstrated that it was appropriate to remove the REC1 use and to develop a limited REC1 category for different sections of Ballona Creek. The State Water Resources Control Board approved changes in recreational standards, based on this UAA, in 2005 (SWRCB Order WQO 2005-0004).

As described in Section 2.3, early work by the SWQSTF included site-visits to waterbodies of various types. The intent was to assess the type of recreational use, if

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<sup>75</sup> USEPA acknowledges that there are situations, such as high flows caused by storm events, where the physical conditions of a water body would make swimming, if not impossible, extremely dangerous. (63 Fed. Reg. 36741-36806 (July 7, 1998) at 36756). The temporary suspension of recreation standards under such high flow conditions is proposed as part of these Basin Plan amendments (See Section 5.5).

any, that the members of the SWQSTF believed occurred or had the potential to occur, based on visual observation of a variety of factors, such as channel morphology, flow, aesthetics, surrounding land use, the proximity of residential or recreational facilities, and access. Based on extensive discussion of the results, the SWQSTF selected a number of different waterbodies to serve as archetypes for groups of waterbodies throughout the Region considered to have the same or at least generally similar characteristics. Where it appeared that a REC1 or REC1 and REC2 designation might be unjustified, the SWQSTF initiated UAAs for selected stream reaches. As noted, UAAs have been completed for portions of the Santa Ana-Delhi Channel, the Greenville-Banning Channel, Temescal Creek and Cucamonga Creek. Consideration and approval/disapproval of the recommendations based on these UAAs will inform future decisions about the need for and nature of UAAs for other similar waterbodies.

The key initial step for each UAA was the collection of relevant data. CDM, one of the SWQSTF consultants, was charged with collecting the basic information needed to inform UAA decision-making. For each of the waterbodies analyzed, CDM collected and compiled the data and information in a technical report. To preserve objectivity and integrity in the UAA decision-making process, the reports were prepared without arguments or recommendations for use designations. Each of the reports is referenced and discussed below and is available on the SAWPA website<sup>76</sup>.

Recognizing that a suite of factors needed to be considered in making recreational use determinations, at the direction of the SWQSTF, CDM collected the following data and information for each of the waters evaluated:

- Waterbody Description:
  - Reach identification
  - Location
  - Hydrologic connectivity
  
- Channel Characterization:
  - Historical channel characteristics
  - Existing structure, slope and materials
  - Land use in the channel vicinity
  - Photographs of representative channel conditions
  
- Eligibility Analysis:
  - Existing Use
    - Evidence of Actual Recreational Activity

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<sup>76</sup>[http://www.sawpa.org/roundtable-SWQTF\\_IV.html](http://www.sawpa.org/roundtable-SWQTF_IV.html) resources tab. The Regional Board website includes a link to the SAWPA SWQSTF page: ([www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/stormwater\\_wq\\_tf.shtml](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/stormwater_wq_tf.shtml))

- Recreational use surveys:
  - Photographs at selected locations (using digital field observation cameras and data transfer technology)
  - Weekly on-location physical surveys
  - Example photographs
- Analysis of Representative Water Quality Monitoring Data
- Historical Use
- Probable Future use
  - Review of relevant county and municipal master plans
  - Expected improvement in water quality with BMP implementation
- UAA Factor Evaluation

The data and information presented in each of the UAA technical reports are intended to inform the following key decisions: (1) is REC1 and/or REC2 an “existing use”?; and, (2) do one or more of the UAA factors specified in 131.10(g)(1)-(6) prevent attainment of the REC1 use, taking into account the suite of factors relevant to recreational use decisions?

The discussion relies heavily on the data and information presented in the technical reports for each of the UAA waters evaluated. The data and information are presented in this report in summary form sufficient to support the evaluation and recommendations. References to specific parts of the technical reports, including particular photographs and detailed figures, are also provided and should be reviewed as part of the UAA analysis.

As described above, and as reading the technical reports makes clear, a significant amount of data and information has been collected on each of the UAA waters. It is important to take special notice of the extensive photographic evidence gathered to assess whether and what type of recreational use, if any, occurs in each of the UAA waters (see also Section 2.3). Digital field observation cameras and data transfer technology, coupled with weekly on-location physical surveys were used to collect recreational use data at specific locations on each of the UAA waters (and other waters not the subject of UAAs, at least at the present time). The cameras were equipped with cellular data transmission equipment to collect an image every fifteen minutes (during daylight hours) and transfer the images to a secure data storage server via a file transfer protocol (FTP) site. Site visits were conducted to log recreational use observations and to monitor and maintain the image collection equipment. Images collected numbered in the ten to hundred thousands, depending on the site and technical difficulties experienced. The images were then reviewed individually to identify and categorize any recreational activity. For each UAA water, the recreational use survey procedures and results are also described in separate recreational use survey reports, also available on the SAWPA website. In sum, the photographic evidence

collected and evaluated is unprecedented. Board staff is not aware of another comparable database anywhere in the country.

In addition to the work completed by CDM, SWQSTF members completed on-site REC surveys during the weekends of July and August of 2006 at all the camera locations, including the UAA waters. SWQSTF members volunteered to spend at least a half hour during daylight hours at the different sites on Saturday or Sunday, when recreation potential was considered highest, to observe and record any evidence of recreational use at the camera sites. As a result, these waters were observed at least eight times during the weekends that summer. In the late summer and fall of 2011 SWQSTF members again completed on-site REC surveys of the four UAAs waters during weekends. As a result, these waters were observed for evidence of REC use up to five times each during 2011. Furthermore, SWQSTF members, including Regional Board staff, have periodically surveyed the UAA waters over the last several years while sampling water quality or for other reasons. Finally, SWQSTF members from the Orange County, Riverside, and San Bernardino flood control agencies have surveyed their staff members, who conduct regular flood-control-related monitoring and maintenance activities in and around many of these waters, to record information regarding any recreational activity observed.

**5.6.3 Use Attainability Analysis Technical Report: Santa Ana-Delhi Channel**

**See separate report at:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_563.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_563.pdf)

**5.6.4 Use Attainability Analysis Technical Report: Greenville-Banning Channel**

**See separate report at:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_564.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_564.pdf)

**5.6.5 Use Attainability Analysis Technical Report: Temescal Creek**

**See separate report at:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_565.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_565.pdf)

**5.6.6 Use Attainability Analysis Technical Report: Cucamonga Creek, Reach 1**

**See separate report at:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_566.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_566.pdf)

## 5.7. Delete the Total Coliform Objective for Surface Waters Designated MUN

The proposed Basin Plan amendments include deleting the total coliform objective (“less than 100 organisms per 100 mL”) for surface waters designated MUN (see Chapter 4 of the Basin Plan). This objective was established in the 1975 Basin Plan. At that time, surface flows could be diverted for municipal and domestic uses without any additional treatment (e.g., filtration, disinfection). The total coliform objective was considered adequate to protect human health where surface waters were consumed directly<sup>77</sup>.

A considerable body of scientific knowledge regarding potential health risks associated with the use of raw (and treated) surface water supplies and measures needed to address them has developed since 1975<sup>78</sup>. This knowledge is reflected in federal and state drinking water statutes and regulations, which have been amended and supplemented over time as understanding continues to grow regarding microbiological contaminants, analytical techniques, and treatment methods and by-products<sup>79</sup>. A detailed discussion of these statutes and regulations is beyond the scope of this report. Rather, the following key points need to be made:

- The California total coliform Maximum Contaminant Level (MCL) is based on the presence/absence of total coliform (or fecal coliform or *E. coli*) in samples collected from water distribution systems. The number of samples required to be collected is contingent on the size of the system. The allowable percentage of total coliform positive samples is also related to the size of the system. For example, a public water system that is required to collect at least 40 samples per month is in violation of the MCL if more than 5 % of the samples collected during any month are positive for total coliform.
- All public water systems in California are required to provide treatment (filtration and disinfection) of raw surface water used for domestic supply. Public water

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<sup>77</sup> The scientific basis of this numeric objective is not clear. It is instructive to note that most of the regional water boards in California have not established this or any other bacteria quality objective to protect the MUN use.

<sup>78</sup> A seminal report, with recommendations that substantively affected subsequent drinking water regulations and practices, was published by the National Academy of Sciences and National Research Council in 1977 (“Drinking Water and Health”, Safe Drinking Water Committee, National Research Council, 1977).

<sup>79</sup> These include: the federal Safe Drinking Water Act (1974) and subsequent amendments; the federal Total Coliform Rule (40 CFR 141 and 142; 54 FR 124, June 29, 1989, p. 27544 *et seq.*), promulgated under the federal Safe Drinking Water Act; the Interim Enhanced Surface Water Treatment Rule (40 CFR Parts 9, 141 and 142; 63 FR 241, Dec. 16, 1998, pp. 69478-69521); the Long Term 1 Enhanced Surface Water Treatment Rule (40 CFR Parts 9, 141 and 142; 67 FR 9, January 14, 2002, pp. 1812); the Long Term 2 Enhanced Surface Water Treatment Rule (40 CFR Parts 9, 141 and 142; 71 FR 71, January 6, 2006, p. 654 *et seq.*); the California Safe Drinking Water Act. California drinking water statutes are included in the Health and Safety Code, Water Code and other codes. Regulations implementing these statutes are included in the California Code of Regulations, Title 17 and Title 22.

systems may avoid filtration, but not disinfection, if specific criteria are met. All state small water systems, which are defined as serving from 5 to 14 service connections and no more than an average of 25 individuals who are served daily for more than 60 days out of the year, must provide continuous disinfection of the water prior to entry to the distribution system. Individuals and drinking water systems with less than 5 service connections are not subject to these treatment requirements.

- In California, the responsibility for regulating public water systems and overseeing the safety of drinking water rests with the California Department of Public Health (CDPH). CDPH has delegated primacy to 35 county environmental health jurisdictions (“local primacy agencies”) in the state, including Riverside and San Bernardino counties, for the regulation of public water systems serving fewer than 200 service connections.

Regional Board staff consulted with staff of the CDPH and the environmental health departments in San Bernardino, Riverside and Orange counties to determine whether there is any known, direct use of raw surface waters in the Santa Ana Region<sup>80</sup>. The only known area where raw surface water supplies may be used is in the San Bernardino Mountains. There are two state small water systems that provide water to recreational cabins that were built in the early 1900’s and that are not occupied on a full-time basis. The systems have 5-14 service connections and, pursuant to state regulations, are required to monitor and provide disinfection before use. However, no monitoring of these systems or treatment of raw water supplies is required at the present time because: the service connections are used only for a short period each year; the water quality of the surface waters in this largely undeveloped, natural area is not expected to be affected by human-related sources of pathogens (sanitary wastes are disposed of to sewage holding tanks that are pumped periodically); the costs of monitoring and treatment would be prohibitive; and, there is no room for treatment systems. Per San Bernardino County Environmental Health Services staff, the owners of the cabins are aware of treatment requirements and are also aware that they are not supposed to consume raw creek water. County staff indicated that they have been assured that the property owners do not consume raw surface water.

