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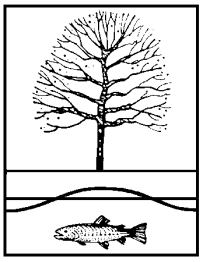


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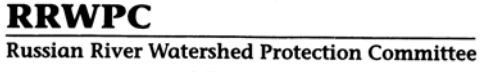
RRWPC
Russian River Watershed Protection Committee

August 30, 2010

Jeffrey Shu, State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95812-0100

VIA ELECTRONIC AND U.S. MAIL: jshu@waterboards.ca.gov

RE: **Notice of Public Solicitation of Water Quality Data and Information for 2012 California Integrated Report [Clean Water Act Sections 305(b) and 303(d)]**

Dear Mr. Shu:

The undersigned organizations have been active for many years on programs and issues affecting the quality and flow of the waters of the State. Our organizations have performed water monitoring and watershed surveys, and conducted outreach among a diverse group of citizens around California, to determine the most pressing issues for state waterway health. We welcome the opportunity to submit these comments in light of these significant and ongoing efforts.

We present in this letter two general themes of proposed listings. First, we highlight some examples of traditional "pollutant"-based "Category 5"[1] listings that are being proposed to you separately. This Category of listings has been the focus of the State Water Resources Control Board's (State Board) 303(d) list to date. We urge the State Board's careful attention to these and the other Category 5 listings proposed by the identified commenters as well as the undersigned organizations and others. The adoption of such proposed listings will help ensure clean, healthy waterways throughout the State.

Second, we highlight additional groups of listings that also identify impaired and threatened waters that should be listed under Category 4 (particularly 4C) or Category 5. Our analysis reveals three such groups that regularly impair designated beneficial uses but that have received inadequate attention in the state's 303(d) process to date. These are: altered natural flows in surface waters, groundwater contamination and excessive groundwater withdrawals that impact surface water health, and anthropogenic climate change-caused impacts to surface waters. Impaired and threatened waterways from these groups of listings must be included in the 2012 303(d) list to ensure compliance with the Clean Water Act, and to achieve full restoration of the health of the waters of the state.

[1] Category references from U.S. EPA, "Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act" (July 29, 2005), available at: http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-report.pdf (2006 Guidance), and SWRCB, "Staff Report: 2010 Integrated Report Clean Water Act Sections 303(d) and 305(b)" (April 19, 2010) (2010 Integrated Report Staff Report), available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/2010ir0419.pdf.

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I. FEDERAL AND STATE MANDATES REQUIRE 303(D) LIST IDENTIFICATION OF ALL IMPAIRED AND THREATENED CALIFORNIA WATER BODIES.

A. Impaired or Threatened Water Bodies Must Be Identified on the 303(d) List Regardless of Whether Impacted by "Pollutants" or "Pollution."

Section 303(d) of the Federal Clean Water Act represents the Act's "safety net."[2] It is the bedrock component of the Clean Water Act, the backstop to ensure that the goals of the Act can be achieved when initial efforts fail. At the advent of implementation of Section 303(d) in the late 1990s, U.S. EPA Assistant Administrator for Water Robert Perciasepe called the TMDL program "crucial to success because it brings rigor, accountability, and statutory authority to the process."[3]

Section 303(d) requires states to address comprehensively all human activities that affect the chemical, physical, and biological integrity of the nation's waters.[4] Section 303(d) is widely recognized as an essential means to achieving the Clean Water Act's goal of restoring waters so that they are safe for swimming, fishing, drinking, and other "beneficial uses" that citizens enjoy, or used to be able to enjoy.[5]

Section 303(d) first requires the State Water Board to identify waters that do not meet, or are not expected to meet by the next listing cycle, water quality standards after the application of certain technology-based controls. Specifically, Section 303(d)(1)(A) states as follows:

> Each State shall identify those waters within its boundaries for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.

In other words**,** if a water body's standards are not being met in the water body, then it *must* be listed under the state's Section 303(d) list. This is a separate and distinct task from the effort of determining whether or not total maximum daily loads (TMDLs) are required, as discussed in CWA Section 303(d)(1)(C):

> Each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those

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[2] Houck, Oliver A., *The Clean Water Act TMDL Program* 49 (Envtl. Law Inst. 1999).
[3] Memorandum from Robert Perciasepe, Assistant Administrator for Water, U.S. EPA, to Regional Administrators and Regional Water Division Administrators, U.S. EPA, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)" (August 8, 1997).
[4] *See* 33 U.S.C. §§ 1251 *et seq.* and 33 U.S.C. § 1313(d).
[5] 33 U.S.C. § 1313(d)(1) and (2); *see also* 40 C.F.R. § 130.7(b)(1). California law defines an existing use as one that has occurred since 1975 and recognizes 23 designated or beneficial uses for water bodies, including uses such as freshwater replenishment, and migration of aquatic organisms. (2002 California 305(b) Report on Water Quality, Appendix A, State Water Resources Control Board, August, 2003. Available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/305b.shtml.

> pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation. Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

This means that a water body is listed on the 303(d) list if beneficial uses are being impaired, and a TMDL is developed if they are being impaired by a "pollutant" (including a combination of pollutants and pollution).

"Pollutant" is defined in CWA Section 502(6).[6] Courts have interpreted the definition of "pollutant" expansively, stating that it "encompass[es] substances not specifically enumerated but subsumed under the broad generic terms" listed in Section 502(6).[7] Similarly, courts have stated that the definition of pollutant is "meant to leave out very little."[8]

"Pollution" is also defined in CWA Section 502, as "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water." U.S. EPA has found that "pollution" must result in a 303(d) listing if it results in impairment, and will result in a TMDL if pollutants are also present:

> In some cases, the pollution is caused by the presence of a pollutant and a TMDL is required. In other cases, pollution does not result from a pollutant and a TMDL is not required. States should schedule these segments for monitoring to confirm that there continues to be no pollutant associated with the failure to meet the water quality standard and to support water quality management actions necessary to address the cause(s) of the impairment.[9]

The mandate to list impaired waterways under Section 303(d)(1)(A) regardless of the cause of impairment is consistent with the reasoning of *Pronsolino v. Nastri*.[10] The Ninth Circuit Court of Appeals found that the source of the impairment at issue is irrelevant to listing, and that decisionmakers may consider only the issue of whether the water body is impaired in determining whether to list it. This position is also supported by the National Research Council (NRC), which found that the TMDL program "should encompass all stressors, both pollutants

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[6] The definition of "pollutant" in Section 502(6) includes: "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water." Several other items are specifically excluded; flow alteration is not one of those items.

[7] *U.S. PIRG v. Atlantic Salmon of Maine* (U.S. Dist. Ct. Maine, Aug. 2001), available at http://www.med.uscourts.gov/Site/opinions/kravchuk/2001/MJK_08282001_1-00cv150_USPIRG_v_Heritage.pdf, citing *United States v. Hamel*, 551 F.2d 107 (6th Cir. 1977).

[8] *Id.*, citing *Sierra Club, Lone Star Chapter v. Cedar Point Oil Co*., 73 F.3d 546, 566-568 (5th Cir. 1996), *cert. denied*, 519 U.S. 811 (1996).

[9] 2006 Guidance at 56.

