State of California
Regional Water Quality Control Board
North Coast Region

Staff Report
for the
2012 Integrated Report
for the Clean Water Act
Section 305(b) Surface Water Quality Assessment
and the 303(d) List of Impaired Waters

July 30, 2014

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List of Abbreviations

Basin Plan	Water Quality Control Plan for the North Coast Region
CalWQA	California Water Quality Assessment Database
CCC	Criteria Continuous Concentration
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game)
CFR	Code of Federal Regulations
CMC	Criteria Maximum Concentration
CTR	California Toxics Rule
CWA	Clean Water Act
C	degrees Celsius
F	degrees Fahrenheit
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DHS	California Department of Health Services
DO	Dissolved oxygen
HA	Hydrologic Area
HSA	Hydrologic Sub Area
HU	Hydrologic Unit
Listing Policy	Water Quality Control Policy for Developing California's Section 303(d) List
LOE	Line of Evidence
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram (parts per million)
mg/L	milligrams per liter (parts per million)
µg/g	micrograms per gram (parts per million)
µg/L	micrograms per liter (parts per billion)
MPN	Most Probable Number
ng/g	nanograms per gram (parts per billion)
ng/L	nanograms per liter (parts per trillion)
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
OEHHA	Office of Environmental Health Hazard Assessment
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
pg/L	picograms per liter
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
Regional Water Board	North Coast Regional Water Quality Control Board
RWQCB	North Coast Regional Water Quality Control Board

SMCP	Statewide Mercury Control Program
State Water Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
WHO	World Health Organization

Chapter 1: Introduction

The federal Clean Water Act (CWA) gives states the primary responsibility for protecting and restoring water quality. Under CWA Section 305(b), states are required to report biennially to the United States Environmental Protection Agency (USEPA) on the water quality conditions of their surface waters. The USEPA then compiles these assessments into their biennial "National Water Quality Inventory Report" to Congress. Under CWA Section 303(d), states are required to review, makes changes as necessary, and submit to the USEPA a list identifying water bodies not meeting water quality standards and identifying the water quality parameter (i.e., pollutant) not being met. Placement on this list generally triggers development of a pollution control plan called a total maximum daily load (TMDL) for each water body/pollutant pair on the list.

The USEPA issued guidance to states requiring that the 305(b) water quality assessment and the 303(d) List of impaired waters be integrated into a single report. For California, this report is called the Integrated Report, and it will satisfy both the CWA Section 305(b) and Section 303(d) requirements.

The North Coast Regional Water Quality Control Board (Regional Water Board) is responsible for developing and adopting the 2012 Integrated Report for waters within the North Coast Region of California. Following adoption by the Regional Water Board, the 2012 Integrated Report will be transmitted to the State Water Resources Control Board (State Water Board), where it will be considered by the State Water Board.

The purpose of this staff report is to describe the assessment process (the procedures utilized by State and Regional Water Board staff to analyze data and information), provide a report of surface water quality in the North Coast Region as required by 305(b), and provide Regional Water Board staff recommendations for additions, deletions, and changes to the 2010 California CWA Section 303(d) List.

The results of the staff analysis are presented as staff recommendations in the form of fact sheets that contain a decision and supporting lines of evidence for each water body/pollutant pair assessed. A summary of staff recommendations can be found in Chapter 4.

The fact sheets are available in Appendix 1 of this Staff Report, which can be found online at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/

Chapter 2: Legal Requirements

This chapter provides a summary of the federal and state legal requirements for the 2012 Integrated Report.

2.1 FEDERAL REQUIREMENTS

2.1.1 CWA Section 305(b) – Water Quality Assessment

Under CWA Section 305(b), states are required to report biennially to the United States Environmental Protection Agency (USEPA) on the water quality conditions of their surface waters. The USEPA then compiles these assessments into their biennial "National Water Quality Inventory Report" to Congress.

2.1.2 CWA Section 303(d) – Impaired Waters

The CWA Section 303(d) requires states to identify waters that do not meet applicable water quality standards after the application of certain technology-based controls[1]. The Section 303(d) List must include a description of the pollutants causing the violation of water quality standards (40 CFR 130.7(b)(iii)(4)) and a priority ranking of the water quality limited segments, taking into account the severity of the pollution and the uses to be made of the waters.

As defined in the CWA and federal regulations, water quality standards include the designated uses of a water body, the adopted water quality criteria, and the State's Antidegradation Policy (State Water Resources Control Board Resolution No. 68-16) (SWRCB 1968). Under state law (Porter-Cologne Water Quality Control Act, California Water Code Section 13300 et seq.), water quality standards are beneficial uses to be made of a water body, the established water quality objectives (both narrative and numeric), the State's Antidegradation Policy, and certain general strategies of implementation.

Federal regulation defines a "water quality limited segment" as "any segment [of a surface water body] where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after application of technology-based effluent limitations required by CWA Sections 301(b) or 306" (40 CFR 130.2(j)). The USEPA considers Category 5 water bodies as the only category that constitutes the 303(d) List. Therefore, the USEPA will approve a 2012 Category 5 list (for more information on the Integrated Report Categories, please see Table 1 of this report).

[1] Technology-based controls are defined in CWA Section 301. They include effluent limits (primary and secondary treatment requirements) for industrial discharges and discharges from publically owned treatment works.

Table 1: Integrated Report Categories	
Category	**Description**
1	Evidence shows all core uses are supported.
2	Evidence shows some core uses are supported (at least one use is supported).
3	Evidence is insufficient to make use support determinations.
4a	Evidence shows at least one use is not supported, a TMDL has been developed and is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame, and the TMDL has been approved by the USEPA.
4b	Evidence shows at least one use is not supported, but a TMDL is not needed as an existing regulatory program is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame.
4c	Evidence shows at least one use is not supported, but a TMDL is not needed as the impairment is caused by non-pollutant sources.
5	Evidence shows at least one use is not supported and a TMDL is needed.

States are required to review the Section 303(d) List in even-numbered years, make changes as necessary, and submit the list to the USEPA for approval. A total maximum daily load (TMDL) is generally developed for a water quality limited segment. A TMDL is the sum of the individual waste load allocations for point sources, load allocations for nonpoint sources, and natural background (40 CFR 130.2(j)).

2.2 STATE REQUIREMENTS

On September 30, 2004, the State Water Board adopted the "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List," also known as the Listing Policy (SWRCB 2004a) in accordance with California Water Code Section 13191.3(a). The Listing Policy identifies the process by which the State Water Board and the Regional Water Quality Control Boards will comply with the listing requirements of CWA Section 303(d). The Listing Policy became effective in December 2004. Justification of each portion of the Listing Policy is presented in the Final Functional Equivalent Document (FED) (SWRCB, 2004b) that was developed to support the provisions of the Listing Policy.

The objective of the Listing Policy is to establish a standardized approach for developing California's Section 303(d) List with the overall goal of achieving water quality standards and maintaining beneficial uses in all of California's surface waters. TMDLs will generally be developed as needed for the waters identified under the provisions of the Listing Policy.

The Listing Policy outlines a "weight of evidence" approach that provides the rules for making decisions based upon different kinds of data, an approach for analyzing data statistically, and requirements for data quality, data quantity, and the administration of the

listing process. Decision rules for listing and delisting are provided for chemical-specific water quality standards; bacterial water quality standards; health advisories; bioaccumulation of chemicals in aquatic life tissues; nuisance such as trash, odor, and foam; nutrients; water and sediment toxicity; adverse biological response; and degradation of aquatic life populations and communities. The Listing Policy also requires that situation-specific weight of evidence listing or delisting factors be used if available information indicates water quality standards are attained or not attained and the other decision rules do not support listing or delisting.

The federal requirement for setting priorities on which TMDLs will be developed first is addressed in the Listing Policy by the establishment of schedules for TMDL development.

The Listing Policy also provides direction related to:

- The definition of readily available data and information.
- Administration of the listing process including data solicitation and fact sheet preparation.
- Interpretation of narrative water quality objectives using numeric evaluation guidelines.
- Data quality assessments.
- Data quantity assessments including water body specific information, data spatial and temporal representation, aggregation of data by reach/area, quantitation of chemical concentrations, evaluation of data consistent with the expression of water quality objectives or criteria, binomial model statistical evaluation, evaluation of bioassessment data, and evaluation of temperature data.

The Listing Policy requires that *all* surface waters that do not meet water quality standards be placed on the Section 303(d) List. The Policy also states that the California 303(d) List includes (1) waters still requiring a TMDL under Category 5, and (2) waters where the water quality limited segment is being addressed under Category 4. Water bodies in the "Water Quality Limited Segments Being Addressed" category must meet either of the following conditions:

1. A TMDL has been approved by USEPA and is expected to result in full attainment of the standard within a reasonable, specified time frame (Category 4a).
2. It has been determined that an existing regulatory program is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame (Category 4b).

Water bodies that are impaired by a non-pollutant source (Category 4c) do not require a TMDL and the State Water Board, in accordance with the Listing Policy, does not consider waters in Category 4c as comprising the 303(d) List. Monitoring should be conducted to confirm that there continues to be no pollutant-caused impairment and water quality management actions may be necessary to address the cause(s) of the impairment.

This means that, for California, waters that fall into the Integrated Report Categories 4a, 4b, and 5 are considered part of the California 303(d) List. The USEPA considers Category 5 water bodies as the only category that constitutes the 303(d) List.

2.3 2010 303(d) LIST OF IMPAIRED WATERS

Until the 2012 303(d) List is approved by the USEPA, the current list is the 2010 Section 303(d) List of Impaired Waters. The 2010 List was adopted by the Regional Water Board on June 3, 2009, in Resolution No. R1-2009-0047; adopted by the State Water Board on August 4, 2010, in Resolution No. 2010-0040; and approved by the USEPA on October 11, 2011. Neither the State Water Board nor the USEPA made any changes to the 303(d) List that was approved by the Regional Water Board in June 2009.

2.4 CHANGES TO CALIFORNIA'S INTEGRATED REPORT-303(d) and 305(b) UPDATES

On June 14, 2013, State Water Board management met with USEPA Division of Water Quality management to discuss strategies to create a more efficient and successful Integrated Report process. The strategy agreed upon includes dividing California into thirds by Regional Water Board and submitting an Integrated Report for three Regional Water Boards per listing cycle. Therefore, the 2012 Integrated Report will consist of data submitted for the North Coast Regional Water Quality Control Board (Region 1), the Lahontan Regional Water Quality Control Board (Region 6), and the Colorado River Basin Regional Water Quality Control Board (Region 7). The 2014 Integrated Report will consist of data submitted for the Central Coast Regional Water Quality Control Board (Region 3), the Central Valley Regional Water Quality Control Board (Region 5), and the San Diego Regional Water Quality Control Board (Region 9). Finally, the 2016 Integrated Report will consist of data for the San Francisco Bay Regional Water Quality Control Board (Region 2), the Los Angeles Regional Water Quality Control Board (Region 4), and the Santa Ana Regional Water Quality Control Board (Region 8). The North Coast Regional Water Board will develop the next Integrated Report update in 2018. It is anticipated that the process will allow for those Regional Water Boards that are "off cycle" to still examine high priority data and make decisions related directly to listings and delistings and submit them for inclusion into the current listing cycle as appropriate.

Chapter 3: Assessment Process

The basis for the 2012 Integrated Report Section 303(d) List is the 2010 Section 303(d) List, which was approved on October 11, 2011. All listings on the 2010 Section 303(d) List will remain unless a change is adopted by the Regional Water Board and the State Water Board, and approved by the USEPA. Throughout the assessment process, Regional Water Board staff complied with the requirements of the Listing Policy and considered public comments.

3.1 FACT SHEETS

A fact sheet is comprised of a decision and the supporting lines of evidence (LOE) for each water body/pollutant pair assessed. The results of the staff analysis are presented as staff recommendations in the form of fact sheets. A summary of staff recommendations can be found in Chapter 4. The fact sheets are available in Appendix 1 of this Staff Report, which can be found online at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/

3.2 DATA & INFORMATION SOLICITATION

The water quality assessment process for Sections 305(b) and 303(d) began with the evaluation of data collected from monitoring throughout the North Coast Region. The monitoring information is critical to understanding and protecting the beneficial uses of water, developing water quality standards, and determining the effect of pollution and pollution prevention programs. Determining the exceedances of water quality standards, objectives, criteria, and guidelines forms the basis of the water quality assessments for Sections 303(d) and 305(b). Whether or not water quality objectives are exceeded determines a water body's ability to support its designated beneficial uses and also determines whether to list, or not list, the water body as impaired.

The State Water Board, on behalf of the Regional Water Boards, solicited and assembled all readily available data and information. This included data and information from the public in general and from Regional Water Board files, documents, and programs.

The public solicitation of data and information began on January 14, 2010, and concluded on August 30, 2010. State Water Board staff received numerous public requests for the review of the 2010 303(d) List for particular water bodies and/or pollutants. Many of these requests included data and information used to develop and revise fact sheets for the 2012 Integrated Report.

Data collected by the Regional and State Water Boards under the Surface Water Ambient Monitoring Program (SWAMP) were also used to develop and revise fact sheets for the 2012 Integrated Report. These data included:

- Regional trend monitoring data for pesticides, metals, nutrients, and physical chemistry parameters (e.g., temperature, pH, dissolved oxygen).
- State-wide lakes sport fish contamination study data for methyl mercury, PCBs, dieldrin, DDTs, chlordanes, and selenium in fish tissue.
- State-wide perennial streams assessment data for nutrients, physical chemistry, and bioassessments.
- State-wide stream pollution trends data for sediment toxicity and sediment contaminant concentrations.
- State-wide urban pyrethroid status data for TOC, pesticides, and DDTs.
- State-wide reference condition management plan data for nutrients and physical chemistry.

Additionally, data from ocean beach bacteria monitoring collected by coastal counties in accordance with AB411 (Chapter 765, Statutes of 1997) requirements were evaluated for this Integrated Report cycle.

3.3 DATA ASSESSMENT

State Water Board staff assessed data and information submitted by the public and from Regional and State Water Board programs. All readily available data and information were assessed using the rules described in the Listing Policy, as appropriate. State Water Board staff developed lines of evidence that summarize the available data and information.

Regional Water Board staff used the lines of evidence created by State Water Board staff to make decisions on overall beneficial use support and water quality impairment. The decisions and lines of evidence constitute the fact sheets for a particular water body/pollutant pair. Lines of evidence and decisions were input into the California Water Quality Assessment (CalWQA) database.

When developing a line of evidence, State Water Board staff's analysis began by looking at the sampling results and comparing them to the water body's beneficial uses and the pollutant's water quality standard(s). Results of this comparison, including the numbers of exceedances, are recorded in the line of evidence. State Water Board staff also reviewed the temporal, spatial, and quality characteristics of the data and information to ensure compliance with the Listing Policy.

3.3.1 Water Quality Standards Used in the Data Assessment

Water quality standards are comprised of (1) beneficial uses, (2) water quality objectives, (3) the Federal and State antidegradation policies, and (4) general policies for implementation.

The beneficial uses for waters in the North Coast Region are identified in the "Water Quality Control Plan for the North Coast Region," also known as the Basin Plan, which was

last amended in May 2011. If beneficial uses were not identified for a water body in the Basin Plan but the uses existed in the water body, then waters were assessed using the existing beneficial uses of water.

The water quality objectives used in the data assessments are from existing and available State Policies and Plans including some of the following:

- The Basin Plan.
- State-wide Water Quality Control Plans (e.g., the California Ocean Plan).
- California Toxics Rule (40 CFR 131.38).
- Bacteria standards at bathing beaches (17 CCR 7958).
- Maximum Contaminant Levels to the extent applicable, such as Table 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of 22 CCR 64431, Table 64444-A (Organic Chemicals) of 22 CCR 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of 22 CCR 64449.

Comparison of data to narrative water quality objectives often required a numeric evaluation guideline to interpret the objective, as allowed by the Listing Policy. Water Board staff used evaluation guidelines that potentially represented water quality objective attainment and/or protection of beneficial uses. Depending on the beneficial use and narrative standard, the following considerations were used in the selection of evaluation guidelines:

- Applicable to the beneficial use(s).
- Protective of the beneficial use(s).
- Link to the pollutant under consideration.
- Scientifically based and peer reviewed.
- Well described.
- Identify a range or limit above which impacts occur and below which no or few impacts are predicted.

The lines of evidences for each water body/pollutant pair describe the specific beneficial use(s), water quality objective, and evaluation guideline (if any) used to assess data.

3.4 DECISIONS

Following data assessment, Regional Water Board staff determined whether the data showed the water body was attaining water quality standards or not (i.e., if the water body was not impaired or impaired) and individual beneficial use support ratings. Decisions summarize all relevant lines of evidence for a water body/pollutant combination and, based on the Listing Policy, state if the number of exceedances constitutes non-attainment (resulting in a listing) or attainment (resulting in a delisting).

For a water body/pollutant pair that is not listed on the 2010 303(d) List as impaired, staff made a decision to either add the water body/pollutant pair to the list or not list it.

For a water body/pollutant pair that is already listed on the 2010 303(d) List as impaired, staff made a decision to either keep the water body/pollutant pair on the list or delist it.

Staff considered all public comments, as described in Chapter 6.

3.4.1 Listing & Delisting Methodology

Staff recommended a water body/pollutant pair be listed as impaired for the first time or remain listed as impaired if any one of the following statements was found to be true. Staff recommended a water body/pollutant pair not be listed as impaired or be delisted if none of the following statements were found to be true, or if the original listing was based on faulty data or improper assessment methodology and listing would not have occurred in the absence of the faulty data or improper assessment methodology. These recommendations were made in compliance with the Listing Policy. Section 3 of the Listing Policy pertains to first time listing considerations and Section 4 pertains to water body/pollutant pairs that are already listed as impaired on the 2010 303(d) List. In summary,

"List" or "Keep Listed" if any one of the following statements is true.
"Delist" or "Do Not List" if none of the following statements are true.

1. Numeric data exceed the numeric objective or evaluation guideline more than a certain number of times. The number of times varies by the number of samples and the type of pollutant, and is based on a binomial distribution as described in the Listing Policy. See Sections 3.1, 3.2, 3.3, 3.5, 3.6, 4.1, 4.2, 4.3, 4.5, and 4.6 of the Listing Policy for more information. Tables 3.1, 3.2, 4.1, and 4.2 of the Listing Policy are especially useful.
2. A health advisory against the consumption of edible resident organisms or a shellfish harvest ban has been issued. See Section 3.4 of the Listing Policy for more information.
3. Nuisance conditions exist for odor, taste, excessive algae growth, foam, turbidity, oil, trash, litter, or color when compared to reference conditions. See Section 3.7 of the Listing Policy for more information.
4. Adverse biological response is measured in resident organisms as compared to referenced conditions and the impacts are associated with water or sediment concentrations of pollutants as described in Section 3.6 of the Listing Policy. See Section 3.8 of the Listing Policy for more information.
5. Significant degradation of biological populations and/or communities is exhibited as compared to reference sites. See Section 3.9 of the Listing Policy for more information.
6. A trend of declining water quality standards attainment is exhibited. See Section 3.10 of the Listing Policy for more information.
7. The weight of evidence demonstrates that a water quality standard is not attained. See Section 3.11 of the Listing Policy for more information.

3.4.2 Assessment Categories

As part of the decision, Regional Water Board staff determined whether beneficial uses are supported, and selected an appropriate beneficial use support rating category for each line of evidence. The rating categories are: fully supporting, not supporting, and insufficient information. These rating categories are recommended by the USEPA.

Also as part of the decision, staff placed each water body/pollutant pair into one of five non-overlapping categories of water quality attainment, based on the overall beneficial use support of the water body. The categories are taken from the USEPA guidance for states' integrated reports, with some modifications based on California's 303(d) Listing Policy. The categories are shown in Table 2.

Table 2:
Integrated Report Categories

Category	Description
1	Evidence shows all core uses are supported.
2	Evidence shows some core uses are supported (at least one use is supported).
3	Evidence is insufficient to make use support determinations.
4a	Evidence shows at least one use is not supported, a TMDL has been developed and is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame, and the TMDL has been approved by the USEPA.
4b	Evidence shows at least one use is not supported, but a TMDL is not needed as an existing regulatory program is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame.
4c	Evidence shows at least one use is not supported, but a TMDL is not needed as the impairment is caused by non-pollutant sources.
5	Evidence shows at least one use is not supported and a TMDL is needed.

Water body/pollutant pair fact sheets for all of the categories comprise the Section 305(b) surface water assessment. Categories 1, 2, 3, and 4c however are informational, do not require state approval, and will be submitted as part of the 2012 Integrated Report to the USEPA for their biennial report to Congress. Categories 4a, 4b, and 5 are what California considers the Section 303(d) List of Impaired Waters and this list requires public review, approval by the Regional Water Board, and approval by the State Water Board. The status of a water body's 303(d) listing (i.e., at what stage it is being addressed) determines whether it is a Category 4a, 4b, or 5 water body (see Table 2). A statewide Category 5 list will be submitted to the USEPA for final approval, as the USEPA only considers Category 5 water bodies for placement on the 303(d) List.

3.4.3 The Decision Process

Regional Water Board staff first determined a beneficial use support rating for each *individual use* of a water body. Staff's recommendation for the individual beneficial use

support rating was done by looking at the lines of evidence in the CalWQA database for the water body/pollutant pair and applying the set of rules shown in Table 3. Then, staff determined the *overall* beneficial use support rating for the entire water body. This was done by applying the same rules in Table 3 to the collection of final individual use support ratings. See Figure 1 for an example of this process.