Naturally, it is possible that individuals at these cabins or at other locations where surface waters are available as a source of supply might consume raw water directly. Such individuals do so at their own risk. The established total coliform objective for MUN waters does not assure the protection of such users.

In summary, the established total coliform objective has no scientific or regulatory validity. For these reasons, the proposed Basin Plan amendments include deletion of this objective.

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<sup>80</sup> See November 29, 2011 memo by Regional Board staff (David Woelfel) for the administrative record of these amendments re “Drinking Water Regulations/Consultation with Health Departments”

## **5.8 Changes to Table 3-1 BENEFICIAL USES and Table 4-1 WATER QUALITY OBJECTIVES**

### **5.8.1 Summary**

The following describes the changes proposed to Table 3-1 BENEFICIAL USES and Table 4-1 WATER QUALITY OBJECTIVES in the Basin Plan. The proposed changes are also shown in the draft revised tables included in the draft Basin Plan amendment (Attachments 1 and 2 to tentative Resolution No. R8-2012-0001) (Attachment A to this staff report).

Eight (8) surface waterbodies and appropriate beneficial use designations for those waters are proposed to be added to Table 3-1 BENEFICIAL USES. These waters would be added also to the list of surface waters in Table 4-1 WATER QUALITY OBJECTIVES. No numeric objectives for the constituents listed in Table 4-1 are proposed to be added for these waters at this time. The narrative objectives specified in the Basin Plan would apply.

The surface waters proposed to be added are listed below. Recommended beneficial use designations for these waters are discussed below and shown in **Table 5.8 Waters Proposed to be Added to Table 3-1** in the proposed Basin Plan amendments.

- 1) Santa Ana-Delhi Channel;
- 2) Greenville-Banning Channel;
- 3) Huntington Beach Wetlands;
- 4) Los Cerritos Wetlands;
- 5) Mystic Lake;
- 6) Goodhart Canyon Creek;
- 7) St. John's Canyon Creek;
- 8) Cactus Valley Creek.

Two irrigation reservoirs (Laguna and Lambert) that are currently listed in Table 3-1 and Table 4-1, together with their beneficial use designations, are proposed for deletion since the reservoirs no longer exist.

Consideration of these additions/deletions will enable the Regional Board to address certain Basin Plan triennial review commitments identified in 2006.

Changes to Table 3-1 and 4-1 are also proposed to revise the listing of Reach 1 of Temescal Creek to Reach 1a and 1b, to specify the revised reach boundaries, to assign appropriate beneficial uses and to adjust the downstream boundary of Reach 2 of the Creek. Given perennial flows in Reach 2 and 4 of the Creek, the beneficial use designations for these reaches are proposed to be modified from "I" (intermittent) to "X", existing or potential.

Changes to the beneficial use designations for Reach 3 and 4 of the Santa Ana River and Sunnyslope Channel are proposed as follows:

- Santa Ana River Reach 3: add Spawning, Reproduction and Development (SPWN);
- Santa Ana River Reach 4: add SPWN and Rare, Threatened or Endangered Species (RARE);
- Sunnyslope Channel: add RARE beneficial use.

Extensive surveys conducted by the Santa Ana Sucker Conservation Team over the last several years have shown that Reach 3 and 4 of the Santa Ana River and Sunnyslope Channel currently are important habitat for the federally listed Santa Ana sucker (*Catostomus santaanae*).

The following table note is proposed to be included in Table 3-1:

- “u”: REC 1 and/or REC 2 are not attainable uses as determined by UAA (See draft Basin Plan amendment, Table 3-2 and Chapter 3, Recreation Beneficial Uses)

The “u” notation would be used to annotate the specific waters listed in Table 3-1 to which it applies.

Other proposed changes are intended to clarify and correct information provided in the two tables:

- 1) Johnson Creek - recognize this creek as a tributary of Bear Creek, not a tributary of Big Bear Lake;
- 2) Cajon Creek, Deer Creek, and Day Creek – Per USGS terminology, the word “Canyon” should be added to each name, i.e., Cajon Canyon Creek, Deer Canyon Creek, Day Canyon Creek;
- 3) Cajon Canyon Creek - delete from the listing of streams associated with Mill Creek (Prado area); (the Cajon Canyon Creek of Region 8 is tributary to the Santa Ana River in the City of San Bernardino);
- 4) Knickerbocker Creek – divide into two reaches, specify the boundaries of these reaches, and list appropriate beneficial use designations; list the Creek separately as a tributary to Big Bear Lake;
- 5) Correct the spelling of the following waters: Poligue (rather than Polique) Creek, a tributary of Big Bear Lake; Herkey (rather than Hurkey) and Potrero (rather than Protrero) Creeks, tributaries to the San Jacinto River; Cienaga (rather

than Cienega) Seca and Round Cienega (rather than Cienega), both tributaries to the Santa Ana River; and Monkeyface (rather than Monkey Face) Creek, a tributary to Mill Creek;

- 6) Revise the key to symbols used in Table 3-1 to show that “X” designates “Existing or Potential Beneficial Use, rather than “Present or Potential”;
- 7) Modify the explanatory note regarding access restrictions to delete specific agency names.

**Due to its size, the complete report that describes these changes is in a separate file that can be found at:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_58.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_58.pdf)

## **5.9 Changes to Chapter 5 Implementation**

### **5.9.1 Summary**

The proposed Basin Plan amendments include changes to the Implementation Plan specified in Chapter 5 of the Basin Plan to incorporate specific strategies for implementation of the proposed *E. coli* and narrative pathogen objectives. These include several strategies that have been discussed previously:

- Intended application of Single Sample Maximum values in REC1 freshwaters (see Section 5.3)
- Antidegradation targets for REC2 only freshwaters (see Section 5.2)
- High flow suspension of recreation standards (see Section 5.5)

Additional recommended strategies are described below:

- Controllable and uncontrollable sources of bacteria
- Monitoring plan for pathogen indicator bacteria in freshwaters
- POTW discharge requirements and implementation of recreational standards

### **5.9.2 Discussion**

#### **5.9.2.1 Controllable and Uncontrollable Sources of Bacteria**

When drafting the proposed narrative pathogen objective (Section 5.4), the SWQSTF evaluated other narrative objectives specified in the Basin Plan. As described in Section 5.4, many of these narrative objectives stipulate that certain water quality conditions not be exceeded as the result of “controllable water quality factors”. That phrase is also included in the proposed narrative pathogen objective. The SWQSTF recommended

that lists of potential uncontrollable and uncontrollable sources of bacteria be identified for consideration in future implementation of the narrative pathogen objective (if approved).

A committee of Task Force members was formed to formulate these lists and associated narrative for inclusion in the Basin Plan. The proposed lists and accompanying text were then considered by the Task Force as a whole and modifications were made as deemed appropriate. The recommended language is shown in the proposed Basin Plan amendments in the proposed revisions to Chapter 5 (Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, IMPLEMENTATION, *Controllable and Uncontrollable Sources of Bacteria*).

It is important to note that the recommended lists and language explicitly acknowledge that each of the sources identified “may be” included in the list of uncontrollable or controllable sources. This recognizes that case-specific circumstances may affect the controllability/uncontrollability of the sources identified, particularly as technological advances take place.

The proposed narrative also recognizes that controllable sources are predominantly anthropogenic in nature. Techniques to identify human sources are available, and are likely to improve as science and technology improves. Since human sources of elevated bacteria densities in surface waters are most likely to result in adverse effect on public health, it is appropriate to require that those techniques be employed, where practical to do so, to determine whether human sources are present. If these sources are found, then more specific sources and control actions can be identified.

The proposed narrative language and lists of potential sources are intended as guidance as the Regional Board takes actions or imposes waste discharge requirements necessary to investigate and correct elevated bacteria densities in surface waters.

### **5.9.2.2 Monitoring Plan for Pathogen Indicator Bacteria in Freshwaters**

The California Water Code (Section 13242) requires that the implementation program for achieving water quality objectives include a program of surveillance to be undertaken to determine compliance. Changes to Chapter 5 IMPLEMENTATION are proposed to address this requirement with respect to the proposed pathogen indicator objectives. (See Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5, IMPLEMENTATION, *Monitoring plan for pathogen indicator bacteria in freshwaters*).

The three principal funding members of the SWQSTF, i.e., the Orange, Riverside and San Bernardino County Stormwater agencies, committed to participate in the development and implementation of a comprehensive, watershed-wide bacteria quality monitoring program. The Regional Board will consider appropriate bacteria monitoring requirements in waste discharge requirements for other dischargers who contribute or may contribute to pathogen indicator bacteria inputs to surface waters in light of this comprehensive program. These

other dischargers could conduct requisite bacteria quality monitoring individually or in concert with this comprehensive program. The goal is to integrate the monitoring efforts to the extent feasible to reduce/eliminate redundancy and maximize the effectiveness of the monitoring programs.

Rather than identifying a specific monitoring program as part of the Basin Plan, the proposed amendments require the Orange, Riverside and San Bernardino County Stormwater agencies to submit a proposed monitoring program no later than 1 year from the date of Regional Board approval of the proposed *E. coli* objectives. This schedule may precede approval of the proposed objectives by all agencies (State Water Board, Office of Administrative Law and USEPA). However, the requisite Quality Assurance Project Plan (QAPP) is not required until the revised objectives are fully approved. The submittal of a proposed program for approval, rather than dictating a specific program as part of these Basin Plan amendments, is recommended since it provides the flexibility to make modifications to the program as needed with the opportunity for public participation but without the far more resource-intensive and time-consuming basin plan amendment process. Hence, needed changes to the monitoring program can be made in a timelier manner, contributing to the efficacy and efficiency of the program.

The recommended amendments stipulate that the proposed comprehensive monitoring program is to be implemented upon approval by the Regional Board. Further, it is proposed that the monitoring program would be reviewed and possibly revised at least once every three years.