[10] *Pronsolino v. Nastri*, 291 F.3d 1123, 1137-38 (9th Cir. 2002), cert. denied, 123 S. Ct. 2573 (2003) ("Water quality standards reflect a state's designated *uses* for a water body and do not depend in any way upon the source of pollution").

and pollution, that determine the condition of the waterbody."[11] The NRC found this step to be important in part because "activities that can overcome the effects of 'pollution' and bring about water body restoration – such as habitat restoration and channel modification – should not be excluded from consideration during TMDL plan implementation."[12]

In its 2006 Guidance informing states on how to prepare their biennial report on water quality (the states' "305(b)/303(d) Integrated Report"), U.S. EPA recommended a division of impaired water body segments into Categories as follows:[13]

- Category 4: Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed;
- Category 5: Available data and/or information indicate that at least one designated use is not being supported or is threatened, and a TMDL is needed.

California adopted the following, similar state categories for impaired waterways:[14]

- Category 4a: A water segment for which ALL its 303(d) listings are being addressed; and 2) at least one of those listings is being addressed by a USEPA approved TMDL.
- Category 4b: A water segment for which ALL its 303(d) listings are being addressed by action(s) other than TMDL(s).
- Category 4c: A water segment that is impaired or affected by non-pollutant related [*i.e.*, "pollution"] cause(s).
- Category 5: A water segment where standards are not being met and a TMDL is required but not yet completed for at least one of the pollutants being listed for this segment.

Categories "4" and "5" together represent the state's "303(d) List," as *both* categories encompass the total of the state's impaired or threatened waterways under Section 303(d)(1)(A). Category 5 waters require a TMDL. This Category includes waters impaired only by pollutants and those impaired both by pollutants and "pollution" (in which case consideration of the "pollution" would be given in the TMDL development for the waterway). Category 4 also includes impaired waters, but categorizes them as not requiring development of a TMDL,[15] though other actions may be taken to improve their health, as noted below.

California's 2008/2010 303(d) list of impaired waters, adopted by the State Water Board on August 4, 2010, contains Category 4A, 4B, and Category 5 waters. However, **the state's 2008/2010 303(d) list fails to include *any* Category 4C waters**, a glaring omission given the numerous pollution-related impairments facing many of the state's threatened and impaired waterways. The State Board must rectify this oversight in the state's 2012 303(d) list.

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[11] National Research Council, "Assessing the TMDL Approach to Water Quality Management," p. 4 (Nat'l Academy Press, Wash. D.C., 2001) (emphasis added).
[12] *Id.*
[13] 2006 Guidance at pp. 46 *et seq.* (emphasis added).
[14] *See* 2010 Integrated Report Staff Report at 20 (emphasis added).
[15] As noted below, we would argue that flow alterations can and should require development of a TMDL even if present without pollutants; there is precedent for this position in California.

In sum, the 2012 303(d) list must identify *all* impaired and threatened waters, whether impaired by pollutants and/or pollution – not only so that they may be addressed as required by the TMDL process,[16] but also so they may be restored to health as well through other programs and policies. For example, California's Porter-Cologne Water Quality Control Act requires that Basin Plans include a program of implementation that describes how water quality standards will be attained.[17] Where standards are not being attained – such as where flow alterations have been identified as impairing waterway beneficial uses – these implementation plans must incorporate strategies for achieving waterway health. Implementation of this state mandate, along with the TMDL program mandates where applicable, will ensure that water bodies whose health is threatened and impaired – in Categories 4(a)-(c) *and* Category 5 – are restored to health.

B. The State Must Use and Consider All Readily Available Information

The body of regulations and guidance that bear on 303(d) listing are unambiguous about the information that should be considered in making listing decisions: *all of it*. Federal regulations state clearly that "[e]ach State shall assemble and evaluate all existing and readily available water quality-related data and information to develop the [303(d)] list."[18] The regulations further mandate that local, state and federal agencies, members of the public, and academic institutions "should be *actively* solicited for research they may be conducting or reporting."[19] Furthermore, EPA's 2006 Guidance explicitly states that U.S. EPA's review of California's list will include an "assess[ment of] whether the state conducted an adequate review of all existing and readily available water quality-related information."[20] To that end, the 2006 Guidance also requires states to provide "[r]ationales for any decision to not use any existing and readily available data and information."[21]

Accordingly, and the State Board's data solicitation notice notwithstanding,[22] any and all existing and readily available data and information must be considered to determine the health of the state's increasingly-degraded water bodies.

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[16] *See supra* n. 15 regarding TMDLs for flow-related impairments in California, and *see infra* regarding requirements to develop TMDLs that consider flows when waterways are also listed due to pollutant impairments. *See also* SWRCB, "A Process for Addressing Impaired Waters in California" (July 2005), available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/iw_guidance.pdf.

[17] Water Code Section 13241 reads: "Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance…." Section 13242 follows that: "The program of implementation for achieving water quality objectives shall include, but not be limited to:

(a) A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private.

(b) A time schedule for the actions to be taken.

(c) A description of surveillance to be undertaken to determine compliance with objectives."

It is both the law and good public policy for the state to take action to ensure that waterways identified as impaired, including those impaired by pollution, are restored to health.

[18] 40 C.F.R. § 130.7(b)(5).

[19] 40 C.F.R. § 130.7(b)(5)(iii) (emphasis added).

[20] 2006 Guidance at 29.

[21] *Id.* at 18.

[22] SWRCB, "Notice of Public Solicitation of Water Quality Data and Information for 2012 California Integrated Report – Surface Water Quality Assessment and List of Impaired Waters" (Jan. 10, 2010; updated May 24, 2010), http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/data_solicitation_ir2012v2.pdf.

II. THE UNDERSIGNED ORGANIZATIONS URGE THE STATE WATER BOARD TO LIST ALL WATERWAYS IMPAIRED BY "POLLUTANTS."

The 2008/2010 303(d) list adopted by the State Board on August 4, 2010 shows a 64% increase from the number of listings in 2006. This number likely reflects both a growing number of severely polluted waterways in California and an improvement in the Board's ability to assess a larger number of waterways and pollutants. We applaud the State Water Board for its efforts to assess a larger number of waterways and sources and causes of impairments and expect to see the 2012 303(d) list capture an even larger number of impairments.

The 2012 list can improve upon the 2008/2010 list by including additional new listings as needed, and in particular those waterways impaired by trash and bacteria. In order to rectify this, the State Water Board must ensure that the 2012 List reflects water quality data and information submitted by Waterkeeper and other groups monitoring local water quality. We bring to the Board's attention just some of the numerous water quality issues in watersheds from the Oregon border to San Diego that have yet to be addressed by the State Board's 303(d) List, and incorporate by reference the related data submissions by local Waterkeepers and the undersigned organizations. This information is by no means comprehensive, but provides the Water Board with examples of additional listings that should be carefully reviewed for inclusion in the 2012 303(d) list.

North Coast

Humboldt Baykeeper's Citizen Monitoring Program has collected water quality data from sites throughout the Humboldt Bay, Mad River, and Little River watersheds since 2005. Numerous waterbodies in the Humboldt Bay, Mad River, and Little River watersheds have quite high levels of fecal coliform (*E. coli*), particularly after major rain events. High fecal coliform levels have resulted in posted closures of several local beaches by the Ocean Monitoring Program of the Humboldt County Division of Environmental Health.[23] These beaches include Moonstone Beach County Park (at the outlet of Little River), and Mad River Mouth North (at the outlet of Widow White Creek and Mad River). The County has sampled ocean waters since 2003, and has documented exceedences of fecal coliform and/or Enterococcus at both Moonstone Beach County Park and Mad River Mouth North.[24] Moonstone Beach County Park is on the 303(d) list for indicator bacteria, but Humboldt Baykeeper's Citizen Monitoring Program is the only source of water quality data upstream from these beaches were water pollution due to indicator bacteria is of concern. This water quality data warrants several additional listings, as described in Humboldt Baykeeper's 303(d) comment letter.