Table 3.
Rules for Determining Individual and Overall Beneficial Use Support Ratings

Beneficial Use Rating for Line of Evidence A		Beneficial Use Rating for Line of Evidence B		Final Beneficial Use Rating
Fully Supporting	+	Fully Supporting	=	Fully Supporting
Fully Supporting	+	Not Supporting	=	Not Supporting
Fully Supporting	+	Insufficient Information	=	Fully Supporting
Not Supporting	+	Insufficient Information	=	Not Supporting
Not Supporting	+	Not Supporting	=	Not Supporting

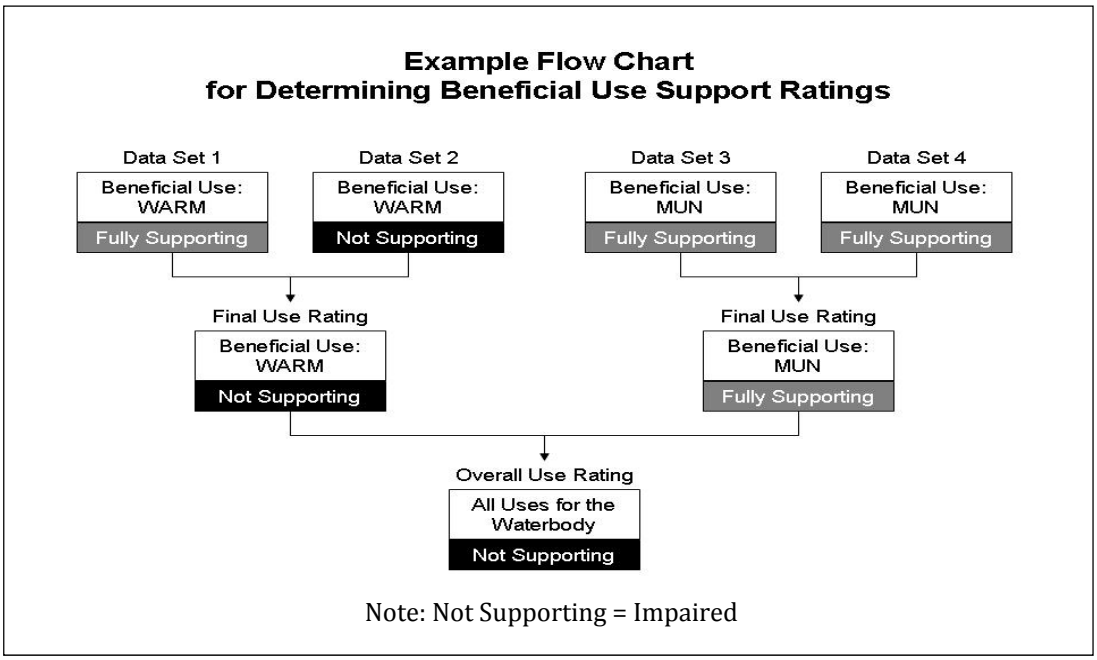

Figure 1: Example Flow Chart For Determining Beneficial Use Support Ratings

3.4.4 Original vs. Revised Decisions

All decisions in the CalWQA database are categorized as either "original" or "revised." An original decision is one that was made prior to 2012 and does not include any new data assessments or changes (with the exception of grammatical or logistical changes) during the 2012 Integrated Report cycle. A revised decision is one that is brand new for the 2012 Integrated Report, or one that is updated and changed from a previous listing cycle with new data or other information.

3.4.5 TMDL Scheduling

Regional Water Board staff developed a schedule for the completion of TMDLs for the water body/pollutant pairs listed as impaired under Section 303(d). The recommended date for TMDL completion is the year that the USEPA will approve a TMDL following Regional Water Board (and often State Water Board) adoption. For those water bodies with existing TMDLs that have been approved by the USEPA, the water body/pollutant pair was placed in the "Water Quality Limited Segments Being Addressed" category (Category 4a) of the Section 303(d) List. TMDLs with completion dates prior to the next list update already have resources dedicated to the effort. Schedules for TMDLs with completion dates after 2018 should be considered tentative. Changes to the Section 303(d) List in the future could result in substantial changes to scheduled completion dates established after 2018.

In developing the schedule, Regional Water Board staff reassessed the priorities established in the 2010 California CWA Section 303(d) List. The schedule was also developed in compliance with federal law and regulations based on the following Listing Policy provisions:

- Water body significance, such as the importance and extent of beneficial uses, threatened and endangered species concerns, and size of water body.
- Degree of impairment. The degree that water quality objectives are not met or beneficial uses are not attained or threatened, such as the severity of the pollution or the number of pollutants/stressors of concern.
- Potential threat to human health and the environment.
- Water quality benefits of activities ongoing in the watershed.
- Potential for beneficial use protection and recovery.
- Degree of public concern.
- Availability of funding.
- Availability of data and information to address the water quality problem.

Staff also relied upon guidance from the USEPA (1997), which states that schedules should be expeditious and normally extend from eight to thirteen years in length, but could be shorter or slightly longer depending on state-specific factors. Therefore, the timeline for completing TMDLs for water bodies listed for the first time as part of the 2012 Integrated Report is estimated to be no longer than thirteen years, which equates to an estimated completion date of 2025.

3.5 WATER BODY RE-SEGMENTATION AND DATA RE-EVALUATION

Historically, 303(d) listings in the North Coast Region were made at a watershed scale. With the creation of the CalWQA database, which was first used for the 2006 Integrated Report cycle, the listings were translated to the water bodies created in the database. Thus, many water bodies were defined at a watershed scale (e.g., by hydrologic area or

hydrologic subarea). This resulted in data from multiple streams evaluated together as a group to determine if the water body as a whole should be listed as impaired.

For the current Integrated Report cycle, data are generally evaluated for each individual stream, or at times for a particular location or stream segment, depending on the pollutant and beneficial use being assessed. Where data were available to re-segment a water body into smaller areas, Regional Water Board staff revised decisions for previous 303(d) listings to more accurately reflect the extent of impairment documented by the available data. Water bodies being re-segmented this current Integrated Report cycle are listed in Table 4.

Table 4.
Water Bodies Re-segmented During the 2012 Integrated Report Cycle

Laguna de Santa Rosa Watershed Re-segmentation	
Original Water Body	**Re-segmented Water Bodies**
Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	Russian River HU, Middle Russian River HA, Laguna HSA, mainstem Laguna de Santa Rosa
	Russian River HU, Middle Russian River HA, Laguna HSA, tributaries to the Laguna de Santa Rosa (except Santa Rosa Creek and its tributaries)
Russian River HU, Middle Russian River HA, Santa Rosa Creek	Russian River HU, Middle Russian River HA, Santa Rosa HSA, mainstem Santa Rosa Creek
	Russian River HU, Middle Russian River HA, Santa Rosa HSA, tributaries to Santa Rosa Creek
Russian River HU, Middle Russian River HA, Mark West Creek HSA	Russian River HU, Middle Russian River HA, Mark West HSA, mainstem Mark West Creek downstream of the confluence with the Laguna de Santa Rosa
	Russian River HU, Middle Russian River HA, Mark West HSA, mainstem Mark West Creek upstream of the confluence with the Laguna de Santa Rosa
	Russian River HU, Middle Russian River HA, Mark West HSA, tributaries to Mark West Creek (except Windsor Creek and its tributaries)
	Russian River HU, Middle Russian River HA, Mark West HSA, Windsor Creek and its tributaries
Elk River Watershed Re-segmentation	
Original Water Body	**Re-segmented Water Bodies**
Eureka Plain HU, Elk River	Eureka Plain HU, Elk River Watershed, Lower Elk River and Martin Slough
	Eureka Plain HU, Elk River Watershed, Upper Elk River
	Eureka Plain HU, Elk River Watershed, Upper Little South Fork Elk River

Regional Water Board staff will continue the process of re-segmenting the water bodies that are in the CalWQA database so that the listings more accurately reflect the extent of impairment documented by the data. Staff plan to re-segment some portion of the water bodies in the CalWQA database each Integrated Report cycle.

3.6 EXPLANATION OF SPECIFIC ANALYSES

Some of the analyses conducted by State and Regional Water Board staff are explained in more detail in this section in order to allow for a better understanding of how data and information were evaluated.

3.6.1 Klamath National Forest Sediment Reference Water Bodies

During the 2010 Integrated Report cycle, the following streams within the Klamath National Forest (Forest) were identified as sediment impaired:

In the Iron Gate Dam to Scott River reach of the Klamath River HU:

- Beaver Creek
- Cow Creek
- Deer Creek
- Hungry Creek
- West Fork Beaver Creek

In the Scott to Trinity River reach of the Klamath River HU:

- China Creek
- Fort Goff Creek
- Grider Creek
- Portuguese Creek
- Thompson Creek
- Walker Creek

The listings were based upon interpreting the narrative Basin Plan objectives for Suspended and Settleable Material with numeric evaluation guidelines from the "Klamath National Forest Land and Resource Management Plan" (USFS 1995). The evaluation guidelines used were based on literature values generally derived from watersheds underlain by the Franciscan Formation, which is not the dominant geology in the watersheds within the Klamath National Forest. Therefore, in September 2010, the Klamath National Forest developed a new approach for assessing sediment conditions in streams within the Forest. Klamath National Forest staff followed the State of California's Surface Water Ambient Monitoring Program guidance for screening and identifying reference water bodies (Ode 2009) in order to identify sediment reference water bodies within the Forest to help select more appropriate sediment targets. Regional Water Board staff reviewed and approved the criteria for sediment reference water bodies, which are described in the "Klamath National Forest Sediment and Temperature Monitoring Plan and Quality Assurance Project Plan (USFS 2010)" and summarized as follows:

1. Road density must be less than 0.19 km/km squared (0.30 mi/mi squared) with no significant failures (this road density value also signifies low past timber harvest intensity).
2. No Best Management Practices violations in areas where grazing occurs. Most have no grazing.
3. Mining activities have no significant sediment inputs.

4. Water bodies with natural disturbance were included in the reference pool as a component of the natural variability in conditions.

Regional Water Board staff find that water bodies that meet the above criteria for sediment reference streams are not significantly altered by anthropogenic activities and are considered to reflect natural conditions. Figure 2 presents the water bodies that meet the criteria for sediment (and temperature) reference water bodies.

The Portuguese Creek and Fort Goff Creek watersheds meet the criteria for sediment reference water bodies, and therefore are being proposed for delisting. The other sediment reference water bodies shown in Figure 2 are not currently listed as sediment impaired and Regional Water Board staff denoted them as reference water bodies in the lines of evidence and decisions, reflecting that they currently meet water quality standards and recommending they not be listed in this cycle.

Most of the reference watersheds identified in Figure 2 have no grazing occurring in the watershed. For those with grazing, it is estimated that no more than 5-10% of the reference water body is actually grazed, as topography largely limits the area suitable for grazing.

3.6.2 Klamath National Forest Temperature Reference Water Bodies

Every stream within the Klamath National Forest has been identified on the 303(d) list as impaired for water temperature. The Scott, Salmon, Shasta, and Klamath River TMDL load allocations for stream temperature include an allocation expressed as site-specific potential effective shade, which is the naturally occurring stream shade condition in the absence of human disturbance.

Klamath National Forest staff identified temperature reference water bodies within the Forest following the State of California's Surface Water Ambient Monitoring Program guidance for screening and identifying reference water bodies (Ode 2009). Regional Water Board staff reviewed and approved the criteria for temperature reference water bodies, which are described in the "Klamath National Forest Sediment and Temperature Monitoring Plan and Quality Assurance Project Plan (USFS 2010)" and are summarized as follows:

1. No evidence of human-caused reduction in stream shade is apparent in aerial photos.
2. Road density must be less than 0.19 km/km squared (0.30 mi/mi squared) with no significant failures (this road density value also signifies low past timber harvest intensity).
3. No Best Management Practices violations in areas where grazing occurs. Most have no grazing.
4. Mining activities have no significant sediment input.
5. Water bodies with natural disturbance were included in the reference pool as a component of the natural variability in conditions.

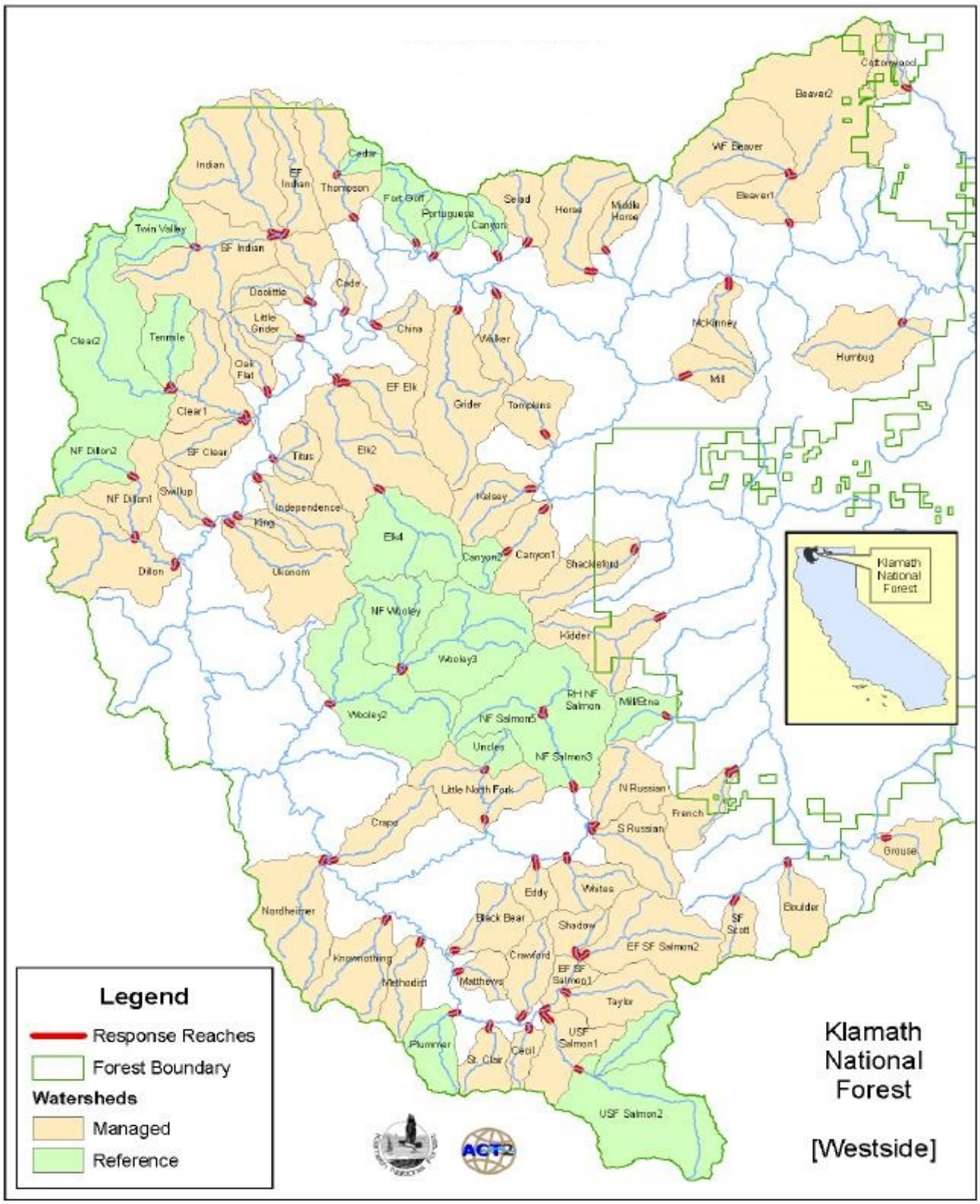

Figure 2: Sediment and Temperature Reference Watersheds within the Klamath National Forest Boundary
*Note: "Response Reaches" are the locations most likely to accumulate fine sediment in response to increased sediment supply and reflect the cumulative effect of sediment input from all sources in the watershed.

Regional Water Board staff find that water bodies that meet the above criteria for temperature reference streams are not significantly altered by anthropogenic activities and are considered to reflect natural conditions. Figure 2 presents the water bodies that meet the criteria for temperature (and sediment) reference water bodies.

The following streams meet the criteria for temperature reference water bodies and therefore are being proposed for delisting:

- Klamath River HU, Middle Klamath River HA, Seiad Valley HSA, Canyon Creek and its Tributaries from the headwaters to confluence with Seiad Creek.
- Klamath River HU, Middle Klamath River HA, Happy Camp HSA, Cedar Creek and its Tributaries.
- Klamath River HU, Middle Klamath River HA, Ukonom HSA, Clear Creek and its Tributaries from the headwaters to the confluence with Tenmile Creek.
- Klamath River HU, Middle Klamath River HA, Ukonom HSA, Elk Creek and its Tributaries from the headwaters to Bear Creek.
- Klamath River HU, Middle Klamath River HA, Happy Camp HSA, Fort Goff Creek and its Tributaries.
- Klamath River HU, Middle Klamath River HA, Happy Camp HSA, Portuguese Creek and its Tributaries.
- Klamath River HU, Middle Klamath River HA, Ukonom HSA, Tenmile Creek and its Tributaries.
- Klamath River HU, Middle Klamath River HA, Happy Camp HSA, Twin Valley Creek and its Tributaries.
- Klamath River HU, Middle Klamath River HA, Ukonom HSA, North Fork Dillon Creek and its Tributaries from the headwaters to Vann Creek.
- Klamath River HU, Scott River HA, Scott Bar HSA, Canyon Creek and its Tributaries from the headwaters to the downstream boundary of the Marble Mountain Wilderness.
- Klamath River HU, Scott River HA, Scott Valley HSA, Mill Creek and its Tributaries from the headwaters to the confluence with Etna Creek.
- Klamath River HU, Salmon River HA, Sawyers Bar HSA, North Fork Salmon River and its Tributaries from the confluence with the Right Hand Fork of the North Fork to the downstream boundary of the Marble Mountain Wilderness (except the Right Hand Fork of the North Fork and its tributaries).
- Klamath River HU, Salmon River HA, Sawyers Bar HSA, North Fork Salmon River and its Tributaries from the headwaters to the confluence with the Right Hand Fork of the North Fork.
- Klamath River HU, Salmon River HA, Cecilville HSA, Plummer Creek and its Tributaries.
- Klamath River HU, Salmon River HA, Sawyers Bar HSA, Right Hand Fork of the North Fork Salmon River and its tributaries.
- Klamath River HU, Salmon River HA, Sawyers Bar HSA, Uncles Creek and its Tributaries.
- Klamath River HU, Salmon River HA, Cecilville HSA, Rush Creek and its Tributaries.

- Klamath River HU, Salmon River HA, Cecilville HSA, South Fork Salmon River from the headwaters to the confluence with Garden Gulch (except Rush Creek and its Tributaries).
- Klamath River HU, Salmon River HA, Wooley Creek HSA, North Fork Wooley Creek and its Tributaries.
- Klamath River HU, Salmon River HA, Wooley Creek HSA, Wooley Creek and its Tributaries from the confluence of the North Fork to Haypress Creek (except North Fork Wooley Creek and its tributaries).
- Klamath River HU, Salmon River HA, Wooley Creek HSA, Wooley Creek and its tributaries from the head waters to the confluence with the North Fork.

Most of the reference watersheds identified above have no grazing occurring in the watershed. For those with grazing, it is estimated that no more than 5-10% of the reference water body is actually grazed, as topography largely limits the area suitable for grazing.

3.6.3 Fecal Indicator Bacteria Assessments

3.6.3.1 Fecal Indicator Bacteria Application in Freshwater and Saltwater

The most common fecal bacteria indicators used to assess the human health risk from recreation beneficial use exposure are total coliform, fecal coliform, *E. coli*, and *Enterococcus* bacteria. With the exception of *E. coli* bacteria, these indicators are composed of specific groups of bacteria species that share common characteristics. *E. coli* bacteria are a single species within the fecal coliform bacteria group.

Total Coliform

Total coliforms are a group of bacteria that are widespread in nature. All members of the total coliform group can occur in human feces, but some can also be present in animal manure, soil, submerged wood, and other places outside the human body. Thus, the usefulness of total coliforms as an indicator of fecal contamination depends on the extent to which the bacteria species found are fecal and human in origin. Because total coliforms can come from non-fecal sources, they are no longer recommended as an indicator for assessing the support of recreation beneficial use (USEPA 1986). However, total coliform is still recommended for use in assessing support of shellfish consumption based on criteria adopted in 1925. These criteria were based on investigations made by the Public Health Service which assessed the occurrence of typhoid fever or other enteric diseases attributed to shellfish harvesting and have been used since adoption (NSSP 2009).

Fecal Coliform

Fecal coliform bacteria are a subgroup of total coliform bacteria found mainly in the intestinal tracts of warm-blooded animals, and thus, are considered a more specific indicator of fecal contamination of water than the total coliform group. Fecal coliform bacteria concentration criteria were initially recommended by USEPA (1976) for assessing support of recreational use. However, since 1976, several key epidemiological studies were conducted to evaluate the criteria for effectiveness at protecting public health from

water contact recreation (Cabelli et al. 1982; Cabelli et al. 1983; Dufour 1983; Favero 1985; Seyfried et al. 1985a, Seyfried et al. 1985b). The studies concluded that the USEPA (1976) recommended fecal coliform bacteria criteria had no scientific basis. As a result of the new information derived from epidemiological studies, the USEPA (1986) changed the criteria recommendation to use the pathogen bacteria indicators of *E. coli* and *Enterococcus* bacteria, instead of fecal coliform bacteria.

In addition, detection of fecal coliform bacteria in recreational waters may overestimate the level of fecal contamination because this bacteria group contains a genus, *Klebsiella*, with species that are not necessarily fecal in origin. *Klebsiella* bacteria are commonly associated with soils and the surfaces of plants, so that areas with allochthonous organic debris (organic material growing outside the water body) may show high levels of fecal coliform bacteria that do not have a fecal-specific bacteria source.

Escherichia coli (E. coli) Bacteria

E. coli is a species of fecal coliform bacteria that is specific to fecal material from humans and other warm-blooded animals. USEPA (2012) compiled numerous epidemiological studies and concluded that *E. coli* bacteria are the best indicator of human health risk from water contact in recreational freshwaters. USEPA (2012) published recommended criteria in the U.S. Federal Register for protection of contact recreation for *E. coli* bacteria.