The proposed amendments identify the specific items that must be addressed in the proposed monitoring program, including: (1) all water quality monitoring for pathogen indicator bacteria must be conducted in accordance with a QAPP that has been approved by the Regional Board's Quality Assurance Officer; (2) bacteria monitoring data must be compatible with the state's Surface Water Ambient Monitoring Program (SWAMP); (3) waterbodies proposed as a high priority for monitoring shall be identified and the rationale for their selection documented; (4) each identified high priority waterbody must be sampled for pathogen indicator bacteria sufficient to provide a minimum of 5 samples per 30 day period, year-round, unless documented waterbody conditions (e.g., water temperature, ice on the surface of lakes, high risk of flash flooding, etc.) exist that justify a reduced frequency; (5) the designated sampling locations must be selected so as to characterize bacteria densities immediately upstream of areas where the greatest level of recreational activity normally occurs; (6) the monitoring plan must identify the latitude and longitude of routine sampling location(s), the rationale for selecting each location, other locations considered but rejected, and the agency responsible for collecting and analyzing the sample from each high priority location; (7) the monitoring plan must describe the sampling locations and frequency for collecting pathogen indicator bacteria data in lakes and streams designated REC-1 but where recreational activities are far less likely to occur (i.e., Tier B, C or D waterbodies); (8) the monitoring plan must include a proposal for periodic bacteria monitoring of waters designated REC2 in order to confirm that there is no significant degradation of the quality of these waters; (9) results from the comprehensive bacteria monitoring program must be submitted annually. The agencies implementing the program

may submit the report collectively or on an individual basis; and, (10) the data must be put into the CEDEN (SWAMP) database and/or the database maintained by the Santa Ana Watershed Project Authority.

In part, these requirements reflect the risk management approach employed in USEPA's 1986 national bacteria criteria. Because monitoring resources are limited, the highest monitoring priority should be given to REC1 waters where primary contact recreation is most likely to occur, i.e., proposed "Tier A" waters. Lower priority should be assigned to waters where primary contact recreation occurs infrequently or not at all (proposed Tiers B, C and D). As stated above, the proposed monitoring program would identify proposed monitoring priorities and the rationale for those recommendations. To facilitate those deliberations, the proposed amendments include a table (Table 5-REC-Potential High Priority Waters for Monitoring of Pathogen Indicator Bacteria in Freshwaters; see below) that identifies waters that should be considered for monitoring as a high priority. The review and possible revision of the monitoring program would include consideration of the waterbodies deemed high and low priority for monitoring purposes.

The proposed monitoring plan must include sampling at each identified high priority waterbody sufficient to provide a minimum of 5 samples per 30-day period year round, unless the infeasibility of this monitoring intensity is demonstrated. The intent is to provide sufficient data to calculate representative geometric means for comparison to the geometric mean *E. coli* objective (if approved). The proposed monitoring program must also address monitoring of REC1 waters in other Tiers, and in surface waters designated REC2 only, pursuant to Use Attainability Analyses (Section 5.6).

Pursuant to the proposed monitoring program language, where monitoring data indicate significant non-compliance with the applicable pathogen indicator objective, agencies discharging to that waterbody would be required to submit a plan to the Regional Board to identify the pollutant source(s) unless monitoring data show that their particular discharge is not causing or contributing to the exceedance. The proposed amendments require that the source evaluation plan must be implemented upon approval by the Regional Board's Executive Officer.

Further, the proposed amendments require that where water quality monitoring data, collected through the approved comprehensive monitoring program or by interested agencies, organizations or individuals, indicate that a Single Sample Maximum (SSM) value assigned to a Tier B, C or D REC1 water, or the bacteria target assigned to a REC2-only water, is being exceeded, then the Regional Board would require agencies discharging to that waterbody to submit a plan for investigation into the bacteria quality of that waterbody, including monitoring. Where the investigation shows that the bacteria quality of the waterbody is adversely affected by a controllable source, then a corrective action plan and schedule would be required. Both the investigation plan and, as necessary, corrective action plan, would be required to be implemented upon approval by the Regional Board's Executive Officer. Such follow-up investigation and corrective action would be triggered only upon the demonstration of credible evidence documenting a potential bacterial quality problem. "Credible evidence" is proposed to be defined as at least two consecutive

samples that exceed the SSM/REC2 target. The proposed amendments state that the proposed schedule for any needed corrective action would be expected to be as soon as practicable but no longer than two years from the date that the controllable source(s) is identified.

Finally, in response to SWQSTF requests for explicit narrative regarding responsibility for investigation of and corrective action for identified bacteria quality problems, the proposed Basin Plan language states that “The Regional Board acknowledges that the obligation to gather, analyze and report water quality data does not, by itself, establish any specific liability for pollutant remediation. That responsibility depends on identifying the source(s) of bacterial contamination. The Regional Board strongly supports proactive voluntary efforts organized through local Task Forces to accomplish these objectives. However, where necessary, the Regional Board will continue to impose monitoring and remediation requirements through the permitting, enforcement and TMDL processes in order to protect water quality for recreational uses”.

**Table 5-REC-Potential High Priority Waters for Monitoring of Pathogen Indicator Bacteria in Freshwaters**

<b><u>LAKES</u></b>	<b><u>STREAMS</u></b>
<u>Big Bear Lake</u>	<u>Lytle Creek, Middle and North Forks</u>
<u>Lake Perris</u>	<u>Mill Creek Reach 2</u>
<u>Lake Elsinore</u>	<u>Santa Ana River – Reach 3</u>
<u>Canyon Lake</u>	<u>San Antonio Creek</u>

**5.9.2.3 POTW Discharge Requirements and Implementation of Recreational Standards**

In issuing waste discharge requirements for discharges to surface waters from sewage treatment plants, which are, for the most part, Publicly-Owned Treatment Works (POTWs), the Regional Board implements recommendations by the California Department of Public Health (CDPH) to assure that public health and primary contact recreational use of the receiving waters are protected. These recommendations are based on regulations established by CDPH in the California Code of Regulations (Title 22, Division 4, Chapter 3, Section 60301 *et seq.*).

CDPH has found that in most instances, in order to protect the health of members of the public who engage in REC1 activities in surface waters that receive treated sewage discharges, treatment of the discharges must be provided so as to achieve an approximate 5 log reduction in the virus content of the wastewater. The efficacy of the treatment process in achieving this reduction is reflected, in part, by measurements of total coliform bacteria. Thus, the effluent limitations specified in waste discharge requirements for POTWs include limitations on total coliform bacteria. Compliance with

these limitations assures that the wastewater discharge has received adequate and appropriate treatment to achieve the 5 log reduction of pathogens recommended by CDPH.

These total coliform limitations are more stringent than the fecal coliform objectives established in the Basin Plan for REC1 use protection. Certain dischargers have asserted that the total coliform limitations are unjustified and should be replaced with limitations consistent with the fecal coliform objectives. This argument is without merit. As noted in Section 5.4, in issuing waste discharge requirements that assure beneficial use protection, the Regional Board must consider not only the established objectives but also whether case-specific circumstances warrant the application of limitations more stringent than those necessary to implement the objectives. Such special consideration applies to discharges of treated sewage to surface waters by Publicly Owned Treatment Works (POTWs) or other entities, where the protection of public health and primary contact recreation in those receiving waters is contingent on compliance with more stringent, treatment performance based limitations, as recommended by CDPH.

The approval of the proposed *E. coli* numeric pathogen indicator objectives, and the proposed narrative objective, would not alter this Regional Board regulatory approach. Absent new or revised recommendations from CDPH, stringent total coliform limitations for discharges of treated sewage to surface waters will continue to be imposed by the Regional Board, consistent with current practice. To make this clear, the proposed Basin Plan amendments include explanatory narrative. (See Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 5 IMPLEMENTATION, *POTW discharge requirements and implementation of recreation standards*). This language is recommended for inclusion in the Basin Plan to bridge the analytical gap between the use of performance-based total coliform limitations rather than limitations based on the established REC1 fecal coliform objectives, and to avoid potential litigation of this matter.

Certain Task Force members questioned whether and how this regulatory approach would be affected if the proposed temporary suspension of recreation standards in certain surface waters is approved (Section 5.5). To provide clarity, the proposed amendments also include language that specifically addresses this question. In short, the temporary suspension of recreation standards under specific flow conditions would not obviate the need for POTWs and other entities discharging treated sewage to surface waters to continue to comply consistently with total coliform limitations. It should be noted that these total coliform limitations themselves already take into account dilution that may be provided by high flows resulting from precipitation events.

## 5.10 Editorial Changes

The proposed Basin Plan amendments include editorial changes:

- a. Revise the current Basin Plan footnote re REC1 and REC2 definitions in Chapter 3 BENEFICIAL USES to clarify and correct the intended meaning.
- b. Change the phrase “present or potential” to characterize beneficial use designations in Table 3-1 of the Basin Plan to “existing or potential”. Correct other references in the text of Chapter 3 BENEFICIAL USES regarding “existing” or “present” beneficial use designations.
- c. In Chapter 4 WATER QUALITY OBJECTIVES, ENCLOSED BAYS AND ESTUARIES, re-name “Bacteria, Coliform” to “Pathogen Indicator Bacteria” and add a note regarding the federal promulgation of enterococcus criteria for coastal waters in California, including enclosed bays and estuaries.
- d. Update narrative language in Chapter 3 BENEFICIAL USES, Chapter 4 WATER QUALITY OBJECTIVES, and Chapter 5 IMPLEMENTATION to include reference to the work of the SWQSTF and to reflect incorporation of the changes to *E. coli* objectives, addition of a narrative objective and the other amendments described above. The proposed text is shown in Attachments 1 and 2 to Resolution No. R8-2012-0001. The text reflects the preceding discussions of each of the amendments and no further discussion is needed here.
- e. Correct spelling errors, footnote numbering and the like. These changes are shown in the proposed amendments in Attachments 1 and 2 to Resolution No. R8-2012-0001; no further discussion of these changes is warranted here.

The following describes the changes identified in a, b and c, above.

### 5.10.1. Revise the Footnote Applicable to the REC1 and REC2 Definitions (Basin Plan Chapter 3 BENEFICIAL USES)

As indicated above (Section 3.1), there is a footnote, denoted by an asterisk, attached to the REC1 and REC2 definitions in Chapter 3 BENEFICIAL USES in the Basin Plan. The language in this footnote reads as follows:

“\* The **REC 1** and **REC 2** beneficial use designations assigned to surface waterbodies in this Region should not be construed as encouraging recreational activities. In some cases, such as Lake Matthews and certain reaches of the Santa Ana River, access to the waterbodies is prohibited because of potentially hazardous conditions and/or because of the need to protect other uses, such as municipal supply or sensitive wildlife habitat. Where **REC 1** or **REC 2** is indicated as a beneficial use in Table 3-1, the designations are intended to indicate that the uses exist or that the water quality of the waterbody could support recreational uses.”