[23] http://co.humboldt.ca.us/hhs/phb/environmentalhealth/oceanmonitoringprogram/.
[24] http://co.humboldt.ca.us/hhs/phb/environmentalhealth/oceanmonitoringprogram/waterqualitytestresults-archive.asp .

Central Coast

From July 2008 to March 2010 San Francisco Baykeeper conducted *Enterococcus* monitoring near storm drains in San Francisco Bay's Oakland Inner Harbor.[25] The data collected reflected exceedences of Basin Plan water quality standards for *Enterococcus*,[26] and showed that contact recreation in the vicinity of these storm drains poses serious risks.[27] Accordingly, Oakland Inner Harbor should be designated as impaired for Indicator Bacteria. In addition, polybrominated diphenyl ethers (PBDEs) are present in Bay sediments, are accumulating in Bay organisms, and are known to negatively impact aquatic life. For these and other reasons, Baykeeper found that the Regional Board should consider a PBDE listing for San Francisco Bay in this 2012 listing cycle. Please refer to San Francisco Baykeeper's independent letter in response to the State Board's data solicitation for further information regarding Indicator Bacteria concentrations and PBDE toxicity in San Francisco Bay.

Despite Santa Barbara Channelkeeper's (SB Channelkeeper) submission of data and photographic evidence reflecting a serious trash problem in San Pedro Creek, the Creek was not listed for trash on the 2010 303(d) List. SB Channelkeeper's data for 2012, which was collected in compliance with the State Water Board's SWAMP guidance on rapid trash assessments, confirms that trash impairs over half the streams monitored in the Santa Barbara and Goleta Area.[28] The State Water Board should review this carefully, and consider other data submitted on trash listings so that another listing cycle does not go by without action to address this important water quality issue.

Ventura Coastkeeper (VCK) conducted water quality monitoring throughout the Santa Clara River, Ormond Beach, Calleguas Creek, and Nicholas Canyon Creek watersheds from June 2009 to August 2010. VCK found based on this information that trash listings for Nicholas Canyon Creek, San Jon Barranca, the Ormond Beach Lagoon, the Santa Clara River Estuary, and Santa Clara River Reaches 1, 3, 4a, and 5 are warranted. Additionally, VCK found the following exceedences that warrant listing on the 2012 303(d) list: Santa Clara River Estuary for flow, dissolved oxygen, pH, phosphate, and nitrate; Santa Clara River Reach 3 for *E. coli*; Ormond Beach wetlands for pH, nitrate, and *E. coli*; San Jon Barranca for *E. coli*; and Santa Clara River Reaches 1 and 2 for flow.

[25] Under this standard, only two stations satisfied the geometric mean objective during the summer and none satisfied the objective during the winter. In addition, none of the stations achieved compliance with the "no sample greater than 104 MPN/100ml" objective within a given 30-day sampling period during either the summer or winter monitoring seasons.

[26] Pursuant to the San Francisco Bay Basin Plan, the *Enterococcus* objectives include a geometric mean of less than 35 MPN/100 ml and states that no sample should exceed 104 MPN/100 ml.

[27] San Francisco Bay is only subject to bacteriological monitoring at designated beaches, although contact recreation occurs routinely throughout the Bay, including Oakland Inner Harbor.

[28] Atascadero, Bell, Cieneguitas, Maria Ygnacio, Phelps Ditch (El Encanto Creek), San Jose, and San Pedro Creeks. *See* Santa Barbara Channelkeeper's 2012 303(d) Comment Letter responding to the State Water Board's request for data.

South Coast

From July of 2007 through February of 2010 Orange County Coastkeeper (OCCK) conducted water monitoring at a total of seven sites on San Juan, San Mateo and Cristianitios Creeks in Orange and San Diego County. All of these Creeks are under the authority of the San Diego Regional Water board. After analyzing the data from this monitoring in accordance with the current state guidelines for developing 303d listings, OCCK found that there are sufficient exceedences of basin plan objectives for ammonia, nitrate, phosphate, and cadmium to warrant additional impairment listings on the 2012 impaired waters list.

The Inland Empire Waterkeeper sampled 10 sites on a weekly basis from July 2008 through November 2009 under contract with the Santa Ana Regional Water Quality Control Board. The project included four locations on San Timoteo Creek (one site perpetually dry), four locations on Warm (Twin) Creek and two locations on City Creek; all of which drain to Reach 4 of the Santa Ana River.[29] The primary focus was *E. coli* bacteria indicators, but samples were also taken for pH, conductivity, dissolved oxygen, flow rate, temperature, metals, minerals, nutrients, PCBs, organochlorine pesticides, TDS, hardness, and COD. Five sites contained *E. coli* bacteria levels during the warm season or cool season (or both) that exceed the proposed geo-mean basin plan objective. All nine sites had a minimum of two exceedences; ranging from the most natural mountain stream, up to as many as twelve in a highly urban concrete channel.

San Diego Coastkeeper is submitting information about trash collected at beach cleanups to seek the listing of all 21 San Diego County beaches. Volunteer data shows the annual removal of more than 200 pounds of trash from 9 out of 21 beaches from Oceanside to Imperial Beach. Data indicates pervasive and widespread debris impairment along the San Diego shoreline as well as nearby watersheds which drain into coastal waters.[30] San Diego Coastkeeper is also submitting ambient water quality data for nine of the eleven watersheds in San Diego County. San Diego has collected data on conventional constituents (pH, DO, temperature) as well as other key water quality indicators (including, but not limited to, nitrogen, phosphorus, toxicity, *E. coli*, *Enterococcus*) for over three dozen sites across San Diego County each month. Data indicate that exceedences of objectives are widespread and require management action.

III. THE STATE MUST IDENTIFY AND LIST ALL WATER BODIES THREATENED OR IMPAIRED BY ALTERATIONS IN NATURAL FLOW.

U.S. EPA requires waterways with flow-related impairments to be listed on the state's 303(d) list, typically (though not exclusively) in Category 4C ("water segment that is impaired or affected by non-pollutant related cause(s)"). If pollutants are also present, the waterway must be listed in Category 5. As discussed further below, we contend that despite U.S. EPA inclination to assess flow alterations as "pollution" to be listed in Category 4C (which should *at a minimum* be populated with flow listings for California in the 2012 list), there is also support for listing such impairments in Category 5 and preparing TMDLs to address them.

[29] *See* final report at: http://www.iewaterkeeper.org/iewaterkeeper/work/projects/UpperSARWaterQuality/.
[30] Please refer to San Diego Coastkeeper's 2012 303(d) Letter to the SWRCB on trash impairments.

A. The State Water Board Must Address Impacts to Beneficial Uses of Water Bodies Caused By Alterations in Natural Flows.

The health of rivers, streams, creeks and other waterways is inextricably linked to the volume, frequency, magnitude, timing, and duration of flows.[31] "[W]ater quantity is closely related to water quality; a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation, or . . . a fishery."[32] As the U.S. Supreme Court has held,

> there is recognition in the Clean Water Act itself that reduced stream flow, *i.e.*, diminishment of water quantity, can constitute water pollution. First, the Act's definition of pollution . . . encompasses the effects of reduced water quantity. *33 U.S.C. 1362(19).* This broad conception of pollution – one which expressly evinces Congress' concern with the physical and biological integrity of water – refutes petitioners' assertion that the Act draws a sharp distinction between the regulation of water 'quantity' and water 'quality.'[33]

The state's ability to ensure healthy waterways hinges in part on its ability to identify waterways impaired or threatened by altered natural flow, and to take targeted action to restore and maintain necessary flow regimes.