Enterococcus Bacteria

Enterococcus bacteria are a subgroup within the fecal streptococcus bacteria group. *Enterococcus* bacteria are distinguished by their ability to survive in salt water, and therefore more closely mimic pathogens than the other indicator bacteria. Thus, they are good indicators of pathogens in marine environments. USEPA (2012) recommends enterococcus bacteria concentration as the best indicator of human health risk in salt water for recreation.

USEPA (2012) states that *Enterococcus* bacteria concentrations may also be used as an indicator of human health risk in freshwater. Similar to *E. coli* bacteria, the *Enterococcus* bacteria criteria for protection of water contact recreation were published in the U.S. Federal Register in 2012. However, concerns have been identified for application of the *Enterococcus* bacteria concentration criteria (USEPA 2012) as an indicator of fecal contamination in freshwater.

First, there is concern about applying the *Enterococcus* bacteria concentration criteria in freshwater when some *Enterococcus* bacteria can come from non-fecal sources. The criteria are based on epidemiological studies that found association between illness and *Enterococcus* bacteria concentrations in surface waters with known sources of human fecal waste, specifically *Enterococcus faecalis* and *Enterococcus faecium*. Most research finds that the bacteria species *Enterococcus faecalis* is found mostly in humans, dogs, and chickens, and may or may not come from other warm-blooded animals (Wheeler et al. 2002). *Enterococcus faecium* is commonly found in production animals, such as chickens (Fisher and Philips 2003). *Enterococcus hirae* is frequently found to originate from domestic animals (Devriese et al. 2002). However, sources of *Enterococcus* bacteria in many surface

waters may also be from non-fecal, natural sources. *Enterococcus mundtii* and *Enterococcus casseliflavus* are associated with plant sources, for example (Ferguson et al. 2005; Ferguson et al. 2011).

Second, using *Enterococcus* bacteria concentrations to assess whether there is potential for sewage and human pathogens assumes that the bacteria do not persist or regrow in the environment. Studies have shown that these bacteria persist in benthic sediment and can regrow when re-suspended into the water column. Hartel et al. (2005) found that *Enterococcus* bacteria survived desiccation and regrew in rewetted sediment. Sediment collected in riparian habitat and from naturally occurring drain surface biofilms in freshwater urban streams was found to be a significant reservoir of *Enterococcus* bacteria (Roberts 2012). Anderson et al. (1997) found that a large portion of *Enterococcus* bacteria load in urban and rural waterways came from non-human sources, including large loads from senescing algae. Urban runoff samples have been found to contain relatively higher proportions of *Enterococcus mundtii* and *Enterococcus casseliflavus*, suggesting runoff sources are associated with plant species (Ferguson et al. 2013). Bacterial growth of *Enterococcus casseliflavus* on drain surfaces have been found to serve as a chronic low-level source of *Enterococcus* bacteria measurements collected in urban runoff (Ferguson et al. 2013). These studies indicate that elevated *Enterococcus* bacteria concentrations in water samples might be due to instream conditions that lead to regrowth and not due to contributions from fecal matter.

Finally, the IDEXX Enterolert® method is reported to be subject to a high rate of false positive results from measurements in freshwater samples. It has been shown that several factors can cause interference with the test methods resulting in the over-estimation of *Enterococcus* bacteria concentrations, including suspended sediment in the water (Hartel et al. 2006). Other bacteria types (*Vibrio*, *Shewanella*, *Bacteroides* and *Clostridium*) have also been found to be enumerated as *Enterococcus* bacteria with the method (Sercu et al. 2010). Also, bacterial culture methods for *Enterococcus* (e.g., the IDEXX Enterolert® or membrane filter methods) measure all species of the genus *Enterococcus*, including species that are not of fecal origin.

Findings – Indicator Bacteria Use In Listing and Delisting Decisions

E. coli bacteria are appropriate indicators of fecal contamination in freshwater and human health risk during water contact recreation. Therefore, lines of evidence with *E. coli* data are utilized in making listing/delisting decisions for freshwater associated with recreational beneficial uses.

Total coliforms are no longer recommended as indicators for assessing the support of recreation beneficial uses in fresh and marine waters because they can come from non-fecal sources. Therefore, total coliform lines of evidence are included in the decisions for the 2012 Integrated Report, however they are not considered when making a final listing/delisting decision. Total coliform bacteria are used in assessing support of shellfish consumption uses.

Fecal coliform bacteria are no longer recommended as indicators for assessing the support of recreation beneficial uses in fresh and marine waters because they can come from non-fecal sources. However, fecal coliform lines of evidence are utilized in making listing/delisting decisions because there is currently a numeric fecal coliform bacteria objective in the Basin Plan. The Basin Plan bacteria objective is expected to be revised before the next Integrated Report cycle to remove the fecal coliform part of the bacteria objective. Once the Basin Plan has been revised, fecal coliform will no longer be utilized in the Integrated Report assessments, and listings originally based solely on fecal coliform data will likely be delisted.

Enterococcus bacteria are not appropriate indicators of sewage and pathogens in freshwater because they can come from non-fecal sources, can regrow in the stream environment, and because there is a likelihood of false positive results in freshwater using current analytical methods. Therefore, *Enterococcus* lines of evidence are included in the decisions for freshwater bodies the 2012 Integrated Report, however they are not considered when making a final listing/delisting decision. However, *Enterococcus* lines of evidence continue to be utilized as an indicator in salt water and listing/delisting decisions are made based upon *Enterococcus* data.

3.6.3.2 Freshwater Bacteria Evaluation Guidelines

State Water Board staff determined that the 2012 USEPA Recreational Water Quality Criteria (USEPA 2012) would not be applied to data submitted for the 2012 Integrated Report cycle, as the data had already been assessed and lines of evidence developed by the time the criteria were finalized. In the interest of expedience, State Water Board staff directed the Regional Water Boards to move forward with the existing lines of evidence and to utilize the 2012 USEPA criteria for the next Integrated Report cycle. Thus, the evaluation guideline for *E. Coli* utilized to interpret the Basin Plan objective is cited from the "California Department of Health Services Draft Guidance for Fresh Water Beaches" (CA DHS 2011), which is the same as that recommended in the USEPA document "Ambient Water Quality Criteria for Bacteria-1986" (USEPA 1986).

3.6.3.3 Exceedance Frequency Selection

Section 3.3 of the Listing Policy states: "*For bacterial measurements from coastal beaches, if water quality monitoring was conducted April 1 through October 31* ***only****, a four percent exceedance percentage shall be used. For bacterial measurements from inland waters, if water quality monitoring data were collected April 1 through October 31* ***only,*** *a four percent exceedance percentage shall be used if (1) bacterial measurements are indicative of human fecal matter, and (2) there is substantial human contact in the water body. If the exceedance is due to a closure related to a sewage spill, the water segment shall not be placed on the section 303(d) list. Postings that are not backed by water quality data shall not be used to support placement of a water segment on the section 303(d) list.*" [emphasis added]

State Water Board staff interprets this to mean that all AB411 ocean beaches and freshwater inland surface waters designated with the Water Contact Recreation (REC -1) beneficial use that have data collected for only dry weather (April 1 – October 31) shall be evaluated based on a four percent exceedance frequency. If there are data submitted for

the entire year (data outside the April 1 – October 31 date range) then all the data should be evaluated based on either a ten percent exceedance rate or some site-specific frequency.

During the 2012 Integrated Report cycle, indicator bacteria lines of evidence were created based on the interpretation above and staff made a concerted effort to indicate when water bodies only had dry weather data.

When creating decisions, Regional Water Board staff grouped data from different Integrated Report cycles (2006, 2010, and 2012) according to when it was collected so that the correct exceedance frequency could be applied to the data. Each indicator bacteria decision explains how the data were or were not grouped, and which exceedance frequency is applied to the data to determine if listing or delisting is warranted.

3.6.3.4 Recommended Changes to Attachment 2 of the Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems

On June 19, 2012, the State Water Board adopted the *Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems* (OWTS Policy) via Resolution No. 2012-0032. The OWTS Policy went into effect on May 13, 2013. The purpose of the OWTS Policy is to allow the continued use of OWTS, while protecting water quality and public health. The OWTS Policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements and sets the level of performance and protection expected from OWTS.

Tier 3 of the OWTS Policy applies to existing, new, and replacement OWTS that are near water bodies that have been listed as impaired by indicator bacteria (referred to as "pathogens" in the OWTS Policy) or nitrogen. If no TMDL and implementation plan has been established and no Local Agency Management Program special provision exists for these water bodies, new or replacement OWTS within 600 feet of those impaired water bodies listed in Attachment 2 of the OWTS Policy must meet the requirements of Tier 3.

Attachment 2 of the OWTS Policy identifies those indicator bacteria and nitrogen impaired water bodies where: (1) it is likely that operating OWTS will subsequently be determined to be a contributing source of indicator bacteria or nitrogen and therefore it is anticipated that OWTS would receive a loading reduction in a TMDL, and (2) it is likely that new OWTS installations discharging within 600 feet of the water body would contribute to the impairment. Per the OWTS Policy (Tier 3, Section 10) the Regional Water Boards must adopt TMDLs by the dates specified in Attachment 2.

The OWTS Policy directs State and Regional Water Boards to identify those indicator bacteria and nitrogen impaired water bodies that are to be added or removed from Attachment 2 at the time of approving the 303(d) List. At the present time Regional Water Board staff do not recommend that any new water bodies be placed on Attachment 2 of the OWTS Policy, as it cannot be determined if OWTS are contributing to the indicator bacteria impairments for those water bodies that are being recommended for listing and there are no new nitrogen listing being proposed. Regional Water Board staff recommend that Luffenholtz Beach, Moonstone County Park, Trinidad State Beach be removed from

Attachment 2 of the OWTS Policy, as data indicate these water bodies are meeting bacterial water quality standards and therefore they are being recommended for delisting for indicator bacteria. Regional Water Board staff also recommend that the mainstem Laguna de Santa Rosa be removed from Attachment 2, as the water body is being delisted for nitrogen.

3.6.4 Flow Impairment Data and Information Submittals

The Regional Water Board received four data submittals requesting waters be identified as impaired by low or altered instream flows in the region: 1) Quartz Valley Indian Reservation flow impairment request and data submittal for the Scott River, 2) Klamath Riverkeeper flow impairment request and data submittal for the Shasta River, 3) Save Mark West Creek flow impairment request and data submittal for Mark West Creek, and 4) a request for impairments in several streams by a coalition of 26 conservation and fishing advocacy groups (the Coalition). In total, the submittals assert that ten water bodies are impaired due to consumptive use of surface water, resulting in the reduction or elimination of stream flows.

Regional Water Board staff reviewed the information submitted and a river-by-river summary is provided below.

3.6.4.1 Information Received

Eel River (see reference Coalition 2010)

The Regional Water Board received a report from the Coalition entitled "Evaluation of the Effectiveness of Potter Valley Project National Marine Fisheries Service Reasonable and Prudent Alternative (RPA): Implications for the Survival and Recovery of Eel River Coho Salmon, Chinook Salmon, and Steelhead Trout" (report), prepared by Patrick Higgins and dated February 2010. Mr. Higgins is a consulting fisheries biologist.

The report contains information describing the history of the Potter Valley Project (Project) and Eel River salmon and steelhead fishery, an analysis of Project flows in relation to salmonid recovery prospects, discussions of the invasive Pikeminnow, flow-related impacts on salmonid migration and rearing, and the impacts of limiting salmonid migration to the Eel River below Lake Pillsbury.

The report asserts that the Federal Energy Regulatory Commission's (FERC) rules governing flow releases from the Potter Valley Project limit the ability of Chinook salmon to successfully migrate and spawn downstream of the Project. The report cites data describing historic flow releases, observed time periods of spawning activity, and a report authored by VTN Oregon, Inc. (1982) developed in support of the 1983 FERC relicensing process. The VTN Oregon report evaluated the flows necessary for Chinook salmon to pass critical riffles downstream of the Project. The report asserts that the flows recommended by VTN Oregon are not met in many years due to Project operations aimed at filling Lake Pillsbury during the time period associated with Chinook salmon migration.

The report also asserts that the operation of the Potter Valley Project results in water temperatures harmful to salmonids and favorable to invasive Pikeminnow during summer months. The report suggests that increasing Eel River flows downstream of the Project in the range of 68 to 235 cubic feet per second (cfs) during the summer months would protect salmonids against high temperatures.

The Coalition's Eel River submittal did not provide any information describing flow conditions relative to unimpaired flows or document any exceedance of water quality objectives.

The USEPA (2004) evaluated the impacts of Potter Valley Project operations on temperature conditions and found that the current summer flow schedule likely results in stream temperatures cooler or nearly equal to estimated natural stream temperatures.

Scott River (see references QVIR 2010 and Coalition 2010)
The Regional Water Board received data submittals from the Quartz Valley Indian Reservation (QVIR) and the Coalition asserting that the beneficial uses of the Scott River and its tributaries are impaired due to flow alteration. The QVIR submittal included the Regional Water Board's findings from the Scott River Sediment and Temperature TMDL (Scott TMDL), flow and water quality data collected by the Tribe, estimates of unimpaired Scott River flows, documentation of increased frequency of extreme low flows and dewatering events, a 1974 California Department of Fish and Wildlife (CDFW [formerly known as California Department of Fish and Game]) report documenting stream flow needs in the Scott River basin, a groundwater modelling analysis of stream depletion associated with groundwater pumping, and commentary on the impacts of low flows and dewatering events on beneficial uses. The Coalition's submittal also included a summary of findings from the Scott TMDL, as well as comments on the Scott TMDL and the Policy for Maintaining Instream Flows in North California Coastal Streams previously submitted by members of the Coalition.

The Scott TMDL identifies flow as a causative factor related to elevated water temperatures, but does not identify specific flow objectives necessary to attain or maintain water quality objectives.

Shasta River (see references Klamath Riverkeeper 2010 and Coalition 2010)
The Regional Water Board received data submittals from the Klamath Riverkeeper (on behalf of Klamath Riverkeeper, Pacific Coast Federation of Fisherman's Associations, the Institute for Fisheries Research, the Environmental Protection Information Center, and Klamath Forest Alliance) and the Coalition asserting that the beneficial uses of the Shasta River and its tributaries are impaired due to flow alteration.

The Klamath Riverkeeper submitted comments prepared on their behalf by consulting fisheries biologist Patrick Higgins. In his report, Mr. Higgins draws on the findings of the National Academy of Sciences, USEPA, Regional Water Board, California Department of Fish and Wildlife (CDFW), and National Marine Fisheries Service to make the case that elevated water temperature, depressed dissolved oxygen conditions, and losses of Coho salmon

habitat in the Shasta River basin can only be remedied by increased stream flows. The report includes flow data spanning the low flow periods of 2001 and 2009 showing abrupt drops in flow during the irrigation season and dramatic increases in flow (approximately 80 cfs) at the end of the season.

The report identifies the near complete dewatering of fisheries habitat in the Shasta River below Dwinnell Reservoir during summer months as a case of flow impairment due solely to lack of water. Likewise, the report identifies extractions from Big Springs as having acute temperature impacts in Big Springs Creek and downstream Shasta River reaches. The report also identifies the dewatering of Parks Creek and diversions from numerous small springs hydrologically connected to the Shasta River as greatly diminishing Coho salmon habitat. Included with the report is a memo from CDFW staff documenting Coho mortality associated with spring diversions. The report concludes that the mainstem Shasta River, Dwinnell Reservoir, Big Springs Creek, Parks Creek, Willow Creek, Julien Creek, and the Little Shasta River are deserving of flow impairment listings.

The Shasta River submittal provided by the Coalition was also authored by Patrick Higgins and contains much of the same information as the Klamath Riverkeeper submittal, but in an abbreviated form.

The *Shasta River Watershed Temperature and Dissolved Oxygen TMDL* identifies the reduction of cold water inputs as a causative factor affecting the water quality of the Shasta River. The TMDL establishes a flow recommendation of an additional 45 cfs of dedicated cold water as a means of addressing the temperature impairment.

Gualala River(see reference Coalition 2010)

The Regional Water Board received data submitted by the Coalition asserting that the beneficial uses of the Gualala River and its tributaries are impaired due to flow alteration. The submittal consists of six comment letters submitted to the California Department of Forestry and Fire Protection by Patrick Higgins in response to timber harvest plans proposed in the Gualala River watershed, including plans for conversion of timber lands to vineyards. The comment letters are similar and discuss sediment, temperature, flow, and fisheries issues present in the Gualala River watershed. The flow issues described include a comparison of flow conditions observed in 2001 to flows measured in the same locations during the drought of 1977. The flows were low in 1977 but absent in 2001.

None of the comment letters submitted identify a cause of reduced flow in the Gualala River, nor are any water quality objectives exceedances associated with reduced flow identified.

Mark West Creek, tributary to Russian River (see references Coalition 2010 and Friends of Mark West Creek 2010)

The Regional Water Board received data submitted by the Coalition and Friends of the Mark West Watershed asserting that the beneficial uses of Mark West Creek, tributary to the Russian River, are impaired due to flow alteration. The submittal consists of letters and

reports documenting substantial changes in summer flows that coincide with rapidly increasing diversions and reduced salmonid populations.

The submittal includes a copy of a CDFW report documenting a stream survey conducted July 22-25, 1969, that documents flows of approximately 1.4 cfs near the headwaters, 1.1 cfs in a middle reach, and 4.2 cfs at the mouth. The CDFW report estimates steelhead numbers at 60 per 100 feet of stream length. The report also notes that flows were intermittent in a 2-mile reach below Calistoga Road.

The submittal includes a document titled "Mark West Creek Flow Study Report" (flow report), dated November 14, 2008. The flow report identifies six locations where flow was monitored during the summer of 2008, and presents the findings. The flow report documents that Mark West Creek flows diminished to zero at all three mainstem sites, and that the three tributary sites were either dry or had flows too low to measure throughout the summer and fall of 2008.

Finally, the submittal includes letters written in opposition to a planned vineyard and winery in the upper Mark West Creek watershed. The letters document landowners' observations that flows have drastically dropped in Mark West Creek over the last 15 years. The observations include an account of one landowner's inability to draw water from the creek after 1998, necessitating the development of a well to replace the surface water use.

Mattole River (see reference Coalition 2010)

The Regional Water Board received data submitted by the Coalition asserting that the beneficial uses of the Mattole River and its tributaries are impaired due to flow alteration. The Coalition letter asserts that lack of streamflow is a major limitation on salmonid habitat in the Mattole basin, and that stranding of juvenile salmonids in isolated pools has resulted in salmonid mortality and fish rescue operations.

The submittal includes a 2007 report authored by hydrologist Randy Klein, which documents an analysis of low flows in the Mattole River basin in the years 2004-2006. The report demonstrates that flows in the upper Mattole River watershed are lower than the rest of the watershed when flows are normalized for drainage area. Water use demands in the area were not analyzed in the study, nor was there any comparison of current flows to historic flows.

Navarro River (see reference Coalition 2010)

The Regional Water Board received data submitted by the Coalition asserting that the beneficial uses of the Navarro River are impaired due to low flows. Two supporting documents were included in the Coalition letter: Patrick Higgins' letter providing comments on the *Policy to Maintain Instream Flows in Northern California Streams* (instream flow policy), and excerpts from the KRIS Navarro database discussing the hypothesis that "surface flows in the Navarro River basin have been diminished in recent decades, which reduces salmon and steelhead productivity."

Higgins' comment letter on the instream flow policy describes the history of a complaint filed by the Sierra Club, including their assertions that water diversions from the Navarro River and its tributaries have significantly impaired beneficial uses. The letter describes an incident when the river was pumped dry during August and September of 1992. Higgins identified Navarro River beneficial uses associated with salmonids (e.g. COLD, RARE, MIGR, SPWN) and recreation (REC-1) as being impaired. Higgins also discusses that flows on September 21, 2001 were 1.1 cfs and fish were absent at a location where, on August 12, 1962, flows of 15 cfs were measured and trout were observed.

The KRIS Navarro excerpt documents the history of the Sierra Club's complaint discussed above, and the investigation by the SWRCB's Division of Water Rights that followed. The excerpt also discusses dry reaches of the Navarro River and tributaries observed by the KRIS Navarro development team.

Redwood and Maacama Creeks, Tributaries to Russian River (see reference Coalition 2010)
The Regional Water Board received data submitted by the Coalition asserting that the beneficial uses of Redwood and Maacama Creeks, tributaries to Russian River, are impaired due to flow alteration. The Coalition submitted a letter by Patrick Higgins to the County of Sonoma commenting on an application for a winery that the County was considering. The letter describes poor salmonid habitat conditions in Maacama Creek and one of its tributaries, Redwood Creek. Higgins' letter identifies low flow conditions among the many habitat conditions limiting salmonids, and asserts that water diversions are partly responsible. The letter describes data describing fish surveys at the beginning and end of summer that indicate juvenile steelhead mortality is high during summer months.

3.6.4.2 Regional Water Board Assessment and Recommendation

The *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List* (Listing Policy) does not provide guidance for evaluation of water quality impairments related to reduced flow. The Listing Policy focuses on evaluation of impairment by *pollutants* to determine if placement on the 303(d) List is warranted, whereas the effects of reduced flows are considered *pollution* and are not covered under the Listing Policy guidance as impairments caused by pollution are not a part of the 303(d) List. The Listing Policy guidance most applicable to the effects of reduced flow is described in Section 3.11, "Situation-Specific Weight of Evidence Listing Factor." Section 3.11 states "When all other Listing Factors do not result in the listing of a water segment but information indicates non-attainment of standards, a water segment shall be evaluated to determine whether the weight of evidence demonstrates that a water quality standard is not attained" (State Water Board 2004a, page 8).

The Basin Plan includes water quality objectives for parameters that are affected by flow, such as temperature. The Eel, Scott, Shasta, Mattole, Navarro, and Russian River watersheds are all listed for temperature impairment on the 2010 303(d) List. Many of those temperature listings and accompanying TMDLs identify flow regulation/modification, upstream impoundment, or hydromodification as a factor contributing to the impairment. USEPA guidance recommends placing waters impaired by non-pollutants (i.e., lack of water) in Integrated Report Category 4c, only if it can be

demonstrated that the failure to meet water quality standards is not caused by a pollutant, but instead is caused by altered or reduced surface water flows. The entities that submitted flow listing requests discussed above seek a determination that reduced flows are the cause of impairment, not just a factor contributing to impairment. The Listing Policy provides no direction to assist in distinguishing whether a factor is the cause versus a contributing source of impairment.