Changes to this footnote are proposed, as shown (added text is underlined; deleted text is shown in strike-out type):

“\* The REC 1 and REC 2 beneficial use designations assigned to surface waterbodies in this Region should not be construed as encouraging or authorizing recreational activities. In some cases, such as Lake Matthews and certain reaches of the Santa Ana River and its tributaries, access to the waterbodies is prohibited by other agencies because of potentially hazardous conditions and/or because of the need to protect other uses, such as municipal supply or sensitive wildlife habitat. Where REC 1 or REC 2 is indicated as a beneficial use in Table 3-1, the designations are only intended to indicate that such the uses may occur exist or that the water quality of the waterbody could support recreational uses may be capable of supporting recreational uses unless a Use Attainability Analysis demonstrates otherwise and the Regional Board amends the Basin Plan accordingly.”

The purpose of the recommended changes is to clarify and correct the intended and long-understood meaning.

As written, the last sentence in this footnote inaccurately conveys the intended and long-understood meaning, which is that the uses are existing **or** may occur, i.e., they are existing or potential. The term “existing” has special regulatory meaning and status. “Existing” uses are those actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards. Designations of “existing” uses cannot be removed. (See Section 5.6.2.1). The last sentence may be construed, incorrectly, to indicate that an investigation of each REC1 and REC2 designated water has been completed to affirm whether or not recreational uses are “existing”, and whether the quality conditions are or have been able to support these uses. For most surface waters in the Region, such an investigation has not been completed. Therefore, it is appropriate to revise the language to reflect the potential for recreational uses, rather than suggesting that such uses are known to occur. Specifically, the word “exist” is proposed to be changed to “may occur”. Further, the revised language adds reference to Use Attainability Analyses, which are necessary to rebut the presumption that the REC1 use should be designated for all surface waters. The intent of this change is simply to acknowledge applicable regulations that affect use designations.

### **5.10.2 Modify Other References Re Existing/Potential Beneficial Uses**

Table 3-1 of the Basin Plan employs the notation “X” to designate numerous beneficial uses for surface (and ground) waters. In Table 3-1, this notation is now defined as “present or potential”. This terminology is not consistent with other references in Chapter 3 of the Basin Plan to “existing”, rather than “present” uses. Therefore, this definition is proposed to be revised in Table 3-1 to read “existing or potential”.

The narrative in Chapter 3 BENEFCIAL USES, BENEFCIAL USES section (last sentence of the second paragraph) makes reference to “the revision of some Beneficial Use designations from “intermittent (I) to existing (X), and the addition of more waterbodies (Resolution No. 89-99).” This phrase is proposed to be modified to reflect that the notation X is (and always has been) intended to refer to existing or potential

uses. The revised language would read as “the revision of some Beneficial Use designations from “intermittent” (I) to existing or potential (X), and the addition of more waterbodies (Resolution No. 89-99).”

### **5.10.3        Modify Chapter 4 WATER QUALITY OBJECTIVES, ENCLOSED BAYS AND ESTUARIES, Bacteria, Coliform**

The Basin Plan establishes coliform fecal coliform objectives applicable to REC1 and shellfish harvesting (SHEL) beneficial uses in enclosed bays and estuaries. While these objectives themselves are not the subject of the proposed amendments, changes to this section of Chapter 4 are proposed to (1) change the section header to “Pathogen Indicator Bacteria”; (2) add text regarding USEPA’s promulgation of enterococci criteria for coastal recreation waters, including bays and estuaries, in 2004 (BEACH Act Rule (40 CFR 131.41)); and, (3) to explain how the Regional Board intends to implement the new criteria (which serve as enforceable water quality objectives). See Attachments 1 and 2 to Resolution No. R8-2012-0001, changes to Chapter 4 WATER QUALITY OBJECTIVES, ENCLOSED BAYS AND ESTUARIES.

The proposed change to the section header is consistent with that recommended for inland surface waters (see Attachments 1 and 2 to Resolution No. R8-2012-0001, Chapter 4 WATER QUALITY OBJECTIVES, INLAND SURFACE WATERS). The purpose of the change is simply to recognize that coliform (and enterococcus) bacteria are pathogen indicators.

Text is proposed to be added to acknowledge the establishment of enterococci criteria for enclosed bays and estuaries by the USEPA. USEPA’s promulgation did not cause the established fecal coliform objectives in the Basin Plan to be deleted, and that action is not proposed in these amendments. Rather, the proposed text explains that the Regional Board will consider a Basin Plan amendment in the future to formally recognize the enterococci criteria, and to define appropriate implementation of those criteria. This would include specifying an averaging period for application of the criteria (e.g., as a minimum of five samples over a 30 day period), and a determination of where and how varying Single Sample Maximum values should apply in the enclosed bays and estuaries of the Region. The proposed text also indicates that until this Basin Plan amendment process is completed, the Regional Board intends to implement the USEPA enterococci criteria on a best professional judgment basis, with full opportunity for public participation and comment.

In short, the proposed changes are intended to provide consistency and clarity regarding the Regional Board’s expectations with respect to implementation of USEPA’s promulgated enterococci criteria.

## 6.0. Evaluation of Water Code Section 13241 Factors

Section 13241 of the California Water Code requires each Regional Board to establish such water quality objectives in water quality control plans as it its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance. It recognizes that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Therefore, Section 13241 specifies several factors that must be considered by a Regional Board when establishing water quality objectives. The factors include, but are not necessarily limited to, all of the following:

- 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) *Economic considerations.*
- e) *The need for developing housing within the region.*
- f) *The need to develop and use recycled water.*

As discussed in detail in Section 5.0 of this report, the proposed Basin Plan amendments include a suite of recommendations for changes to pathogen indicator bacteria objectives in freshwater. These include: (1) establishing new, numeric pathogen indicator objectives, based on *E. coli*, for freshwaters designated REC1 and REC2; (2) deleting the Basin Plan fecal coliform objectives for REC1 and REC2 in freshwaters; (3) establishing a new, narrative pathogen indicator objective; (4) establishing single sample maximum (SSM)<sup>81</sup> values that will be used to assess compliance with geometric mean objectives in the absence of sufficient data to calculate geometric means (and as public notification tools; see Section 5.3); (5) establishing numeric, antidegradation pathogen indicator bacteria targets (in lieu of objectives) for waters designated REC2 only, as justified by Use Attainability Analyses; and, (6) deleting the established total coliform objective for MUN freshwaters.

These proposed water quality objectives must be evaluated in accordance with the provisions of §13241 of the California Water Code. This section provides that evaluation. The information is organized to address each of the six factors the Regional Board is required to consider.

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<sup>81</sup> As noted in Section 4.0 of this report, USEPA has recently recommended that the term "Single Sample Maximum" be replaced by "Statistical Threshold Value" to avoid misinterpretation and misapplication of the concept. This recommendation may be reflected in revised bacteria quality criteria for recreational waters that USEPA expects to publish by the end of 2012. This report employs the established SSM nomenclature.

**Factor (a): Past, present and probable future beneficial uses of water.**

As described in earlier sections of this report (see Section 2.1 and the regulatory background discussion in Section 5.6), the federal Clean Water Act and implementing regulations create the rebuttable presumption that all surface waters support REC1 uses and should be so designated. Use Attainability Analyses (UAAs) may justify removing a REC1 designation.

Consistent with this presumption, all surface waters in the Santa Ana Region are currently designated REC1. REC1-designated waters are generally also designated REC2. However, as discussed in Section 5.6, the SWQSTF conducted UAAs of a number of stream segments in the Region. On the basis of these UAAs, these Basin Plan amendments include recommendations for the removal of the REC1 and, in some cases, REC2 designations for specific stream segments.

The suite of recommendations for changes to pathogen indicator bacteria objectives identified above will assure that applicable water quality standards, including antidegradation policy requirements, will be met:

- The new *E. coli* objectives that are proposed to apply to freshwaters designated both REC1 and REC2 are based on USEPA's 1986 bacteria quality criteria recommendations, which were developed to protect primary contact recreation (i.e., REC1). USEPA found that *E. coli* are the more reliable indicator of public health risk associated with REC1 activities than fecal coliform. Deletion of the Basin Plan fecal coliform objectives for REC1 is therefore appropriate.

As explained in Section 4.0 of this report, USEPA guidance states that USEPA considers states that adopt bacteria indicator objectives based on an illness rate of 8 to 10/1000 (i.e., between 126 and 206 colony forming units (cfu) /100ml for *E. coli*) to have criteria as protective of human health as the 1986 bacteria criteria. In other words, USEPA has found that objectives in this range are approvable. By selecting a value at the lower end of the recommended range, as proposed in these amendments, it is reasonable for the Regional Board to conclude that doing so will provide a small, but explicit margin-of-safety to protect REC1 activities in all freshwaters.

- There is no scientific basis to establish independent objectives to protect the REC2 use (see Section 4.0). Deletion of the fecal coliform objectives ostensibly established in the Basin Plan to protect this use (see Section 4.0) is appropriate. To conform to antidegradation policy requirements, the proposed amendments include recommended "antidegradation targets" for pathogen indicator bacteria in those waters designated REC2 only (through the UAA process). These targets, calculated using ambient bacteria quality data evaluated as part of the UAAs, are intended to establish baseline conditions against which future monitoring data will be compared. If these data provide credible evidence that the triggers are being exceeded and that

there may be a lowering of water quality, then additional monitoring, investigation and corrective action, if needed, will ensue (see 5.2).

- Establishing a narrative pathogen indicator objective, as proposed, will enhance the Regional Board's ability to address water quality problems that may be associated with pathogen indicators (and pathogens themselves) and thereby contribute to the protection of public health and beneficial uses.
- The proposed use of SSMs to assess compliance with geometric mean objectives where inadequate data are available to calculate geomeans, and in particular, as tools to assist in beach posting and closure decisions, is consistent with USEPA's recommended 1986 criteria and applicable guidance (including USEPA's SSM Fact Sheet; see Section 4.0).
- There is no scientific basis for the total coliform objective specified in the Basin Plan to protect the MUN use in the freshwaters of the Region. Further, federal and state regulations require that surface waters be treated prior to distribution in water supply systems. The total coliform objective is obsolete and not scientifically defensible. For these reasons, the MUN use of freshwaters in the Region will not be adversely affected by the removal of the total coliform objective.

As noted in Section 4.0, USEPA expects to publish revised bacteria quality criteria by the end of 2012. It is expected that these new recommendations will focus again on primary contact recreation (REC1). It is not clear whether or what type of recommendations regarding REC2 objectives will be included. In any case, these recommendations, when published by USEPA in criteria form, will need to be considered in future Basin Plan triennial reviews.

**Factor (b): Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.**

The proposed Basin Plan amendments apply to the freshwaters throughout the Santa Ana Region. The Region is densely populated and highly urbanized and there has been extensive modification of streams for flood control purposes. However, largely pristine areas remain in the Region, principally in the mountainous areas. Here, streams are largely in natural condition.