Water quality standards encompass both the designated uses of a water body and the water quality criteria established to protect those uses, as well as antidegradation requirements. Altered natural flows (usually reduced flows) may impact a water body's beneficial uses in a number of ways, causing a violation of standards that prompts 303(d) listing. For example, if a river is designated for use as a coldwater fishery, but reduced flows have resulted in increased temperatures and lowered water depths such that the river can no longer support fish, low flows clearly have impacted the water body's designated use.[34] Where low flows in rivers, creeks, and stream have impaired a beneficial use, the water quality standards have been violated, and the water body segment must be listed under Section 303(d).[35]

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[31] MacDonnell, Lawrence J., "Return to the River: Environmental Flow Policy in the United States and Canada. Journal of the American Water Resources Association" 45(5):1087-1099 (2009), DOI: 10.1111/j.1752-1688.2009.00361 *citing* Poff, N.L., *et al.*,"The Natural Flow Regime: A Paradigm for River Conservation and Restoration," *BioScience* 47:769-784 (1997); Poff, N.L., "Managing for Variation to Sustain Freshwater Ecosystems," *Journal of Water Resources Planning and Management* 135:1-4 (2009).

[32] *PUD No.1 v. Washington Department of Ecology*, 511 U.S. 700, 719 (May 31, 1994).

[33] *Id. See also* U.S. EPA, **"**Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act" (July 21, 2003) ("2004 Guidance"), available at: http://www.epa.gov/owow/tmdl/tmdl0103/2004rpt_guidance.pdf *(2004 (*"Low flow can be a man-induced condition of a water (i.e., a reduced volume of water) which fits the definition of pollution. Lack of flow sometimes leads to the increase of the concentration of a pollutant (e.g., sediment) in a water.")

[34] For example, adult coho salmon migrate at water temperatures of 45 to 59ºF, a minimum water depth of approximately seven inches, and streamflow velocities less than eight ft/sec. National Marine Fisheries Service, "Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan," p. 4 (July 2007), available at: http://www.swr.noaa.gov/salmon/MSRA_RecoveryPlan_FINAL.pdf. Research has demonstrated that upstream migration of Klamath River Chinook salmon is suppressed at mean daily water temperatures above 23.5°C if temperatures are falling.

[35] Attachment 2 provides photos and other information of waterways in California so impacted, such as the Scott River.

For example, in the Russian River Watershed, excessive water diversions have turned fish-bearing creeks such as Mark West Creek and Macaama Creek into dry stream beds.[36] In the Klamath River Watershed, high diversion rates from agricultural developments limit flow levels in river mainstems and tributaries, which raise water temperatures and lower water quality, making segments of the Scott and Shasta Rivers unsuitable for rearing juvenile coho salmon.[37]

In addition, excessive withdrawals, water diversions and dams can concentrate pollutant loadings, resulting in higher in-stream concentrations and impacts. For example, rivers in the Klamath watershed are impaired by toxic algae, temperature, and nutrient pollution caused by dams, cattle grazing and irrigated agriculture.[38] All of these problems are made significantly worse by reduced natural flows. In 2006, U.S. EPA formally recognized that dam impacts to flow caused the impairment of the Klamath River by toxic blue green algae *Microcystis aeruginosa*, a liver toxin and known tumor promoter.[39]

1. Altered Flows Must Be Identified as *Causes* of Impairment, Not Solely *Sources* of Impairment

The State Water Board has identified altered natural flows in its just-adopted 303(d) list as a potential *source* of impairment of dozens of water body-segment pollutant combinations. However, California generally has avoided its responsibility to recognize reduced natural flows, streamflow alterations, water diversions, or similar flow issues as *independent causes* of impairment that require listing of the waterway for "flow alterations" under Category 4C *at a minimum*, or Category 5 where appropriate.[40] This failure to address flow alterations directly is a serious omission by the State Water Board and must be addressed in the 2012 303(d) List.

The *source* of impairment provides available information tied to the impaired segment that generally describes the type of *activity* that has resulted in the impairment. Typical examples in California's 303(d) list include, but are not limited, to the following: range grazing, silviculture, agriculture, construction/land development, urban runoff/storm sewers, mine tailings, onsite wastewater systems (septic tanks), and marinas and boating. This information is generally used to help sort out which parties will be allocated responsibility for addressing the contamination at issue.

By contrast, altered natural flows can be the *cause* of impairment of a water body – just as altered concentrations of various contaminants (dissolved oxygen, mercury, temperature, etc.)

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[36] *See* Appendix A and A-1 for more information.
[37] NMFS, "Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan Prepared by The National Marine Fisheries Service Southwest Region," p. 32 (July 10, 2007), available at: http://www.swr.noaa.gov/salmon/MSRA_RecoveryPlan_FINAL.pdf.
[38] *See* SWRCB, "2010 California 303(d) List of Water Quality Limited Segments: Category 5," North Coast RWQCB, available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml.
[39] http://www.klamathriver.org/media/pressreleases/Press-Release-032008.html.
[40] Exceptions include Regional Water Quality Control Board 4's listing of Ballona Creek Wetlands as impaired by "Hydromodification" and "Reduced Tidal Flushing," and applicable segments of the Ventura River as impaired by "Pumping" and "Water Diversion." *See infra* n. 48.

similarly *cause* impairment. The *sources* of the listings for "altered natural flows" would then be activities such as agriculture, mining, construction, grazing, etc. The parties undertaking these activities would then be contacted to take action to reduce the impacts of their various operations on waterway flow.

This distinction is important if the actual impairment of a water body is to be properly addressed. For example, if natural flows in a creek that has been designated as "cold freshwater habitat" have been diverted to the point that the shallow water becomes too warm to be adequate fish habitat, the water body should be listed as impaired in Category 5 because of *both* low natural flow *and* elevated temperature, rather than improperly listed only for elevated temperature, with flow alteration as a mere "source" of impairment. If the creek is solely listed as impaired because of elevated temperature, the mitigating action could be (for example) solely planting trees along the banks to create shade. If a creek is listed because of both flow and temperature impairments, responsive actions are much more likely to include increased flows as well as increased shade, which would provide for a healthier outcome for the stream and its inhabitants overall.[41]

EPA's 2006 Guidance specifically describes "lack of adequate flow" as a *cause* for listing an impaired or threatened segment on the 303(d) list,[42] distinguishing it from listings of *sources* contained in separate summary tables.[43] A number of states accordingly include flow alterations as a cause of impairment in their 303(d) lists. Specifically, **U.S. EPA has compiled nationwide data submitted by states showing that 56,981 miles of rivers and streams, 517,857 acres of lakes, reservoirs and ponds, 299 square miles of bays and estuaries, and 33,054 acres of wetlands nationwide have been listed on states' 303(d) lists as impaired by "Flow Alterations."**[44] This corresponds to listings for over 100 water bodies nationwide in the District of Columbia, Idaho,[45] Michigan, Wyoming, Ohio and California.[46]

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[41] Of course, the listing should also ideally include the "sources" of both the temperature and low flows impairments, such as agriculture or other activities.

[42] "Examples of circumstances where an impaired segment may be placed in Category 4c include segments impaired solely due to lack of adequate flow or to stream channelization." 2006 Guidance at 56.

[43] *See* U.S. EPA, "National Causes of Impairment" versus "National Probable Sources Contributing to Impairment," available at: http://iaspub.epa.gov/waters10/attains_nation_cy.control#causes.