In the absence of a statewide methodology for assessing flow alteration impairments through the Integrated Report process, Regional Water Board staff are unable to determine if placement of these water bodies in Category 4c is appropriate. Lines of evidence and decisions were not developed.

3.6.4.3 Next Steps

Regional Water Board staff intend to continue working with staff from the State and Regional Water Boards to develop a state-wide scientifically defensible approach to evaluating flow alteration impairment through the Integrated Report process in order to ensure consistency and objectivity. The approach should be applicable to any stream in the state and preferably include a methodology to derive an appropriate instream flow recommendation. Regional Water Board staff are prepared to work with State Water Board staff in developing such an approach, with involvement from the Division of Water Rights, other Regional Water Boards, and stakeholders.

Regional Water Board staff suggest that a methodology for evaluating flow impairment through the Integrated Report process consider the following factors: (1) whether flows are altered from natural or historic flows, (2) whether flow alterations are caused by human activities, (3) impacts to beneficial uses caused by altered flows, and (4) exceedance of water quality objectives caused by altered flows. Staff suggest that factors 1 and 2, and either 3 or 4 must be demonstrated for an affirmative flow impairment listing determination. The methodology should also include guidance for assessment of the four factors and make clear that any flow listing shall not be construed to prevent or delay any ongoing or future efforts to address low flow conditions in the absence of any such listing.

The CDFW has initiated instream flow studies in both the Scott and Shasta River watersheds, and the Regional Water Board is participating in these studies. Regional Water Board staff is supporting the development of instream flow studies in the Mattole, Navarro, and Eel Rivers, consistent with the proposed *Action Plans to Address Elevated Water Temperatures in the Mattole, Navarro, and Eel River Watersheds.* Regional Water Board staff will continue to support instream flow studies in the Scott, Shasta, Mattole, Navarro, and Eel River watersheds, and consider other watersheds, such as Mark West Creek, as appropriate.

3.6.5 Assessment of Data From Streams and Stream Segments Within Native American Reservations

The Regional and State Water Boards do not have the authority to list or delist water bodies within the boundaries of Native American Reservations, as only the federal

government through the USEPA has jurisdiction to list and delist water bodies on Tribal land. However, the Regional Water Board's Basin Plan applies to streams and stream segments within Native American Reservations when the Tribe does not have a USEPA-approved Basin Plan of their own. Only the Hoopa Valley Tribe has a USEPA-approved Basin Plan in the North Coast Region.

State Water Board staff created lines of evidence for data collected both within and outside Native American Reservation boundaries. The objectives from the Regional Water Board's Basin Plan were applied to all data, except those data collected in water bodies on the Hoopa Valley Tribe Reservation, where the objectives from the Hoopa's Basin Plan were utilized.

All lines of evidence were associated with decisions for those water bodies, although the lines of evidence containing data collected on Tribal land were not utilized by Regional Water Board staff to make a final listing or delisting determination. Instead, staff summarized the data from Tribal land and made a recommendation within the decision for the USEPA to either list or delist the stream(s) or streams segment(s) where the data were collected on Tribal Land.

3.6.6 Assessment of Turbidity Data for the Current and Past Integrated Report Cycles

The Basin Plan objective for turbidity reads: "Turbidity shall not be increased more than 20 percent above naturally occurring background levels. Allowable zones of dilution within which higher percentages can be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof." Natural background turbidity levels have been determined for the Mad River through the Mad River TMDLs for Sediment and Turbidity. Natural background turbidity levels have not been determined for any other water body in the North Coast Region.

In previous Integrated Report cycles, turbidity data (from water bodies outside the Mad River watershed) were assessed against an evaluation guideline from a scientific paper published by the American Fisheries Society titled "Effects of Chronic Turbidity on Density and Growth of Steelheads and Coho Salmon" (Sigler et al. 1984). In early 2013, State Water Board staff and staff from the Central Valley Regional Water Quality Control Board met with staff from the California Department of Fish and Wildlife (CDFW) to determine if it was appropriate to utilize the turbidity values from the scientific paper to interpret the Basin Plan turbidity objective and determine beneficial use impairment. The outcome of this meeting was the finding that the turbidity values in the cited paper should not be used to determine if water bodies should be listed or delisted for turbidity. CDFW staff stated that the numbers in the scientific paper should not be applied to the integrated report process and the turbidity values in the paper should not be utilized to defend a decision to list or delist a water body for turbidity.

Therefore, turbidity lines of evidence from past listing cycles have been revised to remove the Sigler et al. 1984 reference as an evaluation guideline. For all water bodies, besides the Mad River, the evaluation guideline field now reads "At the present time, natural

background turbidity levels have not been determined for this watershed, and exceedance probabilities (the turbidity, associated with flow, that is exceeded X% of the time) have not been calculated. Thus, there is currently no appropriate evaluation guideline for this watershed, and no way to determine whether the objective is being exceeded." This change in the evaluation guideline did not result in any listing changes.

3.6.7 Use of MWMT and Grab Sample Temperature Data in Listing & Delisting Decisions

Two common ways to measure water temperatures are by "grab sample," which involves a point-in-time measurement of water temperature, and by continuous measurement of water temperature utilizing a water quality monitoring instrument that is deployed in a water body for a prolonged period of time and records the water temperature at set intervals.

Continuous water temperature data can be used to calculate several water temperature metrics including the maximum weekly maximum temperature (MWMT). The MWMT is also known as the seven-day average of the daily maximum temperatures (7-DADM), and is the maximum seasonal or yearly value of the daily maximum temperatures over a running seven-day consecutive period. The MWMT is useful because it describes the maximum temperatures in a stream in a season or in a year, but is not overly influenced by the maximum temperature of a single day.

By their nature, MWMTs are a robust metric of the water temperatures in a water body, because they require a year or season's worth of continuously monitored temperature data to calculate a single MWMT. Grab sample data, on the other hand, are a point-in-time measurement that only captures water temperatures at a particular date and time, and may not capture the hottest time of day or time of year.

Therefore, for water temperature listing and delisting decisions that had both MWMT and grab sample data, Regional Water Board staff deferred to the MWMT data to make listing and delisting determinations, as they are a much more robust metric of temperature conditions and capture the peak temperatures in the water body that are of the greatest concern to the protection of beneficial uses. Staff required that a minimum of 5 years or 5 summer seasons of continuous temperature monitoring data (5 MWMTs) were necessary to make new listing and delisting determinations.

3.6.8 Overview of the Biostimulatory Conditions Assessment Process

Except in extreme cases, nutrients alone do not impair beneficial uses. Rather, they can contribute to biostimulatory conditions within the water body by causing excessive algal growth, which in turn contributes to extreme diel patterns for dissolved oxygen (DO) and pH that impair beneficial uses. Water body specific factors such as riparian cover, flow, stream channel configuration, and water temperature affect how nutrients are processed within the stream and play a large role in determining whether or not biostimulatory conditions will prevail.

For these reasons the assessment of biostimulatory conditions includes, first, an evaluation of nutrient-related "primary indicator" parameters (DO, pH, and chlorophyll-a) for evidence of biostimulatory conditions that could potentially impair beneficial uses. An evaluation of Total Nitrogen (TN) and Total Phosphorus (TP) data can also be conducted, although it is not necessary to have information on these parameters to establish a biostimulatory conditions listing as factors other than nutrients can contribute to biostimulatory conditions (as outlined above).

Dissolved oxygen and pH thresholds for impairment are taken from the Basin Plan objective for these parameters. Additionally, the diel swings in these data are evaluated to see if they suggest that the water body is exhibiting biostimulatory conditions. The threshold utilized for chlorophyll –a (as benthic algal biomass), is the Beneficial Use Risk Category (BURC) II/III boundary, which represents a level where there is scientific consensus that the risk of impairment from biostimulatory conditions in probable. The BURC II/III threshold values can be found in the document "Technical Approach To Develop Nutrient Numeric Endpoints for California" (CA NNE) (Creager et al. 2006). If TN and TP data are available they are compared to water body specific targets (such as those from a TMDL analysis) or to the "Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion II" (USEPA 2000).

3.6.9 Use of Secondary Maximum Contaminant Levles (MCLs)

Regional Water Board staff assessed metals data under the chemical constituents objective to assess protection of the municipal and domestic supply (MUN) beneficial use. The MUN beneficial use applies to both domestic and municipal water supplies, including domestic water supply systems which deliver untreated surface water for consumption and household use.

Per the Basin Plan, secondary MCLs may be applied to protect the MUN beneficial use through either the taste and odor objective or the chemical constituents objective with the same outcome. The lines of evidence contained in the Integrated Report have been developed utilizing the chemical constituents objective as the bases for applying the secondary MCLs for metals as appropriate criteria, however as stated above they could also have been developed utilizing the taste and odor objective.

Secondary MCLs are incorporated into Table 3-2 of the current, May 2011 version of the Basin Plan by footnote 2 which states "Other water quality objectives (e.g., taste and odor thresholds or other secondary MCLs) and policies (e.g., State Water Board 'Policy With Respect to Maintaining High Quality Waters in California') that are more stringent may apply." Footnote 2 in Table 3-2 was explicitly added to the Basin Plan in a 1993 Basin Plan amendment for the purpose of clarifying how water quality objectives apply to the cleanup of groundwater and surface water. Therefore, more stringent taste and odor criteria as listed in Title 22 (the secondary MCLs) are being applied through the chemical constituents objective to support the Municipal and Domestic Supply (MUN) beneficial use.

3.7 SUMMARY OF SIGNIFICANT CHANGES SINCE THE PUBLIC REVIEW DRAFT RELEASE

The following sections describe the significant changes that have been made to 2012 Integrated Report assessments, fact sheets, and listing / delisting recommendations since the Public Review Draft was released.

3.7.1 Changes to the Assessment Methodology for Evaluating Data for Mercury in Fish Tissue

The assessment method utilized to evaluate mercury in fish tissue data has changed since the Public Review Draft 2012 Integrated Report and this has resulted in the recommendation to list two additional water bodies: Spring Lake in Sonoma County and Dead Lake in Del Norte County.

Comments from staff of the San Francisco Bay Regional Water Quality Control Board and Central Valley Regional Water Quality Control Board working on the Statewide Mercury Control Program (SMCP) reflect concern with the assessment methodology being utilized to evaluate mercury in fish tissue data from the Surface Water Ambient Monitoring Program (SWAMP) Lakes and Reservoirs study. The SMCP is evaluating each composite sample as its own data point, while the Public Review Draft 2012 Integrated Report averaged the composite samples collected on the same day at a single location. San Francisco Bay and Central Valley Regional Water Board staff are concerned that averaging the composite samples results in a large number of lakes and reservoirs with a multitude of composite samples exceeding the threshold for mercury having only one 1 data point reflected in the lines of evidence in the Integrated Report, and one sample is not adequate to list. The Integrated Report and SMCP should use a consistent assessment methodology.

As a result of this comment, Integrated Report staff re-evaluated all mercury in fish tissue data, including those data from lakes and reservoirs that has been collected through SWAMP. The data utilized to make final listing and delisting decisions are now re-evaluated in a manner consistent with how the SMCP is evaluating mercury in fish tissue data. The assessment methodology is as follows: each fish tissue composite sample is evaluated as its own sample instead of the composites from a single date and location being averaged. While the Listing Policy requires that samples be spatially and temporally independent, fish are not static and move throughout a lake or stream and accumulate mercury in tissue over time. Therefore, the data are, by their nature, spatially and temporally independent even though they were collected at the same site on the same day. The original lines of evidence where data are averaged are still included and discussed in the decision although they are not utilized to make the final listing or delisting decision.

3.7.2 Changes to the Public Review Draft Trinidad HU, Little River HA, Bullwinkle Creek Proposed Indicator Bacteria Listing

Assessment protocols provided by State Water Board staff pertaining to the minimum sample size and number of exceedances for indicator bacteria listing and delisting

determinations utilizing a 4% exceedance rate has changed since the Public Review Draft was released. As a result, Regional Water Board staff are no longer recommending that Bullwinkle Creek be listed for indicator bacteria, as discussed below.

Assessment of ocean and freshwater indicator bacteria data evaluated at a 4% exceedance rate in the Public Review Draft 2012 Integrated Report were based upon information provided by State Water Board staff in August of 2013. The information stated that a minimum of 15 samples with 2 or more exceedances were required to make a listing recommendation, and a minimum of 27 samples with less than or equal to 2 exceedances were required to make a delisting recommendation. The exception to this was that listing can occur with less than 15 samples if 2 or more of the samples exceed the objective/ evaluation guideline.

Clarification of the assessment protocol provided by staff at the State Water Board during the public comment period on the Public Review Draft of the 2012 Integrated Report conveyed that the August 2013 information on the minimum sample size requirements for beach indicator bacteria listing and delisting determinations utilizing a 4% exceedance rate under Sections 3.3 and 4.3 of the Listing Policy was incorrect. The correct information is as follows: a minimum of 22 samples with 3 or more exceedances are required to make a listing recommendation, and a minimum of 22 samples with less than or equal to 2 exceedances are required to make a delisting recommendation. The exception to this is that listing can occur with less than 22 samples if 3 or more of the samples exceed the objective/evaluation guideline.

Regional Water Board staff have reviewed all of the indicator bacteria decisions from the Public Review Draft to see if the revised assessment information provided by the State Water Board would change any listing or delisting recommendations. Only one stream would have a listing recommendation changed based upon the new assessment directions: Bullwinkle Creek (Decision 30563). Therefore, staff have revised Decision 30563 to reflect that Bullwinkle Creek is no longer being recommended for listing. There are only 2 samples and 2 exceedances for Bullwinkle Creek, which is less than the minimum of 3 exceedances required for a listing recommendation.

The remainder of the decision recommendations remain unchanged. During the next Integrated Report cycle, the decision language referring to the number of samples and number of exceedances required for listing and delisting will be edited, as appropriate, based upon the State Water Board's clarification of the assessment protocol.

3.7.3 Discussion of the Re-Evaluation of Indicator Bacteria Data Submitted by the Humboldt Baykeeper

Indicator bacteria data submitted by Humboldt Baykeeper were evaluated as fecal coliform in the Public Review Draft 2012 Integrated Report, as the data from the excel spreadsheets and supporting documentation submitted by Humboldt Baykeeper portrayed the data as such. Comments submitted by Humboldt Baykeeper on the Public Review Draft and follow-up e-mail correspondence pertaining to several indicator bacteria listing recommendations

have revealed that the indicator bacteria data were incorrectly describe as all being fecal coliform data, when in fact some of the data are *E. coli*. The data collected from January 2005-May 2008 are fecal coliform data, and the data from September 2008 – October 2009 are *E. coli* data.

Regional Water Board staff have re-evaluated the Humboldt Baykeeper indicator bacteria data from the September 2008 – October 2009 period as *E. coli* data and the lines of evidence and decisions have been updated accordingly. Only one listing recommendation has changed since the Public Review Draft, for Bullwinkle Creek, however this was due to a clarification of the assessment protocol from the State Water Board as described in Section 3.7.2.

3.7.4 Proposal to List the Klamath River HU, Shasta River HA, Mainstem Shasta River for Aluminum

The proposal to "do not list" the mainstem Shasta River (within the Klamath River HU, Shasta River HA water body) changed since the Public Review Draft 2012 Integrated Report was issued. Comments were submitted by the Karuk and Yurok Tribes requesting that all aluminum data from the mainstem Shasta River be evaluated against the secondary Maximum Contaminant Level (MCL) and not the primary MCL.

The secondary MCL is a much lower threshold which protects against taste and odor impairments of the municipal and domestic supply (MUN) beneficial use. Secondary MCLs are incorporated into Table 3-2 of the Basin Plan by footnote 2 which states "Other water quality objectives (e.g., taste and odor thresholds or other secondary MCLs) and policies (e.g., State Water Board 'Policy With Respect to Maintaining High Quality Waters in California') that are more stringent may apply."

Regional Water Board staff have re-evaluated the aluminum data from the mainstem Shasta River against the secondary MCL, and this re-assessment resulted in a change in the listing recommendation from "do not list" to "list".

3.7.5 Re-Segmentation of the Mainstem Scott River and Changes to the Extent of the Biostimulatory Conditions, Dissolved Oxygen, pH, and Aluminum Proposed Listings

The extent of the proposed biostimulatory conditions, dissolved oxygen, pH, and aluminum listings in the mainstem Scott River has changed since the Public Review Draft 2012 Integrated Report was issued. Comments were submitted by the County of Siskiyou and Siskiyou County Flood Control and Water Conservation District stating that the entire mainstem Scott River should not be listed for biostimulatory conditions, dissolved oxygen, and pH based upon data collected at a single location that wasn't representative of the entire mainstem Scott River.

Regional Water Board staff familiar with the Scott River watershed evaluated whether it was appropriate to re-segment the mainstem Scott River for Integrated Report assessment purposes. It was determined that the mainstem Scott River could be appropriately re-

segmented into three parts: (1) the upper mainstem Scott River from the confluence of the East and South Forks to Young's Dam (2) the middle mainstem Scott River from Young's Dam to Boulder Creek, and (3) the lower mainstem Scott River from Boulder Creek to the mouth.

The reach of the Scott River from the confluence of the East and South Forks to Young's Dam is greatly affected by groundwater-surface water interaction, and receives a large amount of groundwater that accounts for the majority of the flow leaving this reach. This portion of the river is not entrenched and the river can access its floodplain. Additionally, a portion of this stretch of river has been affected by dredge mining and the tailings are still apparent in the stream channel.

The hydrology of the Scott River from Young's Dam to Boulder Creek is unique due to the diversion of water at Young's Dam. The diversion to the Scott Valley Irrigation District often takes the majority of the stream flow in the summer months, up to 42 cfs. This is also a logical break in the mainstem segmentation because the relationship of groundwater-surface water interactions changes near this location, and the river is entrenched below the dam, but not above, which affects the river's access to the floodplain.

The hydrology of the reach of the Scott River from Boulder Creek to the Klamath River changes yet again due to the fact that this area runs through the steep canyon portion of the watershed. Additionally, this area of the Scott River receives the inflows from Boulder Creek, Canyon Creek, and nearby springs, and these inflows define the downstream hydrology of the river during the low flow season. Therefore the hydrology in the lower Scott River is different than in the reaches above.

Therefore, all data for the mainstem Scott River were reviewed, and the Lines of Evidence and Decisions for the Scott River HA now reflect this re-segmentation. The re-evaluation of data based upon these new mainstem segments resulted in changes to the extent of four listing recommendations: biostimulatory conditions, dissolved oxygen, pH , and aluminum. In this final staff report, only the middle mainstem Scott River from Young's Dam to Boulder Creek (and not the entire mainstem Scott River) is recommended for listing for these four parameters.

3.7.6 Changes to Indicator Bacteria Delisting Recommendations for the Russian River HU

The proposal to delist or decrease the scope of indicator bacteria listings in four water bodies within the Russian River HU has changed since the release of the Public Review Draft 2012 Integrated Report. The following water bodies in the Russian River HU, Middle Russian River HA are no longer being proposed for delisting for indicator bacteria:

(1) Laguna HSA, mainstem Laguna de Santa Rosa,
(2) Laguna HSA, tributaries to the Laguna de Santa Rosa (except Santa Rosa Creek and its tributaries), and
(3) Santa Rosa HSA, tributaries to Santa Rosa Creek

Additionally, the entire Russian River HU, Lower Russian River HA, Guerneville HSA, Green Valley Creek watershed will remain listed for indicator bacteria (there will be no decrease in scope of the listing).

Regional Water Board staff working on the Pathogen Indicator Bacteria TMDLs for the Russian River watershed (including the Laguna de Santa Rosa watershed) determined that the Russian River and its tributaries are violating the Basin Plan's Bacteria Water Quality Objective (Butkus 2014). *E. coli* data from the mainstem Laguna de Santa Rosa and Green Valley Creek reflect that these streams remain impaired for indicator bacteria. *Bacteroides* bacteria data show that human-caused bacteria concentrations in the Russian River watershed are widespread and found in every mainstem and most tributary sites sampled. The evidence for non-attainment of the Bacteria Objective is used to interpret the narrative, natural background-based language of the objective.

Therefore, Regional Water Board staff are not recommending that any water bodies in the Russian River watershed be delisted for indicator bacteria, as the most recent information being evaluated for the Russian River Pathogen Indicator Bacteria TMDLs reflect impairment throughout the watershed.

Chapter 4: Staff Recommendations

The results of staff's assessment of the available data and information, and consideration of public comments, are presented in the form of fact sheets that consists of a decision and supporting lines of evidence for each water body/pollutant pair assessed. Fact sheets are available in Appendix 1 of this Staff Report, which can be found online at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d

A discussion of the public participation process is presented in Chapter 6. A summary of changes made to the Public Review Draft 2012 Integrated Report is presented in Table 13.

Miscellaneous, not substantive, changes not reflected in the fact sheets are described in Appendix 2, and Appendix 3 contains links to all references used in the fact sheets. Both appendices can be found online at the links provided on pages 59 and 60 of this staff report.

4.1 SUMMARY OF STAFF RECOMMENDATIONS

The following tables summarize Regional Water Board staff's recommended changes to the 303(d) List, summarize the waters in each 305(b) category, and present the new 2012 303(d) List.

Table 5: Presents the new delistings of water body/pollutant pairs for the 2012 303(d) List.

Table 6: Presents changes in the scope of previous listings resulting in a decreased listing extent.

Table 7: Presents the new listings of water body/pollutant pairs for the 2012 303(d) List.

Table 8: Presents changes in the scope of previous listings resulting in an increased listing extent.

Table 9: Presents list and do not delist recommendations to USEPA for the portion of water bodies where new data were assessed on Tribal land.