The warm climate of southern California generally allows aquatic recreation to occur year round in the Santa Ana Region. However, the predominantly dry conditions cause most local creeks to be naturally ephemeral, with little or no significant flow except during storm events. When inclement weather occurs rapid increases in the velocity and volume of stream flows create a serious hazard to recreation, especially where natural channels have been re-engineered or modified to provide better flood protection in the more urbanized areas of the watershed.

Flood control improvements that are designed to convey rainfall runoff out of a community as efficiently as possible also create life-threatening "swift-water" conditions during and immediately following significant storm events. Although relatively infrequent, wet weather significantly increases the risk of flash flooding in many rivers and streams throughout the Santa Ana Region. At such times, elevated storm water runoff temporarily precludes the possibility of safe recreation in or near the water.

The proposed Basin Plan amendments address these circumstances. The temporary suspension of recreation standards, including bacteria objectives established to protect recreational uses, is recommended (see Section 5.5). As proposed, the temporary suspension would apply to specific, engineered or modified channels that are identified in maps and ARC-GIS files (Appendices VIII and IX, respectively). This categorical suspension would be implemented using detailed trigger criteria. Such an approach properly accounts for the environmental characteristics of the hydrographic units under consideration while continuing to ensure that the proposed *E. coli* objective is applied in a manner consistent with federal guidance and regulation.

**Factor (c): Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.**

It is widely recognized that bacteria, viruses, protozoa and parasites can occur naturally in the environment. For example, recent scientific studies have shown that natural sediments may contribute a significant portion of the bacterial load to the Santa Ana River during dry weather conditions.<sup>82</sup> Wildlife may contribute significantly to the presence of these microorganisms in water. These sources are or may be uncontrollable. Efforts to address such sources may, or are even likely to result in environmental harm.

Waste discharge requirements are issued by the Regional Board that require controllable sources of these microorganisms, in particular Publicly Owned Treatment Works (POTWs), to reduce or eliminate these organisms. Stormwater permittees are required to conduct source evaluations designed to identify and eliminate controllable discharges of pathogens throughout developed areas of the watershed. The availability and efficacy of treatment technology or other source control mechanisms varies widely<sup>83</sup>. For example, there is well-established conventional treatment technology that POTWs employ to remove essentially all pathogens from wastewater effluents. On the other hand, the efficacy of stormwater controls, including detention basins, vegetated swales dry or wet basins, constructed wetlands, and the like, varies widely (see Table 6.1).<sup>84</sup>

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<sup>82</sup> Litton, Rachel M. et al. Evaluation of Chemical, Molecular, and Traditional Markers of Fecal Contamination in an Effluent Dominated Urban Stream. *Environmental Science & Technology*. Vol. 44, No. 19. 2010; p. 7369-7375.

<sup>83</sup> Clary, Jane, *et al.* Can Stormwater BMPs Remove Bacteria. *Stormwater*. May, 2008.

<sup>84</sup> Goong, Stuart, PhD. County of Orange, Orange, CA. April 2009. "Stormwater Bacteria BMPs" (Excel spreadsheet and related references). Prepared for the Stormwater Quality Standards Task Force.

These treatment and control measures can improve microbial conditions in the freshwaters of the Region. However, there remains the possibility that established pathogen indicator objectives will not be met as the result of uncontrollable, natural sources. In such cases, it may be appropriate to consider “natural source exclusions”, modifications of the objectives and/or beneficial uses to reflect the influence of uncontrollable sources such as wildlife. Such an approach would be considered through the Basin Planning process.

**Factor (d): Economic considerations.**

In considering the economic implications of establishing water quality objectives, the Regional Board is not required to conduct a formal cost-benefit analysis. Nor would the results of any such analysis be necessarily determinative: economic considerations are only one of the factors that the Board must consider, as reflected in the discussion of the other 13241 factors herein. However, if the Board determines that the costs of compliance with the proposed objectives are significant, the Board must document in the record why the adoption of the objectives is needed to ensure the reasonable protection of beneficial uses and the prevention of nuisance

As a practical matter, the number and complexity of relevant factors make it nearly impossible to develop a precise estimate of the total compliance costs or projected health benefits for an area as large as the Santa Ana Region. In considering the economic implications of the recommended amendments to the Basin Plan, the Stormwater Quality Standards Task Force endeavored to describe a range of potential economic effects of adopting the proposed *E. coli* and narrative objectives. The costs were also considered in the context of specific, recommended implementation strategies for the recommended objectives, including the temporary suspension of the objectives under high flow conditions.

Establishing water quality objectives for pathogen indicator bacteria is intended to reduce the risk of illness among swimmers to an acceptable level. The proposed *E. coli* objectives are believed to provide the same level of risk protection for those engaged in primary contact recreation as the existing fecal coliform objectives now in the Basin Plan. Therefore, meeting either bacteria objective is expected to provide equivalent public health benefits.

Similarly, the cost of complying with the new *E. coli* objective is not likely to be significantly different than the cost of meeting obsolete fecal coliform objectives, provided that both are implemented as recommended in federal guidance. The comprehensive package of proposed Basin Plan revisions is designed to be consistent with that guidance.

If, in fact, all of the lakes and streams throughout the Santa Ana Region were already attaining the current fecal coliform objective, there would be little or no incremental

benefit or marginal cost as a result of adopting the proposed *E. coli* objective. Where the established fecal coliform objectives have not been consistently attained, it is unlikely that the recommended *E. coli* objectives would be attained. In such cases, whether or not the proposed *E. coli* objectives are adopted, additional effort and expenditure would be necessary to assure compliance with applicable objectives. It is appropriate to consider the economic implications of the proposed Basin Plan amendments from this perspective. Additional, more detailed information may be provided through the public review and comment process.

Compliance Costs. The estimated cost of meeting the proposed *E. coli* objective depends on a number of critical factors: current instream bacteria densities, the source of controllable bacteria discharges to the waterbody, and the range of remediation alternatives available to reduce or treat these discharges. Where existing ambient bacteria levels are already meeting the proposed objective, the recommended Basin Plan amendments would impose no new regulatory costs or obligations. However, if instream bacteria densities frequently exceed the proposed recommended *E. coli* objective, the potential cost to meet the objective could be quite considerable. (As noted above, where the established fecal coliform objectives are not being met, additional, potentially considerable costs would be required to assure compliance.)

At the request of the Task Force, CDM prepared planning level cost estimates for all three counties in the Santa Ana Region (Orange County, Riverside County, San Bernardino County). In each case, CDM was asked to evaluate a range of engineering alternatives and select the most cost-effective approach for achieving compliance with the proposed *E. coli* objectives during dry weather conditions.<sup>85</sup> In general, CDM concluded that, at present, the only way to achieve consistent compliance with either the existing or the proposed bacteria objectives was to intercept and divert dry weather urban runoff to local wastewater treatment plants.<sup>86</sup> This finding takes into consideration the efficacy of a number of potential Best Management Practices (BMPs) (see Table 6.1). The total estimated capital cost exceeded \$2.5 billion and the annual O&M cost was nearly \$100 million (see Table 6.2). CDM's estimates are consistent with a similar cost studies to achieve compliance with bacteria objectives during dry weather conditions in adjacent urban regions.<sup>87</sup>

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<sup>85</sup> For the purposes of the analysis, the temporary high flow suspension of recreation standards proposed by the Task Force (see Section 5.5) was presumed to apply during wet weather conditions.

<sup>86</sup> CDM. Technical Memorandum. Economic Analysis of Compliance Alternatives. June 30, 2006.

<sup>87</sup> Los Angeles Regional Water Quality Control Board. Los Angeles River Watershed Bacteria TMDL. July 15, 2010. Weston Solutions, Inc. Quality of Life Funding Strategy San Diego Region: Needs Assessment and Cost Estimate for the Water Quality Enhancement Element. November 17, 2010.