[44] *See* U.S. EPA, "Specific State Causes of Impairment That Make Up the National Flow Alteration(s) Cause of Impairment Group," available at: http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.cause_detail?p_cause_group_name=FLOW%20ALTERATION%28S%29. *See also* details of flow impairment listings at U.S. EPA, "Impaired Waters , Cause of Impairment Group: Flow Alteration(s)," available at: http://iaspub.epa.gov/tmdl_waters10/attains_impaired_waters.control?p_cause_group_id=545. For information on the status of data collection by state for these tables, *see* U,S, EPA, "Status of Available Data Used in This Report," available at: http://iaspub.epa.gov/waters10/attains_nation_cy.control?p_report_type=T#status_of_data.

[45] Idaho's 2008 Integrated Report shows more than 100 waterbody-pollutant segment listings for low flow alterations and other flow regime alterations under its "Section 4C Waters Impaired by Non-Pollutants." Idaho 2008 Integrated Report: "Section 4c Waters Impaired by Non-Pollutants," http://www.deq.state.*Id.*us/water/data_reports/surface_water/monitoring/integrated_report_2008_final_sec4c.pdf.

[46] *See* U.S. EPA, "Watershed Assessment, Tracking and Environmental Results: Specific State Causes of Impairment That Make Up the National Flow Alteration(s) Cause of Impairment Group," (last updated August 12, 2010), available at: http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.cause_detail_303d?p_cause_group_id=545. Conversation with Douglas Norton, U.S. EPA Headquarters (August 9, 2010).

2. Waterways Impaired by Altered Flows Must at a Minimum Be Listed in Category 4C of the 303(d) List, and Also May Be Listed in Category 5

As discussed above, U.S. EPA's and California's Category 4C *must* be populated with all waterways that are impaired or threatened solely due to the presence of non-pollutants. At a minimum, then, *all* flow-related impairments in California *must* be included in the Category 4C portion of the 2012 303(d) list. We would argue as well, however, that many if not all of these impairments could be included in Category 5.[47]

In California, "Pumping" and "Water Diversion" are listed as the sole causes of impairment for the water body segment Ventura River Reach 4.[48] This water body segment is listed specifically in Category 5 and requires a TMDL by 2019, even though Pumping and Water Diversion are the *only* causes of impairment. Water Diversion is specifically identified as a "Pollutant" in the Fact Sheet[49] describing this listing, as is the case with Pumping.[50]

California's choice to list, and most recently uphold the listing of, flow-caused impairments as a "pollutant" under Category 5 is not prohibited by the definition of "pollutant" or by U.S. EPA guidance. First, courts have interpreted the definition of "pollutant" broadly, as noted above, stating that it is "meant to leave out very little."[51] Second, U.S. EPA Guidance, while favoring a position that flow-related impairments are "pollution," does so in a less than

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[47] Idaho, which deferred to EPA's preference that flows be included in Category 4C, tried to provide a rationale for EPA's preference on flows as follows: "A pollutant is a substance, such as bacteria or sediment, that is identifiable and in some way quantifiable. Some unnatural conditions that impair water quality, such as flow alteration, human-caused lack of flow, and habitat alteration, are considered pollution, but are not caused by quantifiable pollutants. Temperature, while not a substance, is considered a pollutant, as changes in water temperature are quantifiable." Idaho DEQ, "Surface Water: Water Quality Improvement Plans (TMDLs), available at: http://www.deq.state.Id.us/water/data_reports/surface_water/tmdls/overview.cfm#Pollution. This loyal though somewhat strained reasoning ignores the fact that flow itself, as well as its impacts, is most certainly quantifiable – as are Pumping and Water Diversion, for which California waters have been listed in Category 5 as discussed below.

[48] SWRCB, "2010 California 303(d) List of Water Quality Limited Segments: Category 5," "Ventura River Reach 4 (Coyote Creek to Camino Cielo Road)," available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml?wbid=CAR4022002119990203090836. Ventura River Reach 3 had an identical listing in 2006, also with a 2019 TMDL, though Indicator Bacteria was added as a cause of impairment in the 2010 list update. SWRCB, "2006 CWA Section 303(D) List of Water Quality Limited Segments Requiring TMDLS," Region 4: "Ventura River Reach 3 (Weldon Canyon to Confl. w/ Coyote Cr)," available at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r4_06_303d_reqtmdls.pdf.

[49] Supporting Information, 2010 Integrated Report, Ventura River Reach 4: Water Diversion, http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/01015.shtml#7310.

[50] Supporting Information, 2010 Integrated Report, Ventura River Reach 4: Pumping, http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/01015.shtml#7308.

[51] *See supra* n. 8. The definition of "pollutant" in Section 502(6) includes: "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water." Several other items are specifically excluded; flow alteration is not one of those items. Arguably, the actions taken by industrial, municipal and agricultural operations (*i.e.* essentially all activities that could impact flow) could be viewed as the discharge of "waste," which is undefined in Section 502 but which could readily be interpreted as the by-product of "operations"*; i.e.* changes in the health of the waterway to its detriment.

definitive manner and without analysis, leaving room for California to make its own determination. For example, the 2004 Guidance states simply that "EPA does not *believe* that flow, or lack of flow, is a pollutant as defined by CWA Section 502(6)."[52] The 2006 Guidance similarly simply asserts without further support or discussion that "[e]xamples of circumstances where an impaired segment may be placed in Category 4c include segments impaired solely due to lack of adequate flow or to stream channelization."[53]

In sum, California can and should protect its waterways as fully as possible, including through the complete identification and listing of waterways impaired by the *cause* of natural flow alterations. Other states have shown leadership in this regard, and California's waters are no less precious or threatened.

Moreover, to ensure full protection and restoration of the waterways' beneficial uses, the identified waters should be placed on the 303(d) list under Category 5 (most certainly if there are additional pollutant impairments), and at a minimum in Category 4C. Section 510 of the Clean Water Act sets a floor but no ceiling for state action to protect and enhance the health of waters of the United States. California should make full use of this provision, and should leverage its prior flow-related listings in Category 5 into a comprehensive effort to address *all* flow-related impairments under the federal Section 303(d) listing and TMDL program, as well as under state law and other programs.

B. The State Must Use and Consider All Readily Available Information Related to Identifying Natural Flow-Related Impairments.

Under federal law[54] and the California Listing Policy, the State and Regional Water Boards must "actively solicit, assemble, and consider all readily available data and information,"[55] including from local, state and federal agencies, for purposes of developing the 303(d) list. This includes but is not limited to: reports of fish kills; dilution calculations; and "predictive models for assessing the physical, chemical, or biological condition of streams, rivers, lakes, reservoirs, estuaries, coastal lagoons, or the ocean."[56]

Accordingly, the State Water Board must examine and consider all readily available information that could inform 303(d) decisions related to alterations in natural flow. This includes but is not limited to the following:

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[52] U.S. EPA, "Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act," p. 8 (July 21, 2003) (emphasis added), available at: http://www.epa.gov/owow/tmdl/tmdl0103/2004rpt_guidance.pdf. It also states, as quoted above, that reduced water volume "fits the definition of pollution" – which could be the case for essentially any water impairment, including more traditional "pollutants."

[53] 2006 Guidance, *supra* n. 1, at 56.

[54] 40 CFR 130.7.(b)(5), see http://law.justia.com/us/cfr/title40/40-21.0.1.1.17.0.16.8.html.