There are no water bodies that support all core beneficial uses (Category 1).

Table 10: Presents all of the water bodies that are supporting some, but not all, core beneficial uses (Category 2).

Table 11: Presents all of the water bodies for which there is insufficient information available to make use support decisions (Category 3).

Table 12: Presents all of the impaired water bodies (Categories 4a, 4b, and 5), including impaired water bodies already listed from the 2010 List and those recommended for listing as part of the 2012 303(d) List. There are no water bodies in Categories 4b or 4c.

Table 13: Presents a Summary of Changes in 303(d) Listing and Delisting Recommendations Since the Public Review Draft 2012 Integrated Report.

Table 5.
New Delistings for the 2012 303(d) List

Water Body Hydrologic Unit	Water Body Name	Pollutant
Klamath River HU	Butte Valley HA	Nutrients
		Temperature, water
Mendocino Coast HU	Hare Creek Beach	Indicator Bacteria
	Pudding Creek Beach	Indicator Bacteria
Russian River HU	Middle Russian River HA, Big Sulphur Creek HSA	Specific Conductivity
	Middle Russian River HA, Laguna HSA, mainstem Laguna de Santa Rosa	Nitrogen
	Middle Russian River HA, Laguna HSA, tributaries to the Laguna de Santa Rosa (except Santa Rosa Creek and its tributaries)	Phosphorus
		Nitrogen
Trinidad HU	Luffenholtz Beach	Indicator Bacteria
	Moonstone County Park	Indicator Bacteria
	Trinidad State Beach	Indicator Bacteria

Table 6.
Changes in Scope of Previous Listings
Resulting in a Decreased Listing Extent

Water Body Hydrologic Unit	Water Body Name	Original Listing Extent	Revised Listing Extent	Pollutant
Eel River HU	Lower Eel River HA (includes the Eel River Delta)	Entire water body	McNulty Slough	Oxygen, Dissolved
		Entire water body	All waters except McNulty Slough	Temperature
	Middle Main HA	Entire water body	Tributaries to the Middle Main Eel River	Temperature
	South Fork HA	Entire water body	All waters except (1) Dutch Charlie Creek and (2) Redwood Creek	Temperature
Klamath River HU	Lower HA, Klamath Glen HSA	Entire water body	Mainstem Klamath River	Oxygen, Dissolved
	Middle HA and Lower HA, Scott River to Trinity River	Entire water body	Mainstem Klamath River	Organic Enrichment/ Low Dissolved Oxygen
		(1) China Creek, (2) Grider Creek, (3) Thompson Creek, (4) Walker Creek, (5) Fort Goff Creek, and (6) Portuguese Creek	(1) China Creek, (2) Grider Creek, (3) Thompson Creek, (4) and Walker Creek	Sediment

Table 6 (cont).
Changes in Scope of Previous Listings
Resulting in a Decreased Listing Extent

Water Body Hydrologic Unit	Water Body Name	Original Listing Extent	Revised Listing Extent	Pollutant
Klamath River HU	Middle HA and Lower HA, Scott River to Trinity River	Entire water body	All waters except: (1) Portuguese Creek and its Tributaries, (2) Cedar Creek and its Tributaries, (3) Twin Valley Creek and its Tributaries, (4) North Fork Dillon Creek and its Tributaries from the headwaters to Vann Creek, (5) Canyon Creek and its Tributaries from the headwaters to confluence with Seiad Creek, (6) Elk Creek and its Tributaries from the headwaters to Bear Creek, (7) Tenmile Creek and its Tributaries, (8) Clear Creek and its Tributaries from the headwaters to the confluence with Tenmile Creek, and (9) Fort Goff Creek and its Tributaries.	Temperature
	Middle HA, Iron Gate Dam to Scott River	Entire water body	Mainstem Klamath River	Organic Enrichment/ Low Dissolved Oxygen
	Middle HA, Oregon to Iron Gate	Entire water body	Mainstem Klamath River	Organic Enrichment/ Low Dissolved Oxygen
	Salmon River HA	Entire water body	All waters except: (1) Uncles Creek and its Tributaries, (2) Plummer Creek and its tributaries, (3) the North Fork Salmon River and its Tributaries from the confluence with the Right Hand Fork of the North Fork Salmon River to the downstream boundary of the Marble Mountain Wilderness, (4) Right Hand Fork of the North Fork Salmon River and its tributaries, (5) the North Fork Salmon River and its Tributaries from the headwaters to the confluence with the Right Hand Fork of the North Fork Salmon River, and (6) the South Fork Salmon River from the headwaters to the confluence with Garden Gulch.	Temperature
	Salmon River HA, Wooley Creek HSA	Entire water Body	All waters except: (1) Wooley Creek and its tributaries from the head waters to the confluence with the North Fork Wooley Creek, (2) Wooley Creek and its Tributaries from the confluence of the North Fork Wooley Creek to Haypress Creek, and (3) North Fork Wooley Creek and its Tributaries.	Temperature

Table 6 (cont).
Changes in Scope of Previous Listings
Resulting in a Decreased Listing Extent

Water Body Hydrologic Unit	Water Body Name	Original Listing Extent	Revised Listing Extent	Pollutant
Klamath River HU	Scott River HA	Entire water body	All waters except: (1) Mill Creek and its Tributaries from the headwaters to the confluence with Etna Creek and (2) Canyon Creek and its Tributaries from the headwaters to the downstream boundary of the Marble Mountain Wilderness.	Sedimentation / Siltation
				Temperature
Mendocino Coast HU	Noyo River HA, Pudding Creek	Entire water body	Mainstem Pudding Creek	Temperature
	Rockport HA, Ten Mile River HSA	Entire water body	All waters except: (1) Mill Creek, (2) Gulch 11, (3) Churchman Creek, (4) Little Bear Haven Creek, (5) Buckhorn Creek, (6) Booth Gulch, (7) Smith Creek, (8) Bear Haven Creek, and (9) the Little North Fork Ten Mile River	Temperature
Redwood Creek HU	Redwood Creek	Entire water body	All waters except Larry Dam Creek	Temperature
Russian River HU	Middle Russian River HA, Geyserville HSA	(1) Mainstem Russian River from Railroad bridge to Hwy 101 and (2) Stream 1 on Fitch Mtn.	Stream 1 on Fitch Mountain (The mainstem Russian River impairment from the railroad bridge to the Highway 101 bridge is now appropriately located within the Guerneville HSA)	Indicator Bacteria[1]
	Middle Russian River HA, Laguna HSA, tributaries to the Laguna de Santa Rosa (except Santa Rosa Creek and its tributaries)	Laguna HSA (all tributaries)	Mainstem Colgan Creek	Oxygen, Dissolved
Trinity River HU	Lower Trinity HA	Entire water body	All waters except: (1) the New River and its tributaries, (2) Big French Creek and its tributaries, (3) the North Fork Trinity River and its tributaries, including the East Fork North Fork Trinity River and its tributaries, and (4) Manzanita Creek and its tributaries.	Sedimentation / Siltation
	Upper Trinity HA	Entire water body	All waters except the Stuart Fork and its tributaries	Sedimentation / Siltation

[1] Listing based solely upon fecal coliform data.

Table 7. New Listings for the 2012 303(d) List			
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**
Eureka Plain HU	Elk River Watershed, Lower Elk River and Martin Slough	Lower mainstem Elk River and Martin Slough	Indicator Bacteria
	Gannon Slough	Campbell Creek	Indicator Bacteria
	Jolly Giant Creek	Jolly Giant Creek	Indicator Bacteria
Klamath River HU	Copco Lake	Copco 1	Mercury
	Iron Gate Reservoir	Entire water body	Mercury
	Lost River HA, Tule Lake and Mt Dome HSAs	Klamath Straits Drain	Mercury
		Entire water body	Oxygen, Dissolved[1]
			pH (high)[1]
	Middle Klamath HA, Iron Gate Dam to Scott River	Mainstem Klamath River from Iron Gate Dam to the Scott River	Aluminum
	Scott River HA	Mainstem Scott River from Young's Dam to Boulder Creek	Aluminum
			Biostimulatory Conditions
			Oxygen, Dissolved
			pH
		Shackleford Creek above Campbell Lake	pH
	Shasta River HA	Mainstem Shasta River	Aluminum
Mad River HU	Mad River	Mainstem Mad River	Aluminum
	Norton Creek	Widow White Creek	Indicator Bacteria
	Ruth Lake	Entire water body	Mercury
Mendocino Coast HU	Big River HA, Berry Gulch	Little North Fork	Temperature, water
		Rocky Gulch, the Little North Fork, and Manley Gulch	Oxygen, Dissolved
	Big River HA, Big River	Cookhouse Gulch, Railroad Gulch, and the mainstem Big River	Oxygen, Dissolved
	Noyo River HA, Pudding Creek	Pudding Creek Lagoon	Indicator Bacteria[2]
Russian River HU	Lower Russian River HA, Guerneville HSA	Russian River at Healdsburg Memorial Beach from the Railroad bridge to Hwy 101	Specific Conductivity
		(1) Russian River at Healdsburg Memorial Beach from the Railroad bridge to Hwy 101 and (2) Russian River from Fife Creek to Dutch Bill Creek	Aluminum
	Middle Russian River HA, Geyserville HSA	Foss Creek	Diazinon
	Middle Russian River HA, Mark West HSA, mainstem Mark West Creek downstream of the confluence with the Laguna de Santa Rosa	Mainstem Mark West Creek downstream of the confluence with the Laguna de Santa Rosa	Aluminum
			Oxygen, Dissolved
			Phosphorus
			Manganese

Table 7 (cont). New Listings for the 2012 303(d) List			
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**
Russian River HU	Middle Russian River HA, Santa Rosa HAS, tributaries to Santa Rosa Creek	Spring Lake	Mercury
	Upper Russian River HA, Ukiah HSA	Mainstem Russian River	Aluminum
Smith River HU	Dead Lake	Entire water body	Mercury
Trinidad HU	Little River HA	Little River	Indicator Bacteria

[1] Listing based upon the establishment of a nutrient TMDL to address dissolved oxygen and pH impairments and data submitted for the 2012 Integrated Report.
[2] Listing based upon fecal coliform data.

Table 8. Changes in Scope of Previous Listings Resulting in an Increased Listing Extent				
Water Body Hydrologic Unit	**Water Body Name**	**Original Listing Extent**	**Revised Listing Extent**	**Pollutant**
Russian River HU	Lower Russian River HA, Guerneville HSA	Mainstem Russian from Fife Creek to Dutch Bill Creek	(1) Mainstem Russian River from (a) Railroad bridge to Hwy 101[1] and (b) Fife Creek to Dutch Bill Creek[1] and (2) Mainstem Dutch Bill Creek	Indicator Bacteria

[1] Listing based solely upon fecal coliform data.

Table 9. Recommendations To USEPA Based Upon Regional Water Board Analysis				
Water Body Hydrologic Unit	**Water Body Name**	**Water Body Extent**	**Pollutant**	**Recommendation to USEPA**
Klamath River HU	Scott River HA	Shackleford Creek and Sniktaw Creek (portions that lie within the Quartz Valley Indian Reservation)	Indicator Bacteria	List
		Sniktaw Creek (portion that lies within the Quartz Valley Indian Reservation)	Oxygen, Dissolved	List
		The portions of the water body that lie within the Quartz Valley Indian Reservation	Temperature	Do Not Delist
	Lower HA, Klamath Glen HSA	Mainstem Klamath River	Aluminum	List
		The portions of the water body that lie within the Yurok Tribe Indian Reservation	Nutrients	Do Not Delist

Table 9 (cont). Recommendations To USEPA Based Upon Regional Water Board Analysis				
Water Body Hydrologic Unit	**Water Body Name**	**Water Body Extent**	**Pollutant**	**Recommendation to USEPA**
Klamath River HU	Lower HA, Klamath Glen HSA	The portions of the water body that lie within the Yurok Tribe Indian Reservation	Temperature	Do Not Delist
		Mainstem Klamath River	Organic Enrichment/Low Dissolved Oxygen	Do Not Delist

Table 10. Waters Supporting Some Core Beneficial Uses (Category 2)	
Water Body Hydrologic Unit	**Water Body Name**
Bodega HU	Doran Regional Park
	Salmon Creek HA
	Salmon Creek Park (South)
Eureka Plain HU	Mad River Slough
	Salmon Creek
Klamath River HU	Campbell Lake
	Lost River HA, Clear Lake & Boles HSAs
Mad River HU	Clam Beach (near Mad River mouth)
Mendocino Coast HU	Albion River HA, Big Salmon Creek
	Big River Beach at Mendocino Bay
	Black Point
	Caspar Headlands State Beach
	Gualala Regional Park Beach
	Hare Creek Beach
	MacKerricher State Park (near Mill Creek)
	MacKerricher State Park (near Virgin Creek)
	Pudding Creek Beach
	Rockport HA, Usal Creek HSA
	Stillwater Cove Regional Park Beach
	Van Damme State Park Beach
	Wages Creek HSA, Dehaven Creek
	Wages Creek HSA, Wages Creek
Russian River HU	Goat Rock State Park Beach
Smith River HU	Smith River Watershed
Trinidad HU	Luffenholtz Beach
	Moonstone County Park
	Old Home Beach
	Trinidad State Beach

Table 11. Waters with Insufficient Information to Determine Use Rating (Category 3)	
Water Body Hydrologic Unit	**Water Body Name**
All water bodies in the North Coast Region not listed in Categories 2, 4a, 4b, 4c, or 5 (Tables 9 and 11), including those listed below	
Bodega HU	Bodega Head
Cape Mendocino HU	Point Delgada Shelter Cove
Eel River HU	Howard Lake
	Plaskett Lake
Eureka Plain HU	McDaniel Slough
Klamath River HU	Butte Valley HA
	Kangaroo Lake
	Klamath River Flint Rock Head
Mendocino Coast HU	Albion River HA, Little River
	Chadbourne Gulch Beach
	Cleone, Lake
	Gerstle Cove
	Manchester State Beach
Mendocino Coast HU	Point Arena Lighthouse
	Point Arena HA, Greenwood Creek HSA
	Sea Ranch Del Mar
	Ten Mile River HSA, coastal tributaries
	Wages Creek Beach
Smith River HU	Smith River Estuary
Trinity River HU	Lewiston Lake
Winchuck River HU	Crescent City Point St. George
	Winchuck River

Table 12. Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Bodega HU	Bodega Harbor HA	Entire water body	Invasive Species	5
	Campbell Cove	Entire water body	Indicator Bacteria	5
	Estero Americano HA, Estuary	Entire water body	Nutrients	5
			Sedimentation /Siltation	5
	Estero Americano HA, Americano Creek	Entire water body	Nutrients	5
	Estero de San Antonio HA, Stemple Creek & Estero de San Antonio	Entire water body	Nutrients	5
			Sediment	5
Cape Mendocino HU	Mattole River HA, Mattole River	Entire water body	Sedimentation /Siltation	4a
			Temperature	4a
Eel River HU	Lower Eel River HA (includes the Eel River Delta)	Mainstem Eel River	Aluminum	5

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Eel River HU	Lower Eel River HA (includes the Eel River Delta)	McNulty Slough	Oxygen, Dissolved	5
		Entire water body except McNulty Slough	Temperature	4a
		Entire water body	Sedimentation/ Siltation	4a
	Middle Fork Eel River HA, Eden Valley HSA & Round Valley HSA	Mainstem Middle Fork Eel River	Aluminum	5
		Entire water body	Sedimentation/ Siltation	4a
			Temperature	4a
	Middle Fork Eel River HA, Wilderness HSA & Black Butte River HSA	Entire water body	Temperature	4a
	Middle Main Eel River HA	Mainstem Eel River	Aluminum	5
		Tributaries to the Middle Main Eel River	Temperature	4a
		Entire water body	Sedimentation/ Siltation	4a
	North Fork Eel River HA, Lower North Fork Eel River Watershed	Entire water body	Sedimentation/ Siltation	4a
			Temperature	4a
	North Fork Eel River HA, Upper North Fork Eel River Watershed	Entire water body	Temperature	4a
	South Fork Eel River HA	Mainstem South Fork Eel River	Aluminum	5
		Entire water body	Sedimentation/ Siltation	4a
		Entire water body except Dutch Charlie Creek and Redwood Creek	Temperature	4a
	Upper Main Eel River HA (included Tomki Creek)	Entire water body	Sedimentation/ Siltation	4a
			Temperature	4a
	Upper Main Eel River HA, Lake Pillsbury HSA, Lake Pillsbury	Entire water body	Mercury	5
	Van Duzen River HA	Entire water body	Sedimentation/ Siltation	4a
Eureka Plain HU	Elk River Watershed, Lower Elk River and Martin Slough	Lower mainstem Elk River and Martin Slough	Indicator Bacteria	5
		Entire water body	Sedimentation/ Siltation	5
	Elk River Watershed, Upper Elk River	Entire water body	Sedimentation/ Siltation	5
	Elk River Watershed, Upper Little South Fork Elk River	Entire water body	Sedimentation/ Siltation	5

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Eureka Plain HU	Freshwater Creek	Entire water body	Sedimentation/ Siltation	5
	Gannon Slough	Campbell Creek	Indicator Bacteria	5
	Humboldt Bay	Entire water body	Dioxin Toxic Equivalents	5
			PCBs	5
	Jacoby Creek Watershed	Entire water body	Sediment	5
	Jolly Giant Creek	Jolly Giant Creek	Indicator Bacteria	5
Klamath River HU	Copco Lake	Copco 1	Mercury	5
		Copco 1 and 2	Microcystin	4a
	Iron Gate Reservoir	Entire water body	Mercury	5
			Microcystin	4a
	Lost River HA, Tule Lake and Mt Dome HSAs	Klamath Straits Drain	Mercury	5
		Entire water body	Oxygen, Dissolved	4a
			pH (high)	4a
			Nutrients	4a
	Tule Lake and Lower Klamath Lake National Wildlife Refuge	Entire water body	pH (high)	4a
	Lower HA, Klamath Glen HSA	Mainstem Klamath River	Organic Enrichment/Low Dissolved Oxygen	4a
		Entire water body	Nutrients	4a
			Sedimentation/ Siltation	5
			Temperature	4a
	Middle HA and Lower HA, Scott River to Trinity River	China Creek, Grider Creek, Thompson Creek, Walker Creek	Sediment	5
		Mainstem Klamath River	Microcystin	4a
			Organic Enrichment/ Low Dissolved Oxygen	4a
		Entire water body	Nutrients	4a

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Klamath River HU	Middle HA and Lower HA, Scott River to Trinity River	Entire water body except: (1) Portuguese Creek and its Tributaries, (2) Cedar Creek and its Tributaries, (3) Twin Valley Creek and its Tributaries, (4) North Fork Dillon Creek and its Tributaries from the headwaters to Vann Creek, (5) Canyon Creek and its Tributaries from the headwaters to confluence with Seiad Creek, (6) Elk Creek and its Tributaries from the headwaters to Bear Creek, (7) Tenmile Creek and its Tributaries, (8) Clear Creek and its Tributaries from the headwaters to the confluence with Tenmile Creek, and (9) Fort Goff Creek and its Tributaries.	Temperature	4a
	Middle HA, Iron Gate Dam to Scott River	Mainstem Klamath River	Organic Enrichment/ Low Dissolved Oxygen	4a
			Microcystin	4a
			Aluminum	5
		Entire water body	Nutrients	4a
			Temperature	4a
		Beaver Creek, Cow Creek, Deer Creek, Hungry Creek, West Fork Beaver Creek	Sediment	5
	Middle HA, Oregon to Iron Gate	Mainstem Klamath River	Organic Enrichment/ Low Dissolved Oxygen	4a
			Microcystin	4a
		Entire water body	Nutrients	4a
			Temperature	4a
	Salmon River HA (except the Wooley Creek HSA)	Entire water body except: (1) Uncles Creek and its Tributaries, (2) Plummer Creek and its tributaries, (3) the North Fork Salmon River and its Tributaries from the confluence with the Right Hand Fork of the North Fork Salmon River to the downstream boundary of the Marble Mountain Wilderness, (4) Right Hand Fork of the North Fork Salmon River and its tributaries, (5) the North Fork Salmon River and its Tributaries from the headwaters to the confluence with the Right Hand Fork of the North Fork Salmon River, and (6) the South Fork Salmon River from the headwaters to the confluence with Garden Gulch.	Temperature	4a

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Klamath River HU	Salmon River HA, Wooley Creek HSA	Entire water body except: (1) Wooley Creek and its tributaries from the head waters to the confluence with the North Fork Wooley Ck, (2) Wooley Creek and its Tributaries from the confluence of the North Fork Wooley Creek to Haypress Creek, and (3) North Fork Wooley Creek and its Tributaries.	Temperature	4a
	Scott River HA	Entire water body except: (1) Mill Creek and its Tributaries from the headwaters to the confluence with Etna Creek and (2) Canyon Creek and its Tributaries from the headwaters to the downstream boundary of the Marble Mountain Wilderness.	Sedimentation / Siltation	4a
			Temperature	4a
		Mainstem Scott River from Young's Dam to Boulder Creek	Aluminum	5
			Biostimulatory Conditions	5
			Oxygen, Dissolved	5
			pH	5
		Shackleford Creek above Campbell Lake	pH	5
	Shasta River HA	Entire water body	Organic Enrichment / Low Dissolved Oxygen	4a
			Temperature	4a
		Mainstem Shasta River	Aluminum	4a
	Shasta River HA, Lake Shastina	Entire water body	Mercury	5
Mad River HU	Mad River	Entire water body	Sedimentation /Siltation	4a
			Temperature	5
			Turbidity	4a
		Mainstem Mad River	Aluminum	
	Norton Creek	Widow White Creek	Indicator Bacteria	5
	Ruth Lake	Entire water body	Mercury	5
Mendocino Coast HU	Albion River HA, Albion River	Entire water body	Sedimentation /Siltation	4a
			Temperature	5
	Big River HA, Berry Gulch	Little North Fork	Temperature	5
		Rocky Gulch, the Little North Fork, and Manley Gulch	Oxygen, Dissolved	5
	Big River HA, Big River	Cookhouse Gulch, Railroad Gulch, and the mainstem Big River	Oxygen, Dissolved	5