**Table 6.1 – Comparative Efficacy of Reducing Bacteria Levels in Urban Stormwater Using Best Management Practices**

Stormwater Bacteria BMPs										
Prepared for the Stormwater Quality Standards Task Force, April 2009 - Prepared by Stuart Goong, Ph.D., County of Orange, OC Watersheds, Orange, CA										
Bacteria BMP Type	Storm?	Parameter	Mean Influent #/100 mL	Mean Effluent #/100 mL	n	Percent Removal	Construction Cost (excluding land costs)	Annual O & M Cost	Source	Comments
<b>Water Treatment BMPs</b>										
Wet Basins (Retention ponds, wet ponds, wet extended detention ponds, stormwater ponds, retention basins). Retains permanent pool.	Y	FC	11700	100	NR	99	\$1.00-12.25/ft <sup>3</sup> Typically <\$100,000 per acre	Up to \$10,000 per pond	CalTrans (2004) study in SoCal	May attract wildlife which could increase bacteria concentrations.
	N	FC	4400	20	NR	99			CalTrans (2004) study in SoCal	
		FC	1929	515	9	73			BMP dB; Fremont, CA	
		FC	58	5	24	91			BMP dB; Largo, FL	
		FC	4231	2475	16	41.5			BMP dB; Valhalla, NY	
	Y	FC	NR	1779	10	90			Schueler (2000); ON	
	Y	FC	NR	2858	10	64			Schueler (2000); ON	
	Y	E. coli	NR	NR	10	86			Schueler (2000); ON	
	Y	E. coli	NR	NR	10	51			Schueler (2000); ON	
	Y/N	FC	152	63	84	58			Mallin et al. (2002); NC	
Dry Basins (Dry ponds, detention or extended detention basins or ponds). Designed to empty within several days.	Y	FC	900	2000	NR	-122	\$0.30-1.00/ft <sup>3</sup> Typically <\$100,000 per acre	\$3,100-10,000 per pond	CalTrans (2004) study in SoCal; storm	Unlined Concrete lined
	Y	FC	6700	7500	NR	-12			CalTrans (2004) study in SoCal; storm	
	Y	FC	27	27	8	0			USGS (2004) study in USVI	
	Y	FC	3412	724	35	79			Harper et al. (1999) study in FL	
	N	E. coli	563	515	18	9			MSAR (2009)	
	N	FC	957	738	18	23			MSAR (2009)	
	Y	E. coli	149	204	12	-37			MSAR (2009)	
	Y	FC	380	490	12	-29			MSAR (2009)	
	Y/N	FC	33.8	7.4	5	78			Hinds et al. (2004); Columbus	
	N	FC	760	80	10	89			LN & COO (2004); Laguna Niguel	
Constructed Wetlands (Stormwater wetlands, wetland basins, shallow marshes, extended detention wetlands). *Essentially shallow wet basins.*	N	FC	1915	116	9	94	\$0.35-1.30/ft <sup>3</sup> , or \$26,325-55,485/acre of wetland	\$1,500-2,700/hectare	LN & COO (2004); Laguna Niguel	
	N	FC	5178	101	12	98			LN & COO (2004); Laguna Niguel	
	N	E. coli	4163	27	10	99			LN & COO (2004); Laguna Niguel	
	N	E. coli	1897	107	9	94			LN & COO (2004); Laguna Niguel	
	N	E. coli	630	73	9	88			LN & COO (2004); Laguna Niguel	
	Y	FC	5800	1400	NR	76			\$6,600-18,500 per acre drainage Total \$230,000-\$485,000 in So CA	5% of construction costs
Media Filters		FC	NR	18528		-85			City of Austin (1997)	
	Y	FC	NR	NR		36			Glick et al. (1998); Austin, TX	
Disinfection (UV, ozone, chlorine)	N	FC	32800**	16**		99.9% (inversely proportional to turbidity)	For facilities to treat 1,250-5,000 cfs peak flow: \$19.2-30.5 million for ozone, \$48-87.8 million for UV	\$534,000-657,000 for ozone, \$248,000-992,000 for UV	**County of Orange (2008)	Caution is required in safe handling of toxic chemicals, and to ensure no toxic residues remain in discharge. **Figures are from a Clear Creek UV treatment system.
Diversion						100% of diverted fraction	\$14,400-2,071,000 for diversions of up to 0.5 MGD in Orange County	\$2,800-83,000	RBF (2003)	Treatment facilities may not be capable of handling the excess flow due to runoff. Costs assume existing sewer infrastructure has sufficient capacity to treat diversion.
Vegetated Swales or Channels (Grassed channels, dry swales, retention swales). Only includes those features with little to moderate soil infiltration.	Y	FC	386	459	NR	-19	\$0.50/ft <sup>3</sup> (<\$35,000 for 3 ft x 21 ft x 1,000 ft swale)	32% of construction costs	BMP dB; Altadena, Caltrans (2004)	Possible groundwater contamination in areas with sandy soils and shallow aquifers
	Y	FC	84853	47	NR	99.9			BMP dB; Carlsbad, Caltrans (2004)	
	Y	FC	490	1122	NR	-129			BMP dB; Cerritos, Caltrans (2004)	
	N	E. coli	20651	717	18	97			MSAR (2009); dry	
	N	FC	16293	675	18	96			MSAR (2009); dry	
	Y	E. coli	2448	2904	12	-19			MSAR (2009); wet	
	Y	FC	3954	4196	12	-6			MSAR (2009); wet	
	Y	FC	65	105	NR	-62			BMP dB; Downey, Caltrans (2004)	
	Y	FC	9460	9168	NR	3			BMP dB; Lakewood, Caltrans (2004)	
	Y	FC	1366	239	NR	82			BMP dB; Vista, CA, Caltrans (2004)	
<b>Volume Reduction BMPs</b>										
Infiltrator Basins & Trenches	Y	FC	80-5000	<23	9	>99	\$1.25-20.76/ft <sup>3</sup> <\$110,000 per 1 ac basin	<\$3,000 per basin or trench	LASGRWC (2005)	Possible groundwater contamination in areas with sandy soils and shallow aquifers
	Y	E. coli	20-1300	<6.9	9	>99				
	Y	FC	500	ND-800	8					
	Y	FC	ND-13000	11-110	8					
	Y	E. coli	ND-120	ND	8	>99				
	Y	FC	230	ND	5	>99				
	Y	E. coli	310	ND	5	>99				
Low Impact Development (LID)						100% for infiltrated fraction	No data.	N/A	N/A	USEPA (1999); Arvind & Pitt (2006)
<b>Source Control BMPs</b>										
Agricultural BMPs						No data	Variable	Variable		
Public Education/Outreach						No data	Variable (up to \$1,000,000+)	Variable		
Routine Inspection/Maintenance of Sewer and Septic Systems						No data	Variable	Variable		
NR = Not reported; ND = Not detected										
Cost estimates from CASQA (2003), Olivieri et al. (2007), RBF (2003), and Narayanan & Pitt (2006)										
Shaded percent removal values were not statistically significant										
BMP categorization scheme mostly from Minton (2002) and Olivieri et al. (2007)										

**Table 6.2: Capital and O&M Costs to Divert Dry Weather Runoff from MS4 Outfalls to Wastewater Treatment Plants**

<b>Description</b>	<b>Orange Co.<sup>88</sup></b>	<b>Riverside Co.<sup>89</sup></b>	<b>San Bernardino Co.<sup>90</sup></b>
Dry Weather Facilities	\$491.4m	\$291.6m	\$329.4m
Conveyance & Treatment	\$458.5m	\$447.3m	\$545.5m
<b>Subtotal for Capital</b>	<b>\$949.9m</b>	<b>\$738.9m</b>	<b>\$874.9m</b>
Annual O&M	\$30.1m	\$31.3m	\$37.6m

The above cost estimates focus exclusively on the level of effort required to achieve consistent compliance with bacteria objectives during dry weather conditions. CDM was unable to identify any reasonable engineering solution to meet the same objectives during wet weather conditions. However, the proposed Basin Plan amendments include a recommendation to temporarily suspend the *E. coli* objectives when storm water runoff precludes any opportunity for primary contact recreation due to unsafe flows in engineered/modified channels. Were the proposed objectives to be adopted without such a provision, the economic and environmental implications would need to be reconsidered by the Regional Board in light of the revised implementation requirements.

Health Benefits. Again, a cost/benefit analysis is not a requisite part of the 13241 economics analysis, and precise estimates of the public health costs and benefits, like the costs of compliance with the new objectives, are virtually impossible, given the number of variables involved. With that said, however, it is of interest to provide relevant data from studies in Orange County and elsewhere.

Minimizing the discharge of pathogens is expected to provide some measure of economic benefit to the community by reducing the risk of preventable gastrointestinal illness (nausea, diarrhea, cramps, etc.) among those engaged in primary contact water recreation. Recent studies performed at two beaches in Orange County determined that such illness cost the unlucky swimmer approximately \$37 in medical expenses and lost wages (2004 dollars).<sup>91</sup> Other studies, using food-borne pathogens as a proxy for

<sup>88</sup> CDM. Memorandum. Analysis of Diversion of Dry Weather Urban Runoff to POTWs for Bacteria Control in Orange County. August 31, 2010.

<sup>89</sup> CDM. Memorandum. Analysis of Diversion of Dry Weather Urban Runoff to POTWs for Bacteria Control in Riverside County. August 31, 2010.

<sup>90</sup> CDM. Memorandum. Analysis of Diversion of Dry Weather Urban Runoff to POTWs for Bacteria Control in San Bernardino County. August 31, 2010.

<sup>91</sup> Dwight, R. H. et al. Estimating the economic burden from illnesses associated with recreational coastal water pollution - A case study in Orange County, California. *Journal of Environmental Management*. 2005 (76); p. 95-103 (as cited in Given, S. et al. *Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches*. *Environmental Science and Technology*. 2006 (40); p. 4851-4858).

contaminated water, indicate that people say that may be willing to pay as much as \$280 per illness avoided.<sup>92</sup>

The total economic benefit of meeting the proposed *E. coli* objective would depend on the number of people engaged in primary contact recreation and the level of risk reduction expected to occur as water quality improves. At some of the most popular swimming locations, such as Canyon Lake and Big Bear Lake, water quality already complies with bacteria objectives, so no significant health benefit is expected to occur. At other locations, such as Reach 3 of the Santa Ana River, improving water quality to meet the proposed *E. coli* objective is expected to reduce the number of gastrointestinal illnesses from approximately 14 per 1,000 swimmers to 8 per 1,000 swimmers.<sup>93</sup> However, while the exact number of people recreating in Reach 3 is unknown, the economic benefit of reducing bacteria concentrations is estimated to range between \$0.22 and \$1.68 per swimmer. Using these estimates, at a popular location like Reach 3 of the Santa Ana River, where as many as 100 persons may engage in primary contact recreation on a warm summer weekend, the total economic benefit is expected to be between \$22 and \$168 (for that location on that weekend). The annual benefit would range between \$1,144 and \$8,736 (for that location). The economic benefits would be proportionally smaller at less popular locations and near zero if and when there is no primary contact recreation occurring (as, for example, during rain storms).

It would be improper to assign comparable public health benefits to the improvement of ambient water quality, where necessary, to meet the established fecal coliform objectives, since USEPA has disavowed the use of fecal coliform as a reliable measure of the protection of public health and recreational uses. However, improvement of ambient fecal coliform quality is likely to result in improvement of *E. coli* quality as well, with some level of resultant public health benefits.

### Other considerations

Much of the mainstem of the Santa Ana River and many of its major tributaries are dominated by the presence of reclaimed water. Wastewater treatment plants throughout the Region have invested hundreds of millions of dollars in advanced treatment and disinfection processes to protect public health and the environment. These facilities are already producing water quality that is substantially better than the proposed *E. coli* objectives. Further improvements to instream water quality will require more effort to reduce bacteria levels in urban and agricultural runoff from the surrounding area.

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<sup>92</sup> Rabinovici, S. et al. Economic and health risk tradeoffs of swim closures at a Lake Michigan Beach. *Environmental Science and Technology*. 2004 (38); pp. 2742-2750 (as cited in Given, S. et al. Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches. *Environmental Science and Technology*. 2006 (40); p. 4851-4858).

<sup>93</sup> CDM. Middle Santa Ana River Bacterial Indicator TMDL 2011 Dry Season Report. Dec. 21, 2011 (Fig. 4-10 & 4-11).

Some of the bacteria found in local lakes and streams may arise from uncontrollable sources including birds, wildlife, decaying vegetation and sediments.<sup>94</sup> The proposed Basin Plan amendments are not intended to impose any obligation to reduce the level of bacteria that occur from natural sources. The potential for waterborne illness from such sources has already been factored into EPA's estimate of acceptable risk that underlies the recommended objective.<sup>95</sup>

Non-contact (Secondary Contact) Recreation. The Basin Plan includes fecal coliform objectives that apply for the protection of non-contact recreational uses (REC2 (secondary contact recreation)). However, as noted in Section 4.0, there is no scientific basis for these REC2 objectives. Therefore, the proposed Basin Plan amendments include deleting the existing fecal coliform objectives for REC-2. Waters designated REC1 are generally also designated REC2 and the proposed *E. coli* objectives for REC1 and REC2 designated waters would apply. Pursuant to Use Attainability Analyses (see Section 5.6), certain waters are proposed to be designated REC2 only. To protect the quality of these waters, the Regional Board would rely on the proposed narrative pathogen objective, if approved. Further, the proposed amendments include bacteria quality antidegradation targets for the proposed REC2 only waters. These targets are intended to be used to assure that bacteria quality conditions in these waters do not degrade. Both the federal and state antidegradation policies will continue to apply to such streams. Consequently, because the proposed Basin Plan amendments merely continue the existing requirement to preserve ambient water quality, no new costs are likely to result from the proposed amendments regarding REC2 waters. Stakeholders will be required to continue collecting water quality data to demonstrate compliance with the state and federal antidegradation policies.