[55] SWRCB, *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List* (Listing Policy) (Sept. 2004), Section 6.1.1" Definition of Readily Available Data and Information (emphasis in original), available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf.

[56] *Id.* (emphasis added).

- Data collected through the Department of Fish and Game's Instream Flow Program[57]
- Information compiled pursuant to programs and funding by the Ocean Protection Council[58]
- The findings of the recently-adopted State Water Board report on Delta flow criteria requirements (attached)[59]
- All comments, information and associated data sets submitted to the State Water Board during the development of its AB 2121 "Policy for Maintaining Instream Flows in Northern California Coastal Streams"[60]
- Flow data released by the California Department of Water Resources,[61] including data from the Water Data Library[62] generally and the Interagency Ecological Program[63] in particular, as well as and outside compilations of DWR data organized by waterbody segments[64]
- Data in the Klamath Resource Information System (KRIS);[65]
- Information and datasets presented at "My Water Quality" meetings,[66] including data from the Department of Natural Resources presented at the August 11, 2010 meeting
- Data contained in CalFish, the California Cooperative Anadromous Fish and Habitat Data Program,[67] especially the Passage Assessment Database.[68]

Note that Federal agencies, such as the U.S. Fish and Wildlife Service,[69] Federal Energy Regulatory Commission,[70] NOAA (particularly the National Marine Fisheries Service[71] and

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[57] *See* DFG Instream Flow Program, http://www.dfg.ca.gov/water/instream_flow_docs.html. *See also* DFG Water Rights Program, http://www.dfg.ca.gov/water/water_rights_docs.html.

[58] This includes but is not limited to Instream Flow Analysis – Santa Maria River, http://www.opc.ca.gov/2009/05/instream-flow-analysis-santa-maria-river/, Instream Flow Analysis – Big Sur River, http://www.opc.ca.gov/2009/05/instream-flow-analysis-big-sur-river/, and Instream Flow Analysis – Shasta River, http://www.opc.ca.gov/2009/05/instream-flow-analysis-shasta-river/.

[59] SWRCB, "Final Report on Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" (Aug. 3, 2010) (Delta Flow Report), available at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/final_rpt.shtml.

[60] As required by California Water Code § 1259.4 (AB 2121), available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/instream_flows/.

[61] DWR, California Data Exchange Center, http://cdec.water.ca.gov/.

[62] DWR, Water Data Library, http://www.water.ca.gov/waterdatalibrary/.

[63] Interagency Ecological Program, http://www.water.ca.gov/iep/.

[64] "CA DWR CDEC Interface," a compilation of data from DWR's California Data Exchange Center, available at: http://acme.com/jef/flow/cdec.html.

[65] http://www.krisweb.com/index.htm.

[66] http://www.waterboards.ca.gov/mywaterquality/monitoring_council/meetings/index.shtml.

[67] www.calfish.org;

[68] http://www.calfish.org/portals/0/Programs/CalFishPrograms/FishPassageAssessment/tabid/83/Default.aspx. This letter incorporates by reference the comments of Heal the Bay with respect to required 303(d) listings needed for beneficial uses impaired by fish passage barriers. The same legal and policy requirements that call for 303(d) listing of water bodies impaired by altered natural flows also apply to listings for water bodies impaired by fish barriers. The Water Board should review the Passage Assessment Database, which has extensive information on barriers, to ensure that all impaired waterways are properly included on the Section 30(d) list. *See also* CCKA's compilation of fish barriers impacting the RARE beneficial use at: http://www.cacoastkeeper.org/programs/mapping-initiative/fish-barriers.

[69] *See, e.g.*, U.S. FWS, Water and Fishery Resources Program, http://www.fws.gov/cno/fisheries/.

[70] *See* http://elibrary.ferc.gov/idmws/search/fercgensearch.asp to search for details of California hydropower projects, which would provide further information on flows.

[71] California is in the Fisheries Service's Southwest Region; *see* http://swfsc.noaa.gov/ for data and publications.

analyses such as the Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan[72]), USGS[73] and U.S. EPA, must also be "*actively*" solicited for data and information.[74]

This and other flow information can provide invaluable insight into the "physical, chemical, or biological condition" of the state's waterways as required by federal law and state Policy. It should be considered carefully in developing a comprehensive Category 4C list as well as Category 5 listings that appropriately include impairments caused by altered natural flows, and combinations of altered natural flows and pollutants.

C. Specific Listing Proposals for Impairments Caused by Reduced Natural Flows

Numerous beneficial uses are impaired by the altered flows, including but not limited to GWR (groundwater recharge discussed separately below), COLD (cold freshwater habitat), MIGR (fish migration), SPWN (fish spawning) and RARE (preservation of rare and endangered species). In addition to the data described elsewhere in this letter and other readily available data sources, data and information for a number of many flow-impaired waterways can be found through KRIS.[75] This letter also includes and incorporates by reference the flow-related listing proposals provided in the detailed comments submitted by Heal the Bay,[76] the Natural Resources Defense Council (NRDC),[77] and Ventura County Coastkeeper.[78]

Please note that the waterways described below, in addition to the flow-related listing proposals incorporated by reference, are just *some* of the numerous flow-impaired waterways throughout the state. <u>This list is by no means a comprehensive assessment</u>. The final 2012 303(d) list should include *all* of the waterways that "readily available" data indicate are threatened or impaired due to alterations in natural flow.

1. <u>Rivers, Creeks and Streams</u>

Carmel River and San Clemente Creek

As documented in a white paper prepared for the Carmel River Steelhead Association, significantly reduced flows in the Carmel River and its tributaries, particularly San Clemente

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[72] National Marine Fisheries Service, "Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan" (July 2007), available at: http://www.swr.noaa.gov/salmon/MSRA_RecoveryPlan_FINAL.pdf.
[73] *See* USGS, "What kinds of water data does the U.S. Geological Survey gather?" available at: http://www.usgs.gov/faq/index.php?action=artikel&cat=102&id=1148&artlang=en.
[74] Listing Policy, Section 6.1.1: Definition of Readily Available Data and Information (emphasis added).
[75] Klamath Resource Information System, http://www.krisweb.com/index.htm.
[76] Letter from W. Susie Santilena, Heal the Bay to Jeffrey Shu, SWRCB, Public Solicitation of Water Quality Data and Information for 2012 Integrated Report (Aug. 20, 2010).
[77] Letter from Doug Obegi, NRDC, to Jeffrey Shu, SWRCB, Public Solicitation of Water Quality Data and Information for 2012 Integrated Report (Aug. 27, 2010).
[78] Letter from Jason Weiner, Ventura County Coastkeeper, to Jeffrey Shu, SWRCB, Public Solicitation of Water Quality Data and Information for 2012 Integrated Report (Aug. 30, 2010) (incorporated herein by reference).

Creek, are placing serious stress on native steelhead populations.[79] This white paper, which includes a comprehensive bibliography of information, should be considered along with DFG data in assessing the Carmel River and San Clemente Creek for listing as impaired by water diversions/flow alterations.

Eel River

A comprehensive assessment of Eel River conditions shows significant impairment as a result of low flows.[80] The report found that:

> low flows . . . often produce temperatures lethal to listed fish species in the Eel River and beneficial to predatory pikeminnow, resulting in a compounding adverse effect on salmonids. Based on available science, increasing flows in the Eel River to 68-265 cfs in the summer will produce corresponding temperature benefits for salmonids that will likely support survival of the species. Bradbury et al (1995) point out that Pacific salmon cannot be recovered without having access to habitat similar to that with which they co-evolved; therefore, to ensure longer term salmonid recovery, access to refugia above the PVP must be provided.[81]

The report recommended that "[i]If summer flow levels were maintained at the 76 to 166 cfs . . . surface water temperatures would drop due to effects described above, increased volume and decreased transit time and steelhead could successfully rear . . . in the mainstem."[82] The flow conditions in the Eel have clearly impaired the health of the river and its associated beneficial uses, and accordingly the waterway must be listed.