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Mendocino Coast HU	Big River HA, Big River	Entire water body	Sedimentation /Siltation	4a
			Temperature	5
	Garcia River HA, Garcia River	Entire water body	Sediment	4a
			Temperature	5
	Gualala River HA, Gualala River	Mainstem Gualala River	Aluminum	5
		Entire water body	Sedimentation /Siltation	4a
		Entire water body except: the Little North Fork Gualala River and its tributaries	Temperature	5
	Navarro River HA	Entire water body	Sedimentation /Siltation	4a
			Temperature	4a
	Navarro River HA, Delta	Entire water body	Sedimentation /Siltation	4a
	Noyo River HA, Noyo River	Entire water body	Sedimentation /Siltation	4a
		(1) Mainstem Noyo River from confluence of Duffy Gulch downstream to confluence with Hayshed Gulch; (2) South Fork Noyo River mainstem from confluence of Kass Creek downstream to confluence with Noyo River mainstem; (3) Little North Fork Noyo River, (4) Duffy Gulch, and (5) Kass Creek tributaries.	Temperature	5
	Noyo River HA, Pudding Creek	Pudding Creek Lagoon	Indicator Bacteria[2]	5
		Mainstem Pudding Creek	Temperature	5
	Rockport HA, Ten Mile River HSA	Entire water body	Sedimentation /Siltation	4a
		Entire water body except: (1) Mill Creek, (2) Gulch 11, (3) Churchman Creek, (4) Little Bear Haven Creek, (5) Buckhorn Creek, (6) Booth Gulch, (7) Smith Creek, (8) Bear Haven Creek, and (9) the Little North Fork Ten Mile River	Temperature	5
Redwood Creek HU	Redwood Creek	Entire water body	Sedimentation /Siltation	4a
		Entire water body except Larry Dam Creek	Temperature	5

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Russian River HU	Lower Russian River HA, Austin Creek HSA	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Lower Russian River HA, Guerneville HSA	Mainstem Russian River at Healdsburg Memorial Beach from the Railroad Bridge to Hwy 101	Indicator Bacteria[2]	5
			Specific Conductivity	
			Aluminum	
		Mainstem Russian River at Fife Creek to Dutch Bill Creek	Indicator Bacteria[2]	5
			Aluminum	
		Mainstem Dutch Bill Creek	Indicator Bacteria	5
		Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Lower Russian River HA, Guerneville HSA, Green Valley Creek watershed	Entire water body	Indicator Bacteria	5
			Oxygen, Dissolved	5
	Middle Russian River HA, Big Sulphur Creek HSA	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Geyserville HSA	Entire water body	Sedimentation /Siltation	5
			Temperature	5
		Stream 1 on Fitch Mountain	Indicator Bacteria[2]	5
		Foss Creek	Diazinon	5
	Middle Russian River HA, Laguna HSA, mainstem Laguna de Santa Rosa	Entire water body	Indicator Bacteria	5
			Oxygen, Dissolved	5
			Mercury	5
			Phosphorus	5
			Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Laguna HSA, tributaries to the Laguna de Santa Rosa (except Santa Rosa Creek and its tributaries)	Mainstem Colgan Creek	Oxygen, Dissolved	5
		Entire water body	Indicator Bacteria	5
			Sedimentation /Siltation	5
			Temperature	5

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Russian River HU	Middle Russian River HA, Mark West HSA, mainstem Mark West Creek downstream of the confluence with the Laguna de Santa Rosa	Entire water body	Aluminum	5
			Oxygen, Dissolved	5
			Phosphorus	5
			Manganese	5
			Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Mark West HSA, mainstem Mark West Creek upstream of the confluence with the Laguna de Santa Rosa	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Mark West HSA, tributaries to Mark West Creek (except Windsor Creek and its tributaries)	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Mark West HSA, Windsor Creek and its tributaries	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Santa Rosa HSA, mainstem Santa Rosa Creek	Entire water body	Indicator Bacteria	5
			Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Santa Rosa HSA, tributaries to Santa Rosa Creek	Spring Lake	Mercury	5
		Entire water body	Indicator Bacteria	5
			Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Warm Springs HSA	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Middle Russian River HA, Warms Springs HSA, Lake Sonoma	Entire water body	Mercury	5
	Upper Russian River HA, Coyote Valley HSA	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Upper Russian River HA, Coyote Valley HSA, Lake Mendocino	Entire water body	Mercury	5

Table 12 (cont). Impaired Water Bodies (Categories 4a, 4b[1], and 5) – The 2012 303(d) List				
Water Body Hydrologic Unit	**Water Body Name**	**Listing Extent**	**Pollutant**	**Category**
Russian River HU	Upper Russian River HA, Forsythe Creek HSA	Entire water body	Sedimentation /Siltation	5
			Temperature	5
	Upper Russian River HA, Ukiah HSA	Mainstem Russian River	Aluminum	5
		Entire water body	Sedimentation /Siltation	5
			Temperature	5
Smith River HU	Dead Lake	Entire water body	Mercury	5
Trinidad HU	Little River HA	Little River	Indicator Bacteria	5
	Clam Beach	Entire water body	Indicator Bacteria	5
Trinity River HU	Lower Trinity River HA	Entire water body except: (1) the New River and its tributaries, (2) Big French Creek and its tributaries, (3) the North Fork Trinity River and its tributaries, including the East Fork North Fork Trinity River and its tributaries, and (4) Manzanita Creek and its tributaries.	Sedimentation / Siltation	4a
	Middle Trinity River HA	Entire water body	Sedimentation /Siltation	4a
	South Fork Trinity HA	Entire water body	Sedimentation /Siltation	4a
			Temperature	5
	Trinity Lake (was Claire Engle Lake)	Entire water body	Mercury	5
	Upper Trinity River HA	Entire water body except the Stuart Fork and its tributaries	Sedimentation / Siltation	4a
	Upper Trinity HA, Trinity River, East Fork Trinity River	Entire water body	Mercury	5
			Sedimentation /Siltation	4a

[1] The North Coast Regional Water Quality Control Board does not currently have any water bodies in Category 4b.
[2] Listing based solely upon fecal coliform data.

Table 13
Summary of Changes in 303(d) Listing and Delisting Recommendations Since Public Review Draft

Water Body Name	Public Review Draft Recommendation	Final Recommendations	Pollutant
Shasta HA, Mainstem Shasta River	Do Not List	List	Aluminum
Scott River HA, Mainstem Scott River	List mainstem Scott River	List mainstem Scott River from Young's Dam to Boulder Creek	Aluminum Biostimulatory Conditions Oxygen, Dissolved pH
Laguna HSA, Mainstem Laguna de Santa Rosa	Delist	Do Not Delist	Indicator Bacteria
Laguna HSA, Tributaries to the Laguna de Santa Rosa (except Santa Rosa Creek and its tribs)	Delist	Do Not Delist	
Laguna HSA, Tributaries to Santa Rosa Creek	Delist	Do Not Delist	
Lower Russian River HA, Green Valley Creek Watershed	Delist all but the mainstem Atascadero Creek	Do Not Delist any portion of the water body	
Little River HA, Bullwinkle Creek	List	Do Not List	
Santa Rosa HSA, Spring Lake	Do Not List	List	Mercury
Smith River HU, Dead Lake	Do Not List	List	

Chapter 5: Information Management

5.1 CALIFORNIA WATER QUALITY ASSESSMENT (CALWQA) DATABASE

All data and information, lines of evidence, listing decisions, and beneficial use support ratings for assessed California water bodies are stored in the Regional and State Water Boards' California Water Quality Assessment (CalWQA) database. This database was developed for the purpose of storing detailed water quality assessment information. The database is designed so that this information can be exported to the USEPA's Assessment Database at the end of each assessment cycle.

5.2 ADMINISTRATIVE RECORD

The administrative record contains all records used to develop the 2012 Integrated Report. Records are any documents produced, received, owned, or used by the State and Regional Water Boards regardless of media, physical form, or characteristics.

5.3 REFERENCES

Data and information used in lines of evidence come from a variety of sources. References are included to help track the sources of data and information summarized in the lines of evidence. Copies of referenced documents are included as part of the administrative record and are available at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/

Chapter 6: Public Participation

Revisions to the Integrated Report Category Lists 4a, 4b, and 5 (the California 303[d] List) require public review and adoption by the Regional Water Board and then adoption by the State Water Board. Category Lists 1, 2, 3, and 4c are provided as information and will be submitted by the State Water Board to the USEPA. A statewide Category 5 List will require final approval by the USEPA.

The "Public Review Draft Staff Report for the 2012 Integrated Report for the Clean Water Act Section 305(b) Surface Water Quality Assessment and the 303(d) List of Impaired Waters" (Public Review Draft 2012 Integrated Report) was released for public review and comment on March 14, 2014. Regional Water Board staff solicited written and oral comments on the Public Review Draft 2012 Integrated Report. The public comment period ended April 18, 2014.

Regional Water Board staff held two public workshops to receive comments on the Public Review Draft 2012 Integrated Report on April 8, 2014 in Santa Rosa, CA and on April 9, 2014 in Redding, CA. Staff have responded in writing to all oral comments related to the Integrated Report received at the public meetings and all written comments received during the public comment period. A summary of the public comments and staff responses to these comments are included in Appendix 4 to this Staff Report.

A Regional Water Board Workshop was held in Fortuna, CA on May 8, 2014. The purpose of the workshop was to present an overview of the Public Review Draft 2012 Integrated Report, including some of the draft listing and delisting recommendations, and an overview of public comments received. The Board Workshop was held after the close of the public comment period, however members of the public spoke at the meeting and provided comments to the Board members about the Public Review Draft 2012 Integrated Report.

A Public Hearing will be held in Santa Rosa, CA on August 14, 2014, at which the Regional Water Board will consider adoption of Resolution No. R1-2014-0043, approving the 303(d) List Portion of the North Coast Region's 2012 Integrated Report for the Clean Water Act Section 305(b) Assessment of Surface Water Quality and Clean Water Act Section 303(d) List of Water Quality Limited Segments. Members of the public may speak and provide comments to the Board at the hearing.

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Appendix 1: Fact Sheets

A fact sheet is comprised of a decision and the supporting lines of evidence (LOE) for each water body/pollutant pair assessed. The results of the staff analysis are presented as staff recommendations in the form of fact sheets.

Fact sheets for the 2012 Integrated Report are available on the Integrated Report website at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/

Appendix 2: Miscellaneous Changes Report

A list of miscellaneous, non-substantive changes not reflected in the fact sheets is available on the Integrated Report Website at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/

Appendix 3: References Report

The references utilized in the fact sheets for the 2012 Integrated Report are available on the Integrated Report website at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/

Appendix 4: Response to Comments on the Public Review Draft

The North Coast Regional Water Quality Control Board (Regional Water Board) released the "Public Review Draft Staff Report for the 2012 Integrated Report for the Clean Water Act Section 305(b) Surface Water Quality Assessment and the 303(d) List of Impaired Waters" (Public Review Draft 2012 Integrated Report) on March 14, 2014. Regional Water Board staff solicited oral and written comments on the Public Review Draft 2012 Integrated Report. The public comment period ended April 18, 2014. Public Comment letters and a summary of oral comments received during the public comment period are available on the Regional Water Board website at:

http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/303d/comments.shtml

Oral comments received at the two Public Workshops and all written comments received by April 18, 2014 that are related to the Public Review Draft 2012 Integrated Report are summarized in this appendix. Comments are summarized and not duplicated verbatim. Oral and written comments are grouped into categories. Within these categories, comments made by more than one individual are listed first, followed by comments made by a single individual.

Comments that are not related to the 2012 Integrated Report are not responded to in this appendix, although they are captured in the notes from the Public Workshops and comment letters and will be referred to other programs as appropriate.

FLOW COMMENTS

1. Comment(s)
   - Regional Water Board staff should recommend flow impairment listings for the Upper and Middle Main Eel River, South Fork Eel River, Van Duzen River, Scott River, Shasta River, Mattole River, Mark West Creek, Maacama Creek, and the Russian River this listing cycle as water quality standards are not met due to lack or absence of flow.
   - Flow listings are not unprecedented as other states have done them and there are a few flow-related listings from other Regional Water Boards. The Regional Water Board should move forward with flow listings modeled off these listings. Water bodies should be placed in Category 4c for flow impairment.
   - The evidence that is needed to support a flow listing for many streams has been submitted (including documentation of anthropogenic effects such as pumping of groundwater and diversions), so a flow listing recommendation should be made this listing cycle.

- Flow listings will have benefits including, but not limited to, requiring decision makers to consider flow impacts in developments/redevelopment projects under CEQA, increasing the chances of receiving restoration funding and grants, and improving the water rights processes.
- Beneficial uses, especially salmonids, cannot wait until a future Integrated Report cycle for flow listings to occur.
- Clean Water Act is the legal basis for State Action on the 303(d) List and therefore the reliance on guidance from the Listing Policy for making flow listing determinations is misplaced. The Regional Water Board can always use the weight of evidence section of the Listing Policy to make flow impairment listing recommendations.
- The list of factors that should be considered for developing a state-wide methodology presented by Regional Water Board staff in the Staff Report is appropriate. The list of factors should be utilized this listing cycle by Regional Water Board staff to evaluate whether flow listings are warranted.
- Regional Water Board staff should describe when they began considering flow data submitted, the thought process utilized to make the determination that flow could not be assessed before the 2018 Integrated Report cycle, that the Regional and State Water Board have been communicating during the current Integrated Report cycle about the flow listing requests, and how Regional Water Board staff are working with State Water Board staff to formulate flow evaluation criteria in an expedited fashion.
- Regional Water Board staff and State Water Board staff should expedite the development of a methodology for determining flow impairment through the Integrated Report process.
- Some commenters would like an opportunity to participate in the process to develop a state-wide methodology for evaluating flow impairment through the Integrated Report process and would like to know the timeline for methodology development.

Comment(s) Made By:
Brenda Adelman – Russian River Protection Committee
Linda Aguirre – Representing Self
Sara Aminzadeh - California Coastkeeper Alliance
Michelle Benson – Representing Self
John Brinkley – Representing Self
Deborah Bruce-Hostler – Representing Self
Lisa Butterfield – Representing Self
Levi Carolin – Representing Self
Kayla Carpetner – Representing Self
Dana Colegrove – Klamath Justice Coalition
Michele Cornelius – Representing Self
Morgan Corviday – Representing Self
Bob Davis – Representing Self
Jim Derden – Representing Self
Dan Ehresman – Northcoast Environmental Center

Ralph Faust – Representing Self
Francine Fischi – Representing Self
Konrad Fisher – Klamath Riverkeeper
Don Forbes – Representing Self
Scott Greacen – Friends of the Eel River
Jaqueline Green – Representing Self
Diana Hartel – Representing Self
Opie Heyerman – Representing Self
Tom Hinz – Representing Self
Gary Hughes – Representing Self
Patrick Kallerman – Representing Self
Andrew Kerr – Representing Self
Cheryl Kozanitas – Representing self
Joe Labash – Representing Self
Douglas Larson – Representing Self
Alan Levine – Representing Self
Don McEnhill – Russian Riverkeeper
Judith Mayer – Representing Self
Robert McCombs – Representing Self
Ken Miller – Representing Self
Charles Minton – Representing Self
Jay Moller – Representing Self
Julie O'Rielly – Representing Self
Tom Peil – Representing Self
Nathanial Pennington – Klamath Riverkeeper
Thomas Peters – Representing Self
Samantha Rich – Representing Self
Chris Riddle – Representing Self
Crystal Robinson - Karuk Tribe
Rickey Russell – California Coastkeeper Alliance
Richard Salzman – Representing Self
Kathleen Sloan - Yurok Tribe
Earl Steen – Representing Self
Erica Terence – Representing self: Resident of Salmon River
Sue Terence – Representing Self: Somes Bar, CA
Craig Tucker – Klamath Coordinator for the Karuk Tribe
Daniel White – Representing Self
Dave Willis – Representing Self
Grant Wilson – Earth Law Center
Steven Zeluck – Representing Self

There were an additional 60+ comment letters submitted via e-mail after the deadline. The contents of these late letters are reflected in the comments listed above.

Response:
Water quality can be impacted by altered or reduced instream surface water flows. Altered flows can increase water temperature, which can impact salmon, steelhead, and other aquatic species. Altered flows can also adversely affect dissolved oxygen conditions and exacerbate biostimulatory responses resulting in eutrophic conditions. Staff express this relationship by saying that flow is a *factor* contributing to other water quality impairments, such as temperature or biostimulatory conditions. Considering whether or not to place a water body in Category 4c as impaired by flow alteration means that staff need to demonstrate that the failure to meet water quality standards is not caused by a pollutant, but instead is caused by altered or reduced surface water flow.

Staff began the assessment process by reviewing the information and data that were submitted, a summary of which can be found in Section 3.6.4. Regional Water Board staff considered assessing the information and data through the Integrated Report process by evaluating four criteria: (1) whether or not flows are altered from natural or historic flows, and (2) whether flow alterations are caused by human activities, and either (3) whether negative impacts to beneficial uses are caused by altered flows or (4) whether exceedances of water quality objectives are caused by altered flows. Not all of the data submittals allowed assessment of each of these criteria. The majority of the submittals provided evidence of beneficial use impacts (criteria #3). However, the information and data submitted for the Eel River, Gualala River, Mark West Creek, Mattole River, Navarro River, Redwood Creek, Maacama Creek, and Russian River did not include enough information to meet all the criteria, if this methodology were to be used. Submitted information for the Scott River and Shasta River indicate all criteria are met, if this methodology were to be used. The Scott and Shasta rivers are both listed as impaired for temperature, the TMDLs document altered flow conditions as one of many factors contributing to the temperature impairment, and the Regional Water Board is addressing altered flow concerns in these rivers in the context of the temperature impairments. A protocol is needed for distinguishing between a water body that is impaired by a pollutant and exacerbated by altered flow conditions, versus a water body that is primarily impaired because of flow conditions.

Regional Water Board staff did not use the above four criteria for determining North Coast flow impairments as the methodology has not been vetted state-wide and has not been determined to be appropriate for assessing flow impairments through the Integrated Report process. An appropriate methodology should be developed in consultation with the State Water Board, the Division of Water Rights, other regional water boards, and stakeholders. Before Regional Water Board staff can make a decision whether or not to place a water body in Category 4c for altered flows, a methodology should be in place that is scientifically defensible and repeatable so that it can be consistently applied in the Integrated Report process state-wide to determine if altered flow is causing the non-attainment of water quality standards now and in the future to any stream in the state. Therefore, staff continues to

recommend that no water bodies be placed in Category 4c for flow alteration due to the lack of a methodology for assessing flow through the Integrated Report process.

Regional Water Board staff have been working with State Water Board staff on this topic since the close of the data submission period. Should a methodology be established prior to the North Coast Region's next Integrated Report cycle in 2018, Regional Water Board staff will consider assessing available information and data using the methodology and recommend water bodies be placed in Category 4c for flow alteration if appropriate prior to 2018.

It should be noted that Regional Water Board staff are actively addressing impacts to water quality from altered flows in the north coast. All the water bodies which were requested to be placed in Category 4c as flow impaired are already listed as impaired for pollutants, including temperature and either sediment or low dissolved oxygen. The Scott, Shasta, Eel, Mattole, and Navarro rivers all have temperature TMDLs completed and flow is a factor considered in those TMDLs. The Shasta TMDL includes a flow recommendation for an additional 45 cfs of instream dedicated cold water. Staff are participating in instream flow studies in the Scott and Shasta River watersheds. Staff are supporting the development of instream flow studies in the Mattole, Navarro, and Eel rivers, and will considering doing so for the Russian River as well. Staff are also currently evaluating flow as a factor contributing to impairment in Mark West Creek as part of the Laguna de Santa Rosa Temperature TMDL.

Regional Water Board staff are working with the Division of Water Rights to ensure Basin Plan requirements are reflected in water right permits and other water right orders. Both the *Policy for Maintaining Instream Flows in Northern California Coastal Streams* (May 4, 2010) and the *Policy for Implementation of the Water Quality Objectives for Temperature* (adopted by the Regional Water Board on March 13, 2014) specifically call for involvement by the Regional Water Board to help ensure adequate consideration of water quality concerns in water right actions. The Division of Water Rights also issues 401 water quality certifications for projects requiring a Federal Energy Regulatory Commission (FERC) license. Regional Water Board staff provide recommendations and identify water quality conditions that are necessary to ensure that the activity will comply with water quality standards. Additionally, the Regional Water Board has the authority to condition waste discharge requirements to require sustainable water resources management, the use of recycled water, and water conservation (see resolution SWRCB-2008-0030).

Finally, it is uncertain what actions will result from placing a water body in Category 4c for flow alteration. The Clean Water Act Section 303(d) List identifies only those waters that are impaired by pollutants, as defined in CWA Section 502(6). Altered flow is considered a condition of pollution, not an impairment caused by a pollutant, and therefore is not a part of the 303(d) List. EPA guidance recommends placing waters impaired by non-pollutants (i.e., lack of water) in Integrated Report Category 4c. Placement of a water body in Category 4c is not the same as a pollutant "listing"

as it does not require the development of a TMDL or alternative program of implementation to remedy the impairment.

2. Comment(s)
   - Support Regional Water Board staff recommendation not to list water bodies as impaired by flow alteration. Mechanisms already exist in the water rights process to address levels of flow and their effect on beneficial uses.

Comment(s) Made By:
Grace Bennett – Siskiyou County Supervisor
Doug T. Jenner – Representing Self
Brian Morris – County of Siskiyou & Siskiyou County Flood Control and Water Conservation District

Response:
Comment noted.

INDICATOR BACTERIA COMMENTS

3. Comment(s)
   - Support Regional Water Board staff recommendation to list the following water bodies as impaired by indicator bacteria: Little River, Bullwinkle Creek, Jolly Giant Creek, Campbell Creek, Widow White Creek, Mad River, Janes Creek, Martin's Slough, and Lower Elk River.