Implementation. Existing MS4 permits already contain terms and conditions prohibiting urban discharges except for storm-related runoff and other de minimus flows. Recent revisions to the areawide stormwater permits now require all three counties to implement Low Impact Development (LID) programs designed to maximize on-site retention. The permittees are also obligated to eliminate urban runoff during dry weather conditions through the use of local ordinances, conservation programs, retention basins and similar Best Management Practices.<sup>96</sup> Collectively, these requirements impose many of the same financial responsibilities on the permittees to control certain types of discharges irrespective of whether the pathogen indicator

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<sup>94</sup> See, for example, Surbeck, C.Q. et al. Ecological Control of Fecal Indicator Bacteria in an Urban Stream. *Environmental Science and Technology*. 2010; 44 (2) December, 2009. pp. 631-637. See, also, Litton, R.M. et al. Evaluation of chemical, molecular, and traditional markers of fecal contamination in an effluent dominated urban stream. *Environmental Science and Technology*. 2010; 44 (19) October, 2010 pp. 7369-7375.

<sup>95</sup> U.S. EPA. Ambient Water Quality Criteria for Bacteria – 1986. EPA-440/5-84-002. January, 1986.

<sup>96</sup> See, for example, NPDES No. CAS 618033 (Order No. R8-2010-0033) Adopted January 29, 2010.

bacteria objective is based on fecal coliform or *E. coli*. The proposed amendments would have no effect on the requirements for POTWs to provide treatment necessary to assure essentially pathogen-free effluents.

The proposed suite of Basin Plan amendments incorporate changes to bacteria quality objectives, designated recreation beneficial uses, and implementation strategies for compliance with the proposed objectives that, collectively, are intended to assure the reasonable protection of beneficial uses, the prevention of nuisance, and conformance with antidegradation provisions. These changes include the temporary suspension of recreation standards during specific high flow, wet weather conditions, when recreational use is not attainable and when, therefore, it would not be reasonable to require compliance with bacteria objectives (either fecal coliform or *E. coli*). The de-designation of the REC1 use is proposed for specific surface water segments, where it is demonstrated, through Use Attainability Analyses, that the REC1 use is neither existing nor attainable. Once again, requiring compliance with the established or proposed bacteria quality objectives in these waters would not conform to the reasonable protection of beneficial uses. Additional language is proposed to address the regulatory approach to controllable and uncontrollable sources of bacteria. These provisions, taken as a whole, are expected to encourage the use of regional mitigation strategies and alternatives and minimize the total cost of compliance.<sup>97</sup> This, in turn, assures that the expenditure of scarce public resources is directed properly to the protection of public health and existing and probable recreation beneficial uses.

#### **Factor (e) The need for developing housing within the region.**

The number of people living in the Santa Ana Region is expected to double by 2050,<sup>98</sup> and the need for housing will rise accordingly.<sup>99</sup> City and county officials must continue to provide essential infrastructure to minimize the potential for flood damage in newly developed areas.

In semi-arid locales, like the Santa Ana Region, where infrequent but intense rain events characterize the most common storm conditions, effective flood control depends on the use of engineered channels to convey urban runoff safely downstream. It is generally not feasible to design MS4 facilities that can simultaneously accommodate these extreme variations in flow with full time recreational access to the modified channel at all times and under all conditions.

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<sup>97</sup> See, for example, the Comprehensive Bacteria Reduction Plans (CBRP) submitted by Riverside County and San Bernardino County on June 28, 2011.

<sup>98</sup> California Department of Finance. July 2007. Population Projections by Race/Ethnicity, Gender and Age for California and its Counties 2000-2050; and, Santa Ana Watershed Project Authority (SAWPA). Integrated Watershed Management Plan., 2010.

<sup>99</sup> The Community Foundation. Riverside County 2011 Community Indicators Report; San Bernardino County 2011 Community Indicators Report.

Use Attainability Analyses may document that the physical features of the flood control channel (e.g., vertical concrete walls, low dry weather flows, etc.) preclude primary contact recreation, justifying a decision to de-designate the REC1 use (provided also that REC1 is not an existing use, as defined in federal regulations). In that case, the proposed *E. coli* objectives would not apply to such facilities. In addition, the proposed High Flow Suspension would temporarily exempt engineered or modified flood control channels from the recommended *E. coli* objectives during and immediately after storm events that make REC-1 activities physically impossible for short periods of time. Taken together, these proposed implementation procedures would prevent the new pathogen indicator bacteria objectives from being applied in a manner that may unintentionally inhibit construction of flood control infrastructure essential to protect housing developments.

**Factor (f): The need to develop and use recycled water.**

Tertiary treated municipal effluent provides a significant portion of most dry weather flows in the Santa Ana River and its major tributaries.<sup>100</sup> Wastewater treatment plants are already required to provide adequate coagulation, flocculation, filtration and disinfection pursuant to NPDES permit requirements based on Title 22 of the California Code of Regulations. The proposed Basin Plan amendments make no changes to any of these existing requirements.

All discharge permits issued to POTWs in the Santa Ana Region contain conditions restricting the average total coliform concentration to less than 2.2 cfu/100 mL. These existing effluent limitations are significantly more stringent than the proposed *E. coli* objective. As such, the recommended water quality objective for pathogen indicator bacteria is not expected to have any adverse effect on the ability to use recycled water in the Region.

## **7.0 ANTIDegradation ANALYSIS**

The proposed Basin Plan amendments are consistent with both State and federal antidegradation policies (State Water Board Resolution No. 68-16 “Statement of Policy with Respect to Maintaining High Quality Waters in California” and 40 CFR 131.12, respectively).

The amendments primarily involve removing fecal coliform objectives established for REC1 and REC2-designated waters (see Section 5.2). However, these fecal coliform objectives would be replaced with *E. coli* objectives based on USEPA’s 1986 recommended bacteria quality criteria. The recommended objectives are believed by USEPA to correlate to approximately the same level of public health protection as provided by the existing fecal coliform objectives. Beneficial uses will continue to be

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<sup>100</sup> SAWPA. 2010 Annual Report of Santa Ana River Water Quality. July, 2011.

protected. *E. coli* bacteria are a subset of fecal coliform bacteria. Reliance on numeric objectives for *E. coli* that are at least as stringent as the existing fecal coliform objectives will not result in a lowering of water quality.

The proposed amendments include the temporary suspension of recreation standards (both beneficial uses and bacteria indicator objectives (proposed to be expressed as *E. coli* densities)) during specific high flow conditions in certain surface waters (see Section 5.5) The temporary suspension of standards will not result in a lowering of water quality. The proposed temporary suspension simply recognizes that recreation uses under certain flow conditions are not attainable while those flow conditions exist. Water quality would continue to be affected by inputs from precipitation and other sources that contribute to the high flow conditions that warrant the suspension. The temporary suspension would not itself cause or contribute to a change in those water quality effects.

The proposed narrative objective would provide the Regional Board an additional tool to assure that appropriate actions are taken to protect water quality and beneficial uses (see Section 5.4). The implementation of this objective is expected to protect and enhance water quality.

For certain waters, the removal of the REC1 and, in some cases, REC2 designations is proposed (see Section 5.6). These recommendations are based on UAAs which rely, in part, on documentation of water quality conditions in those waters and the demonstration that water quality conditions are such that these recreation uses have not been and are not being attained. The revised designations would not trigger activities that would cause changes to water quality conditions in these waters. Applicable beneficial uses would continue to be protected. To assure that water quality conditions would not degrade, the proposed amendments include recommended bacteria indicator targets for REC2-only waters. These proposed targets were calculated based on ambient water quality conditions and application of the antidegradation policy (see Section 5.2). The proposed amendments also include a proposed implementation strategy for the proposed bacteria indicator targets that requires follow-up investigation of exceedances of the recommended targets and corrective action, if necessary (see Section 5.9.2.2.). The overall intent is to assure that water quality conditions in these waters do not degrade and that applicable beneficial uses are protected.

The proposed amendments include the assignment of REC1-designated inland fresh surface waters listed in the Basin Plan to one of four Tiers, based on the intensity of known or anticipated full body contact recreation. The assignments trigger the application of single sample maximum *E. coli* values (SSMs), which are calculated from the proposed geometric mean *E. coli* objectives (see Section 5.3). The SSMs are intended to be used for posting and closure of recreation areas when there are insufficient data to calculate geometric means. These provisions are intended to assure the protection of water quality and beneficial uses. None of these provisions would result in physical or regulatory effects that would result in a lowering of water quality or adverse effects on beneficial uses.

The proposed amendments include deleting the total coliform objective for freshwaters designated municipal or domestic supply (MUN) (see Section 5.7). This action would not result in adverse impacts to the MUN (or other) beneficial uses of these streams; the change is intended to recognize that virtually all MUN-designated surface waters in the Region are and must be treated before being used as a source of supply. Further, the total coliform objective is not supported on either scientific or regulatory grounds. There are very limited instances in the San Bernardino Mountains where surface waters may be distributed and used directly as source of water supply (see Section 5.7). However, the residents in this area have been advised not to consume raw surface water and have stated that they do not do so. Given that these streams are in natural condition in a largely undeveloped area, there is no reason to suppose that the deletion of the total coliform objective would result in increases of total coliform inputs to the surface waters, nor would it adversely affect any present direct use that occurs in contradiction of requirements for prior treatment of the surface water supply. No lowering of water quality in other MUN-designated surface water streams is expected to occur as the result of the deletion of the objective. Bacteria quality conditions will continue to be driven by pathogen indicator objectives for REC1 and REC2 waters, and by antidegradation targets proposed to be established for REC2-only waters (see Section 5.2). Discharges of controllable sources of bacteria inputs (e.g., POTWs) will continue to be regulated to protect established beneficial uses. Waters in the Santa Ana Region to which POTW discharges occur are excepted from MUN pursuant to the State Board's Sources of Drinking Water Policy (Resolution No. 88-63, as revised by Resolution No. 2006-0008). Similarly, waters in which the flows are dominated by stormwater and/or agricultural wastewater are excepted from MUN. The total coliform objective does not apply to these waters and the removal of the objective from the Basin Plan will not result in a lowering of water quality in these waters.