Gualala River

The "National Marine Fisheries Service (NMFS, 2001), the California Department of Fish and Game (CDFG, 2002) and Brown et al. (1994) have found that coho salmon are at risk of extinction throughout Mendocino and Sonoma County."[83] With native species facing extinction, healthy water flows should be of paramount importance. However, "CDFG 2001 habitat typing surveys [citation] found that extensive reaches of the Gualala River and its tributaries lacked surface flows."[84] As in the Russian River, water diversions continue despite the serious and

[79] *See* Appendix A.
[80] Patrick Higgins, Consulting Fisheries Biologist, "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" (Feb. 2010) (included in Appendix A under "Eel River").
[81] *Id.* at p. 39 (emphasis added).
[82] *Id.*
[83] Letter from Patrick Higgins, Consulting Fisheries Biologist to Allen Robertson, California Department of Forestry and Fire Protection, "Negative Declaration for Sugarloaf Farming Corporation dba Peter Michael Winery" (Dec. 12, 2003)
[84] *Id*. at p. 10.

significant impairments in the Gualala, prompting a recent public trust lawsuit.[85] Significant data and information on the Gualala River is provided in Appendix A.

Mark West Creek

Ten years ago all 28 miles of Mark West Creek had water in the summer. Today, because of increased diversions, only 3½ miles have water. DFG flow records of Mark West Creek dating back to the 1960s show that the lowest summer stream flow has historically been 2 cfs, and Summer 2010 is measuring on average at approximately that level. The Russian Riverkeeper[86] has photo-documented this decline. Data and information on the serious and escalating impairments to this creek are provided in Appendix A-1[87] and on the Friends of the Mark West Watershed website.[88]

Mattole River

A detailed study of the Mattole River Basin found that:

> Lack of adequate late summer and early fall streamflow is recognized as one of the most important limitations on salmonid habitat in the Mattole River basin (NCWAP, 2000). In recent years, juvenile salmonids have become stranded in pools due to excessively low flows, causing mortality and necessitating fish rescue operations.[89]

Additional support for a flow-related listing of the Mattole River is found in Appendix A.

Napa River

Studies referenced in AB 2121 comments illustrate the significantly degraded habitat of the Napa River, which can only be restored with a focus on reversing severely reduced natural flows.[90] Research shows that "even in good years. . . 80% of tributary habitat surveyed was marginally functional or non-functional."[91] The Napa River "was formerly a very important nursery area for older age juvenile steelhead (Anderson 1969) . . . and that habitat is now completely non-functional for rearing. Therefore, all indications are that lack of older age steelhead rearing habitat is limiting the population."[92] Moreover, low water years (which are to

[85] Center for Biological Diversity, "Lawsuit Imminent over Water Diversions Killing Salmon and Steelhead in Russian and Gualala Rivers," (Nov. 17, 2009), available at: http://www.biologicaldiversity.org/news/press_releases/2009/russian-river-11-17-2009.html.
[86] www.russianriverkeeper.org.
[87] Appended separately from Appendix A due solely to formatting requirements.
[88] http://www.markwestwatershed.org/Cornell_Winery_PrimerDocsDirectory.html.
[89] Randy D. Klein, Hydrologist, "Hydrologic Assessment of Low Flows in the Mattole River Basin 2004-2006," p. 1 (March 2007), *see* Appendix A.
[90] Letter from Patrick Higgins, Consulting Fisheries Biologist to SWRCB, "Comments on *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams"* (April 2, 2008), pp. 13-15 (in Appendix A).
[91] Letter from Patrick Higgins, Consulting Fisheries Biologist to Thomas Lippe, Living Rivers Council (Aug. 17, 2010), p. 5 (included in Appendix A under "Napa River").
[92] *Id.*

be expected and built into water planning) are "depressing smolt production" due to a continued lack of attention to sufficient flows.[93]

Navarro River

As described in more detail in Appendix A, "diversions from the Navarro River and its tributaries, primarily for agricultural purposes, have significantly impaired instream fish and wildlife beneficial uses, to the point where the river was literally pumped dry" on past occasions.[94] Numerous data sets indicate growing impacts from cumulatively increasing water diversions in this already heavily-drained area.

Redwood and Maacama Creeks

As described in detail in Appendix A, in Maacama Creek "[s]tanding crops of fall fish show a major reduction in many years, suggesting that low flow conditions are limiting, and these low flow conditions are likely linked to agricultural water use."[95] "[A]lmost 70% of habitats in Redwood Creek [are] dry (Figure 12) and all other streams showed signs of dewatering related to diversion of surface water and likely contributed to by over-use of groundwater."[96] Additional assessments have found that

> in undisturbed Pacific Northwest streams, pool frequencies range from 37% to greater than 80% (Murphy et al. 1984 and Grette 1985) and CDFG (2004) rates frequencies greater than 40% as functioning for salmon and steelhead. Figure 12 shows that pool frequencies were under 10% on Redwood and Foote Creeks in some reaches and only about 25% of most Maacama Creek reaches. Pool depths are similarly compromised (Figure 13) with none over three feet deep in Foote Creek and the majority on Redwood Creek as well.[97]

This report concludes that "Coho salmon are at very high risk of extinction in the Russian River basin, yet NMFS (2008) considers their gene resources to be of extremely high importance for rebuilding of the entire CCC ESU. Expensive recovery efforts to restore Russian River coho salmon using captive broodstock from Green Valley Creek is failing to re-establish breeding populations in any Russian River tributary (NMFS 2008)."[98] Because "the biggest problem is over-consumption of water,"[99] listing of these waterways as impaired by natural flow alterations/water diversions is an important step in ensuring their return to good health.

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[93] *Id.*
[94] Letter from Patrick Higgins, Consulting Fisheries Biologist to SWRCB, "Comments on *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams*," p. 15 (April 2, 2008).
[95] Letter from Patrick Higgins, Consulting Fisheries Biologist to Traci Tesconi, County of Sonoma, "Pelton House Winery Application #PLP05-0010," (Dec. 29, 2008), p. 12 (included in Appendix A).
[96] *Id.* at p. 13.
[97] *Id*. at pp. 12-13.
[98] *Id*. at p. 19.
[99] *Id*. at p. 20.

Russian River

As illustrated in documents attached as Appendix A[100] and elsewhere, [101] the Russian River is increasingly impaired due to flow alterations. Numerous technical analyses have found that "[l]egal and illegal diversions pose significant risk to the last streams where coho still persist in the Russian River."[102]

Salinas River

As described in more detail in Appendix A, "channel alteration and changes in flow regime have caused a virtual loss of the anadromous life history of three steelhead [distinct population segments] in the Salinas River."[103] More generally, "flows in lower reaches for adult and juvenile steelhead passage are often lacking,"[104] with "[g]roundwater pumping related to agricultural activities . . . caus[ing] the loss of surface flow in winter and spring."[105] This detailed analysis concluded that "unless the Salinas River channel and flow move back towards their more normal range of variability steelhead cannot be restored."[106]

Santa Clara River

As described in more detail in the comments submitted by Ventura Coastkeeper,[107] which are incorporated here by reference, USGS, county and local agency data show that enough water is diverted at the Vern Freeman Diversion Dam for agricultural usage, groundwater recharge, and other uses to deprive migrating steelhead of sufficient flows and juvenile steelhead of healthy estuary rearing grounds. These activities impact the beneficial uses for this river as habitat for fish, necessitating a listing caused by water diversion. Moreover, as discussed in the Ventura Coastkeeper letter, the river is also impaired for fish passage since the United Conservation Water District put in an impassable fish barrier.

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[100] *See* Letter from Patrick Higgins, Consulting Fisheries Biologist to SWRCB, "Comments on *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams"* (April 2, 2008), pp. 16-20 (included in Appendix A under "Navarro River"). *See also* Merenlender, Adina et al, "Decision support tool seeks to aid stream-flow recovery and enhance water security," 62 *California Agriculture* 148 (Oct.-Dec. 2008), *available at*: http://ucanr.org/repository/cao/landingpage.cfm?article=ca.v062n04p148&fulltext=yes.

[101] *See supra* n. 85, "Lawsuit Imminent Over Water Diversions Killing Salmon and Steelhead in Russian and Gualala Rivers" (data associated with filing should be closely examined).

[102] Higgins, *supra* n. 100 at p. 16.

[103] Letter from Patrick Higgins, Consulting Fisheries Biologist to Curtis Weeks, Monterey County Resources Agency, Comments on Salinas River Channel Maintenance Project (CMP) 404 Permit Application and Mitigated Negative Declaration, p. 4 (Aug. 6, 2009).

[104] *Id.* at p. 5; *see also* Letter from Patrick Higgins, Consulting Fisheries Biologist to SWRCB, "Comments on *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams"* (April 2, 2008).

[105] *Id.*

[106] *Id.* at p. 17.

[107] Letter from Jason Weiner, Ventura Coastkeeper to Jeffrey Shu, SWRCB, Public Solicitation of Water Quality Data and Information for 2012 Integrated Report (Aug. 30, 2010).

Scott River and Shasta River

In summer 2009, agricultural irrigation and dewatering caused record low flows in the Scott and Shasta River watersheds, flows that will continue to impair these waterways because they are associated with increased usage for agriculture and other, non-situational sources.[108] Extensive photo documentation of the activities producing this flow impairment and its impact on fish habitat was collected by Klamath Riverkeeper and others.[109] The Pacific Coast Federation of Fishermen's Associations and Environmental Law Foundation have already brought a public trust action[110] against the State Water Board and Siskiyou County regarding flows in the Scott River. Information associated with that lawsuit should be considered in the determination that the river is and will continue to be impaired due to low flows associated with withdrawals. Additional instream flow analyses are being conducted by Humboldt State University under the oversight of the California Ocean Protection Council.[111]

Documentation of the impacts of low flows in these waterways is extensive and included in Appendix A and other readily available data sources. For example, the Scott River Sediment and Temperature TMDL process several years ago produced substantial evidence of impaired beneficial uses resulting from low flows, including reaches that now regularly go dry, placing the Scott River salmon and steelhead stocks at "high risk of extinction"[112] Similarly, the recent Shasta River Watershed Dissolved Oxygen and Temperature process produced information supporting the conclusion that "[t]he need for a baseline minimum flow with most reaches of the Shasta River, and the importance to salmon . . . of maintaining minimum flows even during low water years, cannot be over-stated."[113] Properly listing these water bodies as impaired by flows, in addition to the other listed causes for their impairment, will ensure the appropriate attention is paid to addressing alterations in natural flow that are devastating the rivers' beneficial uses.

2. The Sacramento-San Joaquin Delta

Finally, *all* of the Delta waterways examined in the State Water Board's recently-adopted "Final Report on Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" should be considered for flow impairments. This Report concluded unequivocally

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[108] See attached documentation in Appendix A.
[109] Klamath Riverkeeper, "Scott and Shasta Rivers 2009 Flow Emergency," available at: http://picasaweb.google.com/klamathriverkeeper/ScottAndShastaRivers2009FlowEmergency#.
[110] "Fishing and Conservation Groups Sue over Poor Water Management on Northern California's Scott River" (June 24, 2010) (press release), available at: http://www.envirolaw.org/documents/ScottRiverPTDSuitPressRelease062410.pdf; *see also* Petition for Writ of Mandamus and Complaint for Declaratory and Injunctive Relief (Sup. Ct. Sacramento, June 23, 2010), at: http://www.envirolaw.org/documents/WRITPETITIONCOMPLAINT.pdf.
[111] CA Ocean Protection Council, "Instream Flow Analysis – Shasta River," available at http://www.opc.ca.gov/2009/05/instream-flow-analysis-shasta-river/.
[112] Letter from PCFFA *et al* to Tam Doduc, SWRCB, "Joint Comments on the Proposed Action Plan for the Scott River Watershed Sediment and Temperature TMDL," Attachment A - Scott TMDL Related Data, Photos and Maps Regarding Flow and Temperature Problems (June 12, 2006) (included in Appendix A).
[113] Letter from Pacific Coast Federation of Fishermen's Associations and the Institute for Fisheries Resources to SWRCB, "Comment Letter - Shasta River Watershed DO and Temperature TMDLs," p. 4 (Oct. 29, 2006) (included in Appendix A).

that **"[r]ecent Delta flows are insufficient to support native Delta fishes for today's habitats."**[114] More specifically, the Report found that:

> In order to preserve the attributes of a natural variable system to which native fish species are adapted, many of the criteria developed by the State Water Board are crafted as percentages of natural or unimpaired flows. These criteria include:
>
> - 75% of unimpaired Delta outflow from January through June;
> - 75% of unimpaired Sacramento River inflow from November through June; and
> - 60% of unimpaired San Joaquin River inflow from February through June.
>
> It is not the State Water Board's intent that these criteria be interpreted as precise flow requirements for fish under current conditions, but rather they reflect the general timing and magnitude of flows under the narrow circumstances analyzed in this report. In comparison, historic flows over the last 18 to 22 years have been:
>
> - approximately 30% in drier years to almost 100% of unimpaired flows in wetter years for Delta outflows;
> - about 50% on average from April through June for Sacramento River inflows; and
> - approximately 20% in drier years to almost 50% in wetter years for San Joaquin River inflows.[115]

In other words: (a) the Delta is always impaired for flow in drier years and potentially impaired seasonally in wetter years, (b) the Sacramento River is regularly flow impaired, and (c) the San Joaquin River is always flow impaired. Note that this comparison is based on averages over the past two decades; flow data from more recent years (available from the citations above and other readily available sources) would likely skew these results towards more, not less, impairment, as noted in the Report quote above.

Accordingly, *all* Delta waterways for which the Report has found flow-related impairments of beneficial uses should be listed in the 2012 303(d) list as impaired by water diversion, flow alteration, and/or other appropriate cause, with the specific sources (agriculture, etc.) clearly delineated.

D. The State Must Specifically Identify and List All Surface Waters That Can No Longer Provide the Beneficial Use of "Groundwater Recharge" Due to Reduced Flows

"Groundwater recharge" is defined as the use of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers. "Groundwater recharge" is listed as a beneficial use for 2,167 hydrologic units/areas in eight out of nine of the Regional Basin Plans for surface waters around the state: North Coast: 109, San Francisco Bay: 23, Central Coast: 396, Los

[114] Delta Flow Report, *supr*a n. 59, at p. 5 (emphasis added).
[115] *Id*.

Angeles: 222, Central Valley: 0,[116] Lahontan: 1009, Colorado River: 93, Santa