Comment(s) Made By:
Mary Ella Anderson – Representing Self
Terri Bonow – Representing Self
Rita Carlson – Representing Self
Rob DiPerna – Environmental Protection Information Center
Margaret Draper - Representing Self
Hollie Hall - Hollie Hall & Associates Watershed Resources Consulting
Urania Hunter – Representing Self
Jennifer Kalt – Humboldt Baykeeper
Joel Mielke - Representing Self
Ken Miller - Representing Self
Colby Peffer – Representing Self
Erin Rowe – Representing Self
Georgia Salmon – Representing Self
Jennifer Savage – North Coast Environmental Center

Response:
Comment noted. It should be noted that Regional Water Board staff are not proposing to list the mainstem Mad River or Janes Creek for indicator bacteria impairment as there were no indicator bacteria data submitted for these water bodies during the 2012 Integrated Report data submittal period (which ended

August 30, 2010). There were indicator bacteria data available for the Mad River slough, however it did not reflect impairment.

The data for Bullwinkle Creek, and other indicator bacteria data submitted by Humboldt Baykeeper, have been re-assessed as they were incorrectly assessed in their entirety as fecal coliform data instead of *E. coli* data. Additionally, the minimum sample size for evaluations at a 4% exceedance rate has changed. Based upon this re-assessment, staff are no longer proposing to list Bullwinkle Creek (please see Responses #7 and #8 and Staff Report Sections 3.7.2 and 3.7.3 for further discussion relating to Humboldt Baykeeper indicator bacteria data reassessment and Bullwinkle Creek).

4. Comment(s)

- The Upper Elk River should be listed as impaired for indicator bacteria. Additional data were submitted during the public comment period for evaluation by Regional Water Board staff.
- The South Fork and North Fork Elk River should be considered for indicator bacteria listing. Data and information were submitted during the public comment period for evaluation by Regional Water Board staff.
- New indicator bacteria data for Campbell Creek, Jolly Giant Creek, Martins Slough, and the Lower Elk River were provided during the public comment period to supplement the data submittal for the 2012 Integrated Report and support recommended listings of these water bodies.
- Janes Creek, near Arcata Bay, should be listed for indicator bacteria as it sometimes has an oily appearance, odor, and brown foam in the BLM wildlife refuge.

Comment(s) Made By:
Margaret Draper - Representing Self
Jennifer Kalt – Humboldt Baykeeper
Jessie Noel – Representing Self
Kristi Wrigley – Representing Self

Response:
Thank you for the data and information. However, the data and information provided in these comments was submitted after the August 30, 2010 deadline for submittals for the current 2012 Integrated Report cycle. Please sign up for the Integrated Report e-mail notification list to be notified when the data solicitation period for the next Integrated Report cycle occurs and to receive information on the data submittal requirements including data quality assurance requirements, site location information requirements, and formatting. The website for the Integrated Report Lyris list is: http://www.waterboards.ca.gov/resources/email_subscriptions/reg1_subscribe.shtml (please check the box for "Integrated Report – 303(d) List and 305(b) Report"). Staff have made note in the 2018 Integrated Report file of the new data and information submitted.

5. Comment(s)
   - Support the Regional Water Board recommendation to USEPA that Shackleford and Sniktaw Creeks within the Quartz Valley Indian Reservation should be listed as impaired for indicator bacteria.

   Comment(s) Made By:
   Crystal Robinson - Karuk Tribe
   Kathleen Sloan - Yurok Tribe

   Response:
   Comment noted.

6. Comment(s)
   - The Scott River at the USGS gage (SRGA) and at Jones Beach (SCJB) should be listed for indicator bacteria. When data for April – October data for these two locations are extracted from the entire data set and evaluated at a 4% exceedance frequency (instead of at a 10% exceedance frequency) there are ample exceedances of the *E. coli* 235 MPN per 100 mL evaluation guideline to merit listing.

   Comment(s) Made By:
   Crystal Robinson - Karuk Tribe
   Kathleen Sloan - Yurok Tribe

   Response:
   Based upon other comments received, the mainstem Scott River has been re-segmented and the data reassessed (see response #11 for more details). The Scott River at the USGS gage(SRGA) and the Scott River at Jones Beach (SCJB) are within the middle mainstem Scott River segment, and therefore data from these two locations were re-evaluated together to determine if the listing of the middle mainstem Scott River from Boulder Creek to Young's Dam is warranted.

   Per the Listing Policy, when the data submitted only encompass the April – October timeframe, they are to be evaluated at a 4% exceedance rate. If the data submitted included months outside that timeframe, they shall be evaluated at a 10% exceedance rate. The data submitted for the middle mainstem Scott River at the USGS gage and at Jones Beach by the Quartz Valley Indian Reservation include months outside the April – October timeframe and therefore were assessed at a 10% exceedance rate.

   Additionally, even if staff were to assess the data for April – October at SRGA and SCJB at a 4% exceedance rate, the decision recommendation would not change.

   Therefore, the data from the mainstem Scott River sites SRGA and SCJB continue to be evaluated together at a 10% exceedance rate and the decision recommendation

for the mainstem Scott River has not changed since the Public Review Draft and remains "do not list."

7. Comment(s)

- Information provided by staff at the State Water Board to Regional Water Board staff pertaining to the minimum sample size requirements for beach indicator bacteria listing and delisting determinations utilizing a 4% exceedance rate under Sections 3.3 and 4.3 of the Listing Policy were incorrect. The correct information is as follows: a minimum of 22 samples with 3 or more exceedances are required to make a listing recommendation, and a minimum of 22 samples with less than or equal to 2 exceedances are required to make a delisting recommendation. The exception to this is that listing can occur with less than 22 samples if 3 or more of the samples exceed the objective or evaluation guideline.

  [Regional Water Board Staff Note: The original information from State Water Board staff was that a minimum of 15 samples with 2 or more exceedances were required to make a listing recommendation, and a minimum of 27 samples with less than or equal to 2 exceedances were required to make a delisting recommendation. The exception to this is that listing can occur with less than 15 samples if 2 or more of the samples exceed the objective or evaluation guideline.]

Comment(s) Made By:
Nick Martorano – State Water Resources Control Board

Response:
Regional Water Board staff have reviewed all indicator bacteria decisions from the Public Review Draft to see if the revised assessment information provided by the State Water Board would change any listing or delisting recommendations. Only one stream was affected by this change: Bullwinkle Creek (Decision 30563). Therefore, staff have revised Decision 30563 to reflect that Bullwinkle Creek is no longer being recommended for listing. This change is due to the fact that there is now the requirement for 3 or more samples to exceed the evaluation guideline to recommend listing. There are only 2 samples and 2 exceedances for Bullwinkle Creek, which does not warrant a listing recommendation.

The remainder of the Decisions remain unchanged. However, during the next Integrated Report cycle the Decision language referring to the number of samples and number of exceedances required for listing and delisting will be edited as appropriate based upon the State Water Board's clarification of the assessment protocol.

8. Comment(s)

- The indicator bacteria data from the excel spreadsheets and supporting documentation submitted by Humboldt Baykeeper incorrectly describe all the data as fecal coliform, when in fact some of the data are *E. coli*. Therefore the

data are incorrectly assessed in the Fact Sheets for the Public Review Draft 2012 Integrated Report. The data from 2005-May 2008 are fecal coliform data, and the data from September 2008 – October 2009 are *E. coli* data.

Comment(s) Made By:
Jennifer Kalt – Humboldt Baykeeper

Response:
Indicator bacteria data submitted by the Humboldt Baykeeper for September 2008 – October 2009 have been re-evaluated as *E. coli* data and the Fact Sheets (Lines of evidence and Decisions) have been updated.

It should be noted that Bullwinkle Creek is no longer being recommended for listing for reasons discussed in the response to comment #7 above and described in Staff Report Sections 3.7.2 and 3.7.3.

SCOTT RIVER BIOSTIMULATORY CONDITIONS, DISSOLVED OXYGEN, and pH COMMENTS

9. Comment(s)
   - The data submitted by the Quartz Valley Indian Reservation data used for biostimulatory conditions listing should not be used as they are not valid, old, and of poor quality.

Comment(s) Made By:
Mark Baird – Scott Valley Protect Our Water
Liz Bowen – Representing Self
Roy Hall – Shasta Nation
Tom Mohler – Representing Self
Terry Raposa – Representing Self

Response:
Data submitted by the Quartz Valley Indian Reservation during the public data solicitation period, prior to the August 30, 2010 deadline, included data for 2007 – 2009. There will be an opportunity to provide additional data for 2010 and beyond during the next data solicitation period for the next Integrated Report. The submittal by the Quartz Valley Indian Reservation represents the most recent data that was available prior to the deadline for submittals for the 2012 Integrated Report.

The Listing Policy contains a section titled "Data Quality Assessment Process" that Regional Water Board staff follow when evaluating if data is of adequate quality for consideration in the Integrated Report. The data submitted by the Quartz Valley Indian Reservation were accompanied by a Quality Assurance Project Plan that was approved by the USEPA. Based upon these factors, staff have no reason to believe that the data is not of adequate quality for use in the Integrated Report process.

10. Comment(s)
- Support the proposed biostimulatory conditions, dissolved oxygen, and pH listings for the mainstem Scott River, and the proposed pH listing for Shackleford Creek above Campbell Lake.

Comment(s) Made By:
Crystal Robinson - Karuk Tribe
Kathleen Sloan - Yurok Tribe

Response:
Comment noted. Please note that based upon comments on the Public Review Draft 2012 Integrated Report, the mainstem Scott River has been re-segmented and only the mainstem Scott River from Young's Dam to Boulder Creek is proposed for listing in this final staff report. Please see Staff Report Section 3.7.5 and response #11 below for more details.

11. Comment(s)
- The entire mainstem Scott River should not be listed for biostimulatory conditions, dissolved oxygen, and pH based on data collected at a single location that is not representative of the entire mainstem. Data collected at other locations show that objectives are being met.

Comment(s) Made By:
Brian Morris – County of Siskiyou & Siskiyou County Flood Control and Water Conservation District

Response:
Regional Water Board staff familiar with the Scott River watershed evaluated whether it was appropriate to re-segment the mainstem Scott River for Integrated Report assessment purposes. It was determined that the mainstem Scott River could be appropriately re-segmented into three parts: (1) the upper mainstem Scott River from the confluence of the East and South Forks to Young's Dam (2) the middle mainstem Scott River from Young's Dam to Boulder Creek, and (3) the lower mainstem Scott River from Boulder Creek to the mouth. Please see Staff Report Section 3.7.5 for more details and an explanation about the re-segmentation.

All data for the mainstem Scott River were reviewed, and the lines of evidence and decisions for the Scott River HA were edited to reflect this re-segmentation. The re-evaluation of data based upon these new mainstem segments resulted in changes to the extent of the biostimulatory conditions, dissolved oxygen, and pH listing recommendations. In this final staff report, only the middle mainstem Scott River from Young's Dam to Boulder Creek (and not the entire mainstem Scott River) is recommended for listing for these three parameters.

12. Comment(s)
    - Erroneous data were used in the dissolved oxygen assessment for the Scott River as demonstrated by dissolved oxygen data collected in the Scott River at Gold Flat, Jones Beach, and the USGS gage on August 19, 2008.

    Comment(s) Made By:
    Brian Morris – County of Siskiyou & Siskiyou County Flood Control and Water Conservation District

    Response:
    Thank you for bringing to staff's attention that an old version of the excel data spreadsheet had been associated with some of the lines of evidence for dissolved oxygen in the Scott River (see Decision 32296 and supporting lines of evidence). When the data were received, Regional Water Board staff communicated with the data submitter who relayed that some of the data for dissolved oxygen presented in mg/L were accidentally transposed with the dissolved oxygen percent (%) saturation data. The issue was rectified during the assessment process although the correct spreadsheet was not linked to lines of evidence in the CalWQA database. The spreadsheet with the corrected data is now associated with various lines of evidence for Decision 32296.

SCOTT RIVER MISCELLANEOUS COMMENTS

13. Comment(s)
    - The Scott River should be delisted for all impairments. A substantial amount of work has been done to improve stream conditions and landowners have made significant efforts to improve conditions, therefore delisting is appropriate.

    Comment(s) Made By:
    Grace Bennett – Siskiyou County Supervisor
    Mark Baird – Scott Valley Protect Our Water
    Liz Bowen – Representing Self

    Response:
    Regional Water Board staff acknowledge and appreciate that a significant amount of work has been done in the Scott River watershed to improve water quality conditions and commend landowners for their efforts. The data available for evaluation in the 2012 Integrated Report reflect impairment; there are no proposed delistings for the Scott River.

14. Comment(s)
    - Requests staff look at the Scott River data from the Siskiyou Resource Conservation District (RCD), especially hobo temp data from the Scott River, to utilize in the Integrated Report.

Comment(s) Made By:
Grace Bennett – Siskiyou County Supervisor
Mark Baird – Scott Valley Protect Our Water
Liz Bowen – Representing Self

Response:
The data and information submittal period closed on August 30, 2010. However, Regional Water Board staff will contact staff at the RCD before the next Integrated Report cycle to request that they submit surface water data and the associated quality assurance information.

TEN MILE TEMPERATURE COMMENTS

15. Comment(s)
- The 16 degree Celsius temperature threshold utilized in the lines of evidence is different than the 14.8 degree Celsius from Sullivan et al. utilized last Listing Cycle. Why was it changed?

Comment(s) Made By:
Ken Boche – Campbell Global

Response:
Sullivan et al. presents a Maximum Weekly Average Temperature (MWAT) of 14.8 degrees Celcius as suitable for salmonids. The MWAT reflects the highest weekly average temperature conditions in the watershed. USEPA recommends using the Maximum Weekly Maximum Temperature (MWMT), which reflects the maximum value of the weekly average of the daily maximum temperatures fish are exposed to. Since the MWMT is derived from daily maximum temperatures, it can be used to protect against acute effects, such as lethality and migration blockage conditions. Therefore, Regional Water Board staff utilize the USEPA recommended MWMT of 16 degrees Celsius, which is protective of core juvenile rearing.

KLAMATH SEDIMENT AND TEMPERATURE REFERENCE STREAM COMMENTS

16. Comment(s)
- The large high-severity fires that have burned riparian zones on Klamath National Forest lands in recent decades should not be considered natural as they are the result of a century of fire suppression that has dramatically altered forest stand, structure, and fuel continuity. Therefore, no streams should be delisted for sediment or temperature until the "reference" streams within the Klamath National Forest are re-visited to identify those streams where riparian zones have been impacted by high-severity fire, and those impacted streams should not be delisted.

Comment(s) Made By:
Crystal Robinson - Karuk Tribe

Kathleen Sloan - Yurok Tribe

Response:
Regional Water Board staff acknowledge that fire regimes have changed in forests over the last 100 years. However, this does not necessarily preclude watersheds with a change in fire history from being included as reference watersheds.

Sediment and temperature reference stream criteria were developed by the Klamath National Forest (KNF), and reviewed and approved by Regional Water Board staff, utilizing the guidance document that the State Water Board's Surface Water Ambient Monitoring Program uses titled "Recommendations for the development and maintenance of a reference condition management program (RCMP) to support biological assessment of California's wadeable streams" (Ode and Schiff 2009). Ode and Schiff state that the water bodies that have had "natural disturbance such as forest fires" should be kept in the reference pool. However, the "Klamath National Forest Sediment and Temperature Monitoring Plan and Quality Assurance Project Plan" (KNF 2010) criteria does allow for a stream's data to be temporarily removed from the reference pool in extreme circumstances where a significant portion of the watershed has been significantly impacted (e.g., severely burned), if such a determined is warranted.

Regional Water Board staff conducted an audit of the process utilized by KNF staff to identify reference streams, which included reviewing the protocol for using GIS and aerial photographs to ensure that candidate watersheds met the thresholds for reference streams. Additionally, field validation inspections were conducted by Regional Water Board staff in Fort Goff Creek and Portuguese Creek in March of 2013. Staff reported that the fire suppression activity within the riparian reserves did not appear to result in burn severity that was significantly greater than on the surrounding landscape, and the burn severity along Fort Goff and Portuguese Creeks was noted as "low to very low within a patchwork of moderate soil burn severity (Williams 2013)." Staff concluded that the KNF were following the criteria for selecting reference streams, and the field inspections verified that conditions were supporting beneficial uses and that the watersheds were suitable as reference watersheds (Williams 2014).

Miller et al. (2012) studied trends in fire size, fire frequency, and the percentage of high-severity fires in northwest California. Miller et al. report that although fire size and frequency are important they do not necessarily scale with ecosystem effects of fire. Their study found that while fire size and total annual area burned increased from 1910- 2008, there was no temporal trend in the percent of high severity fires.

If future data and information reflect that a reference watershed's data should be temporarily removed from the reference pool, then Regional Water Board staff will consider that information. For the present, staff are recommending that all water bodies identified as meeting the reference criteria be removed from the 303(d) List for sediment and temperature.

17. Comment(s)
    - Wooly Creek drainage in the Salmon River has a grazing allotment and should not be considered a reference stream.
    - Canyon Creek should not be delisted for sediment as more than 10% of the watershed is grazed and this level of grazing does not meet the criteria for reference streams. Additionally, one can infer that best management practice (BMP) violations have occurred in the Canyon Creek watershed because Klamath National Forest BMP evaluations over the past 15 years show grazing BMPs within the Klamath National Forest lands have not controlled impacts in about 50% of the cases monitored.

    Comment(s) Made By:
    Felice Pace – Klamath, CA
    Crystal Robinson - Karuk Tribe

    Response:
    Regional Water Board staff clarified in the final staff report for the 2012 Integrated Report that the reference stream criteria require that water bodies which have grazing also have no best management practice violations (see Sections 3.6.1 and 3.6.2). There is no percent grazing threshold required by the criteria for reference water bodies. That said, most of the reference watersheds have no grazing. Of those reference water bodies where grazing occurs, it is estimated that no more than 5-10% of the reference water body is grazed, as topography largely limits the area suitable for grazing.

    Recent information from staff of the Klamath National Forest report that there are no known BMP violations for any of the reference water bodies and that there are no large sediment sources or shade impacts that would exclude them from the reference pool (Laurie 2014). Tom Williams, Regional Water Board P.G. Engineering Geologist, conducted an audit of the reference watersheds and found "that these [reference] watersheds appear to be supporting beneficial uses and are suitable as reference watersheds" (Williams 2014).

    All of the water bodies identified as reference meet the criteria for reference streams and therefore are being proposed for delisting for temperature and sediment.

18. Comment(s)
    - The mainstems of Fort Goff Creek and Portuguese Creek should not be delisted for sediment due to discretionary fire suppression activities conducted by the US Forest Service to fight fires along these two water bodies in 2012 (including felling trees along the Creeks and cutting lots in the channel), which have resulted in sediment delivery to these streams.

    Comment(s) Made By:
    Felice Pace – Klamath, CA

Response:
Please see response #16 pertaining to consideration of streams with a fire history as reference.

On March 6, 2013 Regional Water Board staff inspected portions of Fort Goff Creek and Portuguese Creek in response to a request from a member of the public (Williams 2013). Staff did note that snags were felled within the burned area and that there was a lack of large woody debris in the creeks. As with any fire, it is expected that some increased erosion and sediment delivery may occur as a result of the fire. Staff concluded that the fire suppression activity within the riparian reserves did not appear to result in burn severity that was significantly greater than on the surrounding landscape and the burn severity along Fort Goff and Portuguese Creeks was noted as "low to very low within a patchwork of moderate soil burn severity." A summary by Williams (2014) of his 2013 inspection stated that "The reference watershed inspections verified that these watersheds appear to be supporting beneficial uses and are suitable as reference watersheds."

If future data and information reflect that either of these reference watersheds should be temporarily removed from the reference pool, then Regional Water Board staff will consider that information. For the present, staff continue to recommend that Fort Goff and Portuguese Creeks be removed from the 303(d) List for sediment and temperature as they are "suitable as reference watersheds" (Williams 2014).

19. Comment(s)
- Canyon Creek should not be delisted for temperature as a recent controlled burn that "got out of control" has resulted in the removal of shade from Canyon Creek. Additionally, grazing has altered riparian shade especially willow shade along the streams and in wetlands.

Comment(s) Made By:
Felice Pace – Klamath, CA

Response:
To clarify, the entire Canyon Creek watershed is not being proposed for delisting. Only the portion of Canyon Creek and its tributaries from the headwaters to the downstream boundary of the Marble Mountain Wilderness are being proposed for delisting.

In September 2011, Regional Water Board staff conducted an inspection of the burned area of Canyon Creek within the area being proposed for delisting (McFadin 2014). Staff specifically examined the northern boundary of the fire along the constructed fire line, as well as the fire boundary along the east side of Canyon Creek. Staff's observations were that the fire line had been rehabilitated in a way that minimized the potential for sediment delivery. This was achieved by disrupting the topography of the fire line in a way that runoff would be diverted to one side or another at regularly spaced intervals. The fire line terminated at the bank of the

creek after traversing a fairly steep slope. At the time of this inspection there was less than a cubic yard of material that had accumulated at this location on the flood plain at the bottom of the slope.

In September 2011, staff also evaluated impacts on the riparian canopy and stream shade caused by the fire and suppression activities. The removal of the riparian trees created a relatively small opening, but did not create large openings in the canopy, and based on the incremental change in shade, staff's best professional judgment is that the temperature effects were negligible. Staff did not observe any other canopy openings that were a result of the fire or associated fire suppression activities.

A review of aerial images for Canyon Creek in May 2014 did not reflect any substantial canopy alterations or areas lacking riparian shade. This exercise, combined with staff's findings from the 2011 field inspection, lead to the conclusion that grazing has not significantly impacted canopy in the portion of Canyon Creek being proposed for delisting.