A number of waters are proposed to be added to the list of waters identified in the Basin Plan, along with appropriate beneficial use designations (see Section 5.8). These amendments would not adversely affect water quality or beneficial uses and can reasonably be expected to facilitate appropriate recognition and regulation of these waters to protect water quality standards.

Changes are proposed to the definition of the REC1 use, to the footnote attached to the REC1 and REC2 definitions, and to narrative descriptions of bacteria objectives and implementation strategies (see Sections 5.1., 5.9 and 5.10). These proposed changes are intended to enhance clarity and consistency and to explain how the Regional Board intends to implement the proposed revisions to the recreation standards. None of these changes would result in a lowering of water quality or adversely affect beneficial uses. Rather, the intent is to improve the regulatory basis for the Regional Board's actions to protect water quality and beneficial uses.

Other minor editorial corrections (e.g., spelling corrections) are also proposed but would have no material effect on water quality.

## **8.0 PEER REVIEW**

Pursuant to Health and Safety Code Section 57004, all proposed rules that have a scientific basis or components must be submitted for external scientific peer review. Cal/EPA guidelines for this peer review were used to conduct the external scientific review for the scientific components of the proposed amendments. Peer reviewer comments, found in Attachment D to this report, were considered in recommendations regarding the proposed amendments. Responses to peer reviewer comments are found in Attachment F1.

## **9.0 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS**

Pursuant to the requirements of CEQA and implementing regulations, including those established by the State Water Board, analyses were conducted of the potential effects of the proposed amendments on a variety of environmental factors. These analyses are presented in “Environmental Checklist and Analysis - Substitute Environmental Document for Proposed Amendments Related to Recreational Use Standards for Inland Fresh Waters within the Santa Ana Region”, November 30, 2011 (Attachment C to this report). This staff report, the draft Basin Plan amendments shown in the attachments to Resolution No. R8-2012-0001, and this environmental analysis document, collectively comprise the Substitute Environmental Document (or, “SED”) required under CEQA.

The requirements pertaining to this analysis are described in detail in the environmental analysis document (Section 1.1 Regulatory Setting). In brief, the Secretary for Resources has certified the basin planning program as exempt from the requirement to prepare an Environmental Impact Report (EIR), Negative Declaration (ND) or Initial Study. However, an environmental analysis is to be presented in a substitute environmental document (SED). The SED must include: 1) a brief description of the proposed amendments (the proposed project); 2) identification of any significant or potentially significant adverse environmental impacts of the proposed amendments; 3) where the potential for any significant adverse environmental impacts is found, an analysis of reasonable alternatives to the proposed amendments and mitigation measures to minimize those impacts; and, 4) an environmental analysis of the reasonably foreseeable methods of compliance, reasonably foreseeable significant adverse environmental impacts associated with those reasonably foreseeable methods of compliance and reasonably foreseeable mitigation measures. In preparing the environmental analysis of reasonably foreseeable methods of compliance, the Regional Board is required to take into account a reasonable range of environmental, economic and technical factors, population and geographic areas and specific sites. However, the Regional Board is not required or encouraged to engage in speculation or conjecture, nor is the Board required to conduct a site-specific project level analysis of the methods of compliance.

Because the Regional Board is prohibited from specifying the design, location, type of construction, or particular manner of compliance with waste discharge requirements or other orders issued by the Board (Water Code Section 13360), those entities subject to the proposed Basin Plan amendments and orders of the Board that may be derived therefrom are required to conduct project-level CEQA analysis of compliance projects. Accordingly, the environmental analysis document analyzes the potential environmental effects of implementing reasonably foreseeable methods of compliance on a programmatic level.

Based on the analyses presented in the environmental analysis document, Regional Board staff has made the preliminary determination that the proposed amendments could not have a significant adverse effect on the environment, and, therefore, no alternatives or mitigation measures are proposed. (See environmental analysis document p. 4-3; see also p. 4-46). The proposed amendments primarily involve changes to the indicator bacteria used as the basis for setting objectives in the Basin Plan, and changes to beneficial use designations, which would not trigger the need for new BMPs or other compliance mechanisms that would not otherwise occur should the proposed amendments not be adopted. In other words, BMPs would continue to be implemented and maintained whether or not the proposed amendments are adopted. In addition the amendments are not anticipated to substantially change the manner or type of BMPs that are implemented in the future. The proposed re-designation of certain waters, pursuant to UAAs, from REC1 to REC2 or neither REC1 nor REC2 and temporary suspension of recreation standards are expected to reduce the number of BMPs that will need to be implemented, thereby reducing potential impacts on the environment. As BMPs are implemented, site-specific, project level CEQA review and conformance will be necessary.

While no significant potential adverse impacts of the proposed amendments were identified and no analysis of alternatives is thus required, the environmental analysis document evaluated the "No Project" alternative (See the environmental analysis document, Section 5.0). Under this alternative, the Regional Board would not adopt the proposed amendments. No changes to the established bacteria objectives, beneficial uses or implementation strategies would occur. The fecal coliform objectives now established in the Basin Plan would remain in effect, contrary to the expectation of USEPA that states will adopt water quality standards that implement the USEPA 1986 bacteria quality criteria.

Further, under the "No Project" alternative, the need for all freshwater streams to meet REC1 standards during high flow conditions would continue. Given the large challenges and costs that would be associated with reducing bacterial indicators and the associated potential pathogens under large storm event flows, it may be economically infeasible for local agencies to implement actions to try and attain these standards under all flow conditions. Expending resources to address standards compliance under all flow conditions could delay expenditures to address compliance when and where most needed, i.e., when and where recreational use occurs. This would be contrary to the public interest.

Finally, the water bodies proposed for re-designation (through UAAs) as REC2 only or neither REC1 nor REC2 would remain REC1. Implementation of additional treatment controls or BMPs would be required for those water bodies to attain REC1 standards throughout the entire reach. This would divert funds and efforts for establishment of BMPs at other locations which may yield greater benefits to public health and the protection of beneficial uses (i.e., where recreational uses are known or anticipated to occur.) Once again, this would be contrary to the public interest.

## **10.0 PUBLIC PARTICIPATION**

Public participation is an important part of the Basin Planning process. As described in detail in Section 2.3, the Task Force actively sought public and agency participation in the development and consideration of the proposed Basin Plan amendments. All Task Force meetings were open to the public and agendas, meeting notes and work products were posted at the SAWPA website. Task Force work products were also e-mailed to interested persons who requested inclusion on the Task Force listserv. There were periodic presentations to the Regional Board regarding the work of the Task Force during the Board's regularly scheduled meetings. These presentations were included on the agendas for the Board meetings. The agendas are posted in advance on the Board's website and distributed to interested parties. Regional Board meetings are open to the public. A presentation regarding the proposed Basin Plan amendments was made at the Regional Board's meeting on July 15, 2011 and a verbatim transcript was prepared. The transcript will be included in the administrative record for this matter.

In accordance with the State Water Board's regulations for the implementation of CEQA, Board staff held a CEQA scoping meeting on January 28, 2010 in Riverside, California. Notice of the meeting was posted on the Regional Board and SAWPA websites and sent electronically to those included on the Board's Basin Planning distribution list. The scoping meeting provided participants the opportunity to comment on the appropriate scope and content of the substitute environmental document (SED) to be prepared for the proposed Basin Plan amendments (see Section 9.0 California Environmental Quality Act (CEQA) Analysis). An overview of the amendments was presented by Board staff at the meeting. Ten individuals attended the meeting. At the meeting, participants provided oral comments and oral responses were provided by Board staff. One set of written comments was received and written responses were provided (see Attachment B).

The Regional Board will conduct a public hearing to consider adoption of the proposed amendments. Changes to the proposed amendments may be made in response to comments provided. A Notice of Public Hearing/Notice of Filing (Notice) will be published in newspapers of general circulation in Orange, Riverside and San Bernardino counties, portions of which are within the Santa Ana Region and would be affected by the adoption of the proposed amendments. The Notice will also be posted on the Regional Board website and sent electronically to the Board's Basin Planning and agenda distribution lists and to those included on the Task Force listserv. The

Notice will be published, posted and distributed at least 45 days prior to the scheduled Regional Board meeting. Regional Board staff will prepare written responses to comments that are received in accordance with schedule established in the Notice of Public Hearing/Notice of Filing. Written comments and responses will be included in the administrative record of this matter as Appendix F to this staff report.

## **11.0 RECOMMENDATION**

Board staff recommends the adoption of Resolution No. R8-2012-0001, adopting the amendments to the Water Quality Control Plan (Basin Plan) shown in attachment 1 (underline/strike-out version) and attachment 2 ("clean" version) to the Resolution.

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## **CHANGES TO TABLE 3-1 BENEFICIAL USES and TABLE 4-1 WATER QUALITY OBJECTIVES – REPORT REFERENCES**

### **5.8.10 References**

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### 13.0 ATTACHMENTS

- Attachment A: Resolution No. R8-2012-0001  
Attachment 1: Draft Basin Plan amendments (underline/  
strike-out version)  
Attachment 2: Draft Basin Plan amendments ("clean"  
version)
- Attachment B: CEQA Scoping Meeting Notice, Comments and Responses
- Attachment C: CEQA "Environmental Checklist and Analysis – Substitute  
Environmental Document for Proposed Amendments  
Related to Recreational Use Standards for Inland Fresh  
Waters within the Santa Ana Region", November 30, 2011
- Attachment D: Peer Review Comments
- Attachment E: Comments from Interested Parties/Agencies
- Attachment F: Response to Comments document
- Attachment F1: Response to Peer Review Comments
- Attachment F2: Response to Comments from Interested  
Agencies/Parties

#### Web links to attachments:

##### Attachment A:

##### Resolution No. R8-2012-0001:

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA.pdf)

**Attachment 1 to Resolution No. R8-2012-0001:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA\\_1.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA_1.pdf)

**Attachment 2 to Resolution No. R8-2012-0001:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA\\_2.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA_2.pdf)

**Appendix VIII:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA\\_AppVIII.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA_AppVIII.pdf)

**Appendix IX:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttA\\_AppIX.zip](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttA_AppIX.zip)

**Attachment B:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttB.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttB.pdf)

**Attachment C:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttC.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttC.pdf)

**Attachment D:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttD.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttD.pdf)

**Attachment E:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttE.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttE.pdf)

**Attachment F:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttF.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttF.pdf)

**Attachment F1:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttF\\_1.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttF_1.pdf)

**Attachment F2:**

[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/BPA\\_REC\\_Standards\\_Staff\\_Rpt\\_AttF\\_2.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Staff_Rpt_AttF_2.pdf)