LAKES AND RESERVOIRS MERCURY COMMENTS

20. Comment(s)

- Staff from the San Francisco Bay Regional Water Quality Control Board and Central Valley Regional Water Quality Control Board working on the Statewide Mercury Control Program (SMCP) are concerned with the assessment methodology being utilized to evaluate mercury in fish tissue data from the Surface Water Ambient Monitoring Program (SWAMP) Lakes and Reservoirs study. The SMCP is evaluating each composite sample as its own data point, while the Public Review Draft 2012 Integrated Report averaged the composite samples collected on the same day at a single location. San Francisco Bay and Central Valley Regional Water Board staff are concerned that averaging the composite samples results in a large number of lakes and reservoirs with a multitude of composite samples exceeding the threshold for mercury having only one 1 data point reflected in the LOEs in the Integrated Report, and one sample is not adequate to list. The Integrated Report and SMCP should use a consistent assessment methodology.

Comment(s) Made By:
Carrie Austin – San Francisco Bay Regional Water Quality Control Board; Statewide Mercury Control Program

Response:
Integrated Report staff appreciate the comments by staff of the San Francisco Bay and Central Valley Regional Water Boards. Staff re-evaluated all mercury in fish tissue data, including those data from lakes and reservoirs that have been collected through SWAMP. The data utilized to make final listing and delisting decisions are re-evaluated in a manner consistent with how the SCMP is evaluating mercury in

fish tissue data. The assessment methodology is as follows: each fish tissue composite sample is evaluated as its own sample instead of the composites from a single date and location being averaged. This is due to the fact that fish are not static and move throughout a lake or stream and accumulate mercury in tissue over time. Therefore, the idea of spatial and temporal independence does not apply, and composite samples collected on a single day at a single location should not be averaged. The original LOEs where data are averaged are still included and discussed in the decision although they are not utilized to make the final listing or delisting decision. This change in assessment method has resulted in two additional listings: Spring Lake in Sonoma County and Dead Lake in Del Norte County. See Staff Report Section 3.7.1 for additional information about the re-evaluation of mercury in fish tissue data.

21. Comment(s)
- There are not adequate data to support the listing of Ruth Lake for mercury. The listing should be based on more than four samples.

Comment(s) Made By:
Carol Rische – Humboldt Bay Municipal Water District

Response:
The listing for mercury in fish tissue in Ruth Lake is based upon 14 composite samples collected in the lake. In the Public Review Draft 2012 Integrated Report the composite sample results from fish collected on the same date at the same location were averaged resulting in 2 of 4 samples exceeding the evaluation guideline for mercury. Per Listing Policy Section 3.1, this is ample evidence to recommend listing the water body for mercury.

However, per comments from San Francisco Bay and Central Valley Regional Water Quality Control Board staff working on the Statewide Mercury Control Program (see comment #20), the data for mercury in fish tissue have been re-evaluated so that each fish tissue composite sample is evaluated as its own sample instead of the composites from a single date and location being averaged. See Response #20, and Staff Report Section 3.7.1 for more details. This change in assessment method has resulted in a total of 12 of 14 composite fish tissue samples exceeding the evaluation guideline for mercury and the listing recommendation remains as "List."

22. Comment(s)
- Supports mercury listing for Copco 1 and Iron Gate Reservoirs.

Comment(s) Made By:
John Menke – Scott Valley Protect Our Water

Response:
Comment noted.

USE OF THE SECONDARY MCL COMMENTS

23. Comment(s)

- The use of the secondary Maximum Contaminant Level (MCL) for data assessment is inappropriate as the secondary MCL is intended to be applied "at the tap" for community water systems, not to receiving waters, and the rivers themselves are not used for drinking water.
- Secondary MCLs do not pose a threat to public health, but may cause taste and order or color problems.
- The Basin Plan establishes water quality objectives that apply to surface waters and does not incorporate secondary MCLs as water quality objectives, although it does refer to the existence of secondary MCLs in footnote 2 to Table 3-2.
- A draft Basin Plan amendment is currently in review, and the use of secondary MCLs is being disputed. Therefore, the decision to use the secondary MCL is premature and use of it for 303(d) Listing purposes would be an "underground regulation" and would make the 2012 Integrated Report vulnerable to legal challenge.
- The proposed listings for aluminum should be re-assessed using the primary MCL in lieu of the secondary MCL.
- The proposed listing for Manganese in Mark West Creek below the confluence with the Laguna de Santa Rosa should be removed as there is no water quality objective for manganese that applies to this water body because there is no primary MCL and the secondary MCL should not be applied to surface water.

Comment(s) Made By:
Toni Bertolero – Public Works Director, Town of Windsor
David Guhin – Director of Utilities, City of Santa Rosa
Brian Morris – County of Siskiyou & Siskiyou County Flood Control and Water Conservation District
Carol Rische – Humboldt Bay Municipal Water District

Response:
Regional Water Board staff assessed metals data, including aluminum and manganese data, under the chemical constituents objective to assess protection of the municipal and domestic supply (MUN) beneficial use.

The MUN beneficial use applies to both domestic and municipal water supplies, including domestic water supply systems which deliver untreated surface water for consumption and household use.

Per the Basin Plan, secondary MCLs may be applied to protect the MUN beneficial use through either the taste and odor objective or the chemical constituents objective with the same outcome. The lines of evidence contained in the Integrated Report have been developed utilizing the chemical constituents objective as the bases for applying the secondary MCLs for metals as appropriate criteria, however

as stated above they could also have been developed utilizing the taste and odor objective.

Secondary MCLs are incorporated into Table 3-2 of the current, May 2011 version of the Basin Plan by footnote 2 which states "Other water quality objectives (e.g., taste and odor thresholds or other secondary MCLs) and policies (e.g., State Water Board 'Policy With Respect to Maintaining High Quality Waters in California') that are more stringent may apply." Footnote 2 in Table 3-2 was explicitly added to the Basin Plan in a 1993 Basin Plan amendment for the purpose of clarifying how water quality objectives apply to the cleanup of groundwater and surface water. Therefore, more stringent taste and odor criteria as listed in Title 22 (the secondary MCLs) are being applied through the chemical constituents objective to support the Municipal and Domestic Supply (MUN) beneficial use.

24. Comment(s)

- The Listing Policy and the Clean Water Act state that the purpose of the 303(d) list is to prioritize waters for TMDL development. The use of the secondary MCL, which is intended to address concerns such as taste and odor, are not intended to protect aquatic life or human health and are not an appropriate basis for developing TMDLs.
- The Listing Policy does not require the use of the secondary MCL, and only refers to "applicable MCLs" which the commenter interprets to mean those that are incorporated into the Basin Plan.

Comment(s) Made By:
Toni Bertolero – Public Works Director, Town of Windsor
David Guhin – Director of Utilities, City of Santa Rosa

Response:
The 303(d) List is intended to identify those water bodies whose beneficial uses are impaired due to pollutants, with the goal of creating a TMDL or other regulatory program to address and remedy the impairment. TMDLs must be developed for water bodies placed upon the 303(d) list for any reason, including placement on the list due to impairment from taste and odor related issues.

The Listing Policy directs staff to compare data to Basin Plan objectives. As detailed in response #22, above, metals data are appropriately compared to the secondary MCLs for the purpose of assessing protection of the MUN beneficial use in surface waters under the chemical constituents objective.

25. Comment(s)

- Aluminum data from the Shasta River and Lower Klamath River should be re-evaluated against the secondary Maximum Contaminant Level (MCL) to be consistent with how aluminum data were evaluated for the Scott River. Aluminum levels in the Shasta River are higher than those in the Scott River,

which is being proposed for listing for aluminum, and therefore the Shasta River should be listed too.

Comment(s) Made By:
Crystal Robinson - Karuk Tribe
Kathleen Sloan - Yurok Tribe

Response:
Regional Water Board staff assessed metals data, including aluminum and manganese data, under the chemical constituents objective to assess protection of the municipal and domestic supply (MUN) beneficial use. The secondary MCL is a much lower threshold which protects against taste and odor impairments of the municipal and domestic supply (MUN) beneficial use. Secondary MCLs are incorporated into Table 3-2 of the Basin Plan by footnote 2 which states "Other water quality objectives (e.g., taste and odor thresholds or other secondary MCLs) and policies (e.g., State Water Board 'Policy With Respect to Maintaining High Quality Waters in California') that are more stringent may apply."

Staff re-evaluated the aluminum data from the mainstem Shasta River (which lies within the Klamath River HU, Shasta River HA) utilizing the secondary MCL. This re-assessment resulted in a change to the listing recommendation for the mainstem Shasta River from "do not list" to "list." The final Staff Report for the 2012 Integrated Report reflects Regional Water Board staff's recommendation to list the mainstem Shasta River for aluminum.

Aluminum data from the mainstem Klamath River within the Klamath River HU, Lower HA, Klamath Glen HSA water body are currently evaluated against the secondary MCL as reflected in the LOEs and decision from the Public Review Draft 2012 Integrated Report. In the decision, staff recommend that the USEPA list the mainstem Klamath River within this water body on the 303(d) List for aluminum. However, staff did not reflect this recommendation in Table 8 (*Recommendations To USEPA Based Upon Regional Water Board Analysis)* of the Public Review Draft 2012 Integrated Report. Staff added the aluminum listing recommendation for mainstem Klamath River within the Klamath Glen HSA to Table 8.

LAGUNA DE SANTA ROSA WATERSHED COMMENTS

26. Comment(s)
- Supports Regional Water Board staff re-segmentation of the Laguna de Santa Rosa watershed.

Comment(s) Made By:
Toni Bertolero – Public Works Director, Town of Windsor
Don McEnhill – Russian Riverkeeper

Response:
Comment noted.

27. Comment(s)
- Supports Regional Water Board staff recommendation to not delist the mainstem Laguna de Santa Rosa for mercury impairment.

Comment(s) Made By:
Don McEnhill – Russian Riverkeeper

Response:
Comment noted.

28. Comment(s)
- Supports Regional Water Board staff recommendation to keep the mainstem Laguna de Santa Rosa listed and recommend the mainstem of Mark West Creek below the confluence with the Laguna be listed for phosphorus impairment.

Comment(s) Made By:
Don McEnhill – Russian Riverkeeper

Response:
Comment noted.

29. Comment(s)
- Tributaries to the Laguna de Santa Rosa and Santa Rosa Creek should not be de-listed for phosphorus. Source of phosphorus impairment in the mainstem Laguna de Santa Rosa is from the tributaries. Urban runoff and dairies are a major source of phosphorus, many of which are located along Laguna tributaries.

Comment(s) Made By:
Don McEnhill – Russian Riverkeeper

Response:
The recommended de-listing of the tributaries to the Laguna de Santa Rosa and Santa Rosa Creek for phosphorus is the result of the re-segmentation of the Laguna Watershed and the analysis of data for those tributary water bodies that was submitted by August 30, 2010.

In 2010 and prior 303(d) List update cycles, data from the tributaries were combined and assessed along with data from the mainstem Laguna de Santa Rosa, which was inappropriate due to the difference between the slow, lentic conditions in the mainstem and the more riverine, lotic conditions in the tributaries. Additionally, data for each individual stream should be considered on its own merits to see if listing for a particular stream or stream segment is

warranted. Thus, the basis for the geographic extent of the original listings were flawed.

Following the re-segmentation, staff assessed data from the tributary water bodies on their own merit. Water column phosphorus data is available from several tributaries (Coglan, Roseland, Cotati and a few other creeks). However, these data cannot be compared to our Biostimulatory Water Quality Objective because diel samples of dissolved oxygen, pH, or chlorophyll-a are not available in these creeks. As described in Section 3.6.8, the assessment of biostimulatory conditions includes, first, an evaluation of nutrient-related "primary indicator" parameters (dissolved oxygen, pH, and chlorophyll-a) for evidence of biostimulatory conditions that could potentially impair beneficial uses. De-listing the tributaries is appropriate at this time because, when the data for the tributaries are evaluated on their own merits, there is insufficient information available to determine if the Biostimulatory Water Quality Objective is being violated.

Additionally, it is important to note that sources of phosphorus from throughout the Laguna de Santa Rosa and Mark West Creek watersheds will be evaluated during the ongoing development of the Laguna de Santa Rosa watershed TMDLs.

30. Comment(s)

- The Laguna de Santa Rosa should not be delisted for nitrogen as it may impact the Russian River estuary where nitrogen is the nutrient limiting algal productivity. Regional Water Board staff should assess the impact of current nitrogen loading from the Laguna de Santa Rosa on the Russian River estuary before a delisting occurs.

Comment(s) Made By:
Don McEnhill – Russian Riverkeeper

Response:
The mainstem Russian River and its estuary are not currently listed for nitrogen or biostimulatory conditions. Regional Water Board staff encourage the Russian Riverkeeper to submit any data that may be available for the mainstem Russian River pertaining to nutrients and biostimulatory conditions. Should the Russian River be listed for nutrients or biostimulatory conditions in the future, any subsequesntly developed TMDL would include a source analysis and determine which areas of the watershed are contributing to the impairment, and this analysis would include looking at the Laguna de Santa Rosa as a possible source. At the present time there is evidence for delisting the Laguna de Santa Rosa for nitrogen, as stated in the fact sheets.

31. Comment(s)

- Supports Regional Water Board staff recommendation to not delist the Laguna de Santa Rosa watershed for sediment impairment.

Comment(s) Made By:
Don McEnhill – Russian Riverkeeper

Response:
Comment noted.

RUSSIAN RIVER COMMENTS

32. Comment(s)
- Would like Regional Water Board staff to get data and list the mainstem Russian River for cyanobacteria, algae, nutrients, and endocrine disruptors.

Comment(s) Made By:
Brenda Adelman – Russian River Protection Committee

Response:
For the current 2012 Integrated Report cycle, the public data solicitation period ended August 30, 2010. Regional Water Board staff request that you submit any data or information you have about water quality in the mainstem Russian River during the public data submittal period for the next Integrated Report cycle.

Regional Water Board staff are in the process of assessing nutrient and algae data collected from the Russian River as part of the Surface Water Ambient Monitoring Program (SWAMP); a report is expected in Spring 2015 and will be considered in the next Integrated Report cycle. Regional Water Board staff support the idea that additional monitoring of endocrine disruptors in the Russian River watershed is needed.

OCEAN ACIDIFICATION COMMENTS

33. Comment(s)
- Regional Water Boards must consider information submitted by the Center for Biological Diversity on February 27, 2007 and February 4, 2009 (as well as information submitted to the State Water Resources Control Board on June 11, 2008; May 28, 2010; and August 27, 2010) and obtain readily available ocean acidification data from online research institutes for evaluation in the Integrated Report.
- Research since 2010 was provided in summary form in the comment letter and the commenter states that it highlights that Northern California oceans and aquatic life are particularly vulnerable to ocean acidification.

Comment(s) Made By:
Miyoko Sakashita – Center for Biological Diversity

Response:
The Pacific Ocean overlaps jurisdictional boundaries for multiple Regional Water Boards. Since this is a national and global issue, the regions are not addressing this issue individually as it is more appropriately addressed by the USEPA. To this point, the USEPA recently released a document titled "Strategic Plan for Federal Research and Monitoring of Ocean Acidificaion" (Ocean Acidification Research Plan) which will guide research and monitoring that will improve our understanding of ocean acidification, its potential impacts on marine species and ecosystems, and adaptation and mitigation strategies.

It should be noted that staff of the State Water Resources Control Board reviewed the information provided on February 27, 2007 and June 11, 2008, and in a response from State Water Board senior staff sent to Emily Jeffers of the Center for Biological Diversity dated September 10, 2008, stated that the data did not meet the requirements of the Listing Policy. USEPA staff also reviewed data and information listed in the above comment and concluded in their October 11, 2011 approval letter to Tom Howard at the State Water Resources Control Board that California's omission of ocean acidification from its 303(d) list was appropriate as the data are insufficient.

DIELDRIN AT BODEGA HEAD AND KLAMATH RIVER AT FLINT ROCK HEAD COMMENTS

34. Comment(s)
- Lines of evidence for dieldrin at Bodega Head (LOE 31747) and the Klamath River Flint Rock Head (LOE 31751) should be altered to reflect that the sample results are below the laboratory method detection limit (MDL) and the MDL is greater than the evaluation guideline and therefore, per the Listing Policy, the result shall not be utilized in the analysis.

Comment(s) Made By:
Lisa Holmes – State Water Board

Response:
The lines of evidence have been edited to explain why the data could not be utilized, and the listing decisions have been edited accordingly.

LISTING POLICY COMMENTS

35. Comment(s)
- The Listing and Delisting Methodology (Section 3.4.2 of the Public Review Draft 2012 Integrated Report, now Section 3.4.1 of the Final 2012 Integrated Report) states that "staff recommend a water body / pollutant pair be listed as impaired for the first time or remain listed as impaired if any one of the following statements was found to be true." Conversely to delist, none of the seven statements referenced in the Public Review Draft 2012 Integrated Report can be

"true." The seven statements were then described (p.9 of Public Review Draft 2012 Integrated Report). Determining whether each statement is true or not true would be very difficult, if not impossible, to determine conclusively. This approach appears to be inherently biased towards listing determination (versus not listing), and each listing triggers a costly, time consuming process. Therefore, the basis for listing recommendations should be revised and the resource-side of the equation be factored in.

Comment(s) Made By:
Carol Rische – Humboldt Bay Municipal Water District

Response:
Staff followed the guidance of the Listing Policy to make listing and delisting determinations. The intent of the Listing Policy is to determine if water bodies are meeting water quality standards. It is not required that data and information be submitted showing that all seven listing statements be proven untrue before a delisting can occur. A water body can be removed from the 303(d) List if the data and information that are available for evaluation through the Integrated Report process reflect that objectives are not being exceeded and beneficial uses are not being impaired. However, if data reflect impairment, a water body will remain on (or be placed on) the 303(d) List. Economic considerations are beyond the scope of the Integrated Report. Please see the language in the Listing Policy for additional information:

http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf

MISCELLANEOUS COMMENTS

Other Projects and/or Processes

36. Comment(s)
- The Klamath River dams should not be removed since they provide beneficial uses such as flood control, ground water replenishment, and recreation.

Comment(s) Made By:
Chuck Dunn – Representing Self
Richard Marshall – Siskiyou Water Users Association

Response:
The Integrated Report is developed to identify impaired surface waters.

Integrated Report Process

37. Comment(s)
- Handouts should be plentiful and the printed text easy to read.

- Public meeting time and location should be more convenient to facilitate public participation.

Comment(s) Made By:
Betty Hall – Shasta Nation
Richard Marshall – Siskiyou Water Users Association
Terry Raposa – Representing Self
Craig Tucker – Karuk Tribe

Response:
Regional Water Board staff have made and will continue to make every attempt to ensure that the handouts are easy to read and that there are enough handouts for all members of the public attending meetings. Staff scheduled two public meetings to discuss the findings of the Public Review Draft 2012 Integrated Report, one in the southern part of the Region (Santa Rosa) and one close to the northern part (Redding). The northern meeting was held in Redding in order to make the driving distance similar for stakeholder from Siskiyou County and Humboldt County. Staff have worked to ensure that all needs are balanced.

Source Determination / Identification

38. Comment(s)
- Why aren't sources named in the Staff Report? How can the public comment when sources are not given?
- The source of high water temperatures is the sun.
- Septic tanks on the Quartz Valley Indian Reservation are the source of indicator bacteria found in the data submitted by the Quartz Valley.
- Low flows in many streams are natural as the streams are fed by snowpack and are ephemeral. Low flows in streams this year are caused by drought.
- Irrigation withdrawals/diversions and groundwater pumping are the cause of low flows in the Scott River.
- The flood of 1964 altered the Scott River and is the cause of many impairments in the system and it is still recovering.
- Cattle grazing and human inputs by timber company workers contribute to indicator bacteria in the Elk River and its tributaries.
- The fact that the Regional Water Board does not have a natural source exclusion policy is disappointing and must be rectified.

Comment(s) Made By:
Mark Baird – Scott Valley Protect Our Water
Liz Bowen – Representing Self
Dana Colegrove – Klamath Justice Coalition
Betty Hall – Shasta Nation
Roy Hall – Shasta Nation
Konrad Fisher – Klamath Riverkeeper
Richard Marshall – Siskiyou Water Users Association

John Menke – Scott Valley Protect Our Water
Jessie Noel – Representing Self
Tom Penske – Representing Self
Erica Terence – Representing Self
Craig Tucker – Karuk Tribe
Kristi Wrigley – Representing Self

Response:
Source identification is beyond the scope of the Integrated Report process. When TMDLs or other watershed assessments occur, a source identification analysis will be conducted and that is when the source of impairments will be identified.

APPENDIX 4 REFERENCES:

Klamath National Forest. 2010. Klamath National Forest Sediment and Temperature Monitoring Plan and Quality Assurance Project Plan. September 29, 2010.

Laurie, G. 2014. Re: Questions about Some KNF Reference Watersheds. E-mail from Greg Laurie, Klamath National Forest staff, to Katharine Carter, Regional Water Board staff. May 27, 2014.

McFadin, B. 2014. Canyon Creek Fire Impacts. E-mail from Bryan McFadin, Regional Water Board Staff, to Katharine Carter, Regional Water Board staff. May 19, 2014.

Miller, J.D., C.N. Skinner, H.D. Safford, E.E. Knapp, and C.M. Ramirez. 2012. Trends and causes of severity, size, and number of fires in northwestern California, USA. *Ecological Applications*. 22(1), pp. 184-203.

Ode, P. and K. Shiff. 2009. Recommendations for the development and maintenance of a reference condition management program (RCMP) to support biological assessment of California's wadeable streams. March 2009.

Williams, T.R. 2013. KNF Goff Fire Inspection. May 10, 2013. Memo to Fred Blatt, Regional Water Board Supervisor of Timber / Nonpoint Source Division.

Williams, T.R. 2014. Klamath National Forest (KNF) Sediment and Temperature Monitoring Plan Reference Watershed Audit. May 13, 2014. Memo to Dean Prat, Regional Water Board Senior Engineering Geologist, Northern Timber Unit and Rebecca Fitzgerald, Regional Water Board Senior Environmental Scientist, TMDL Unit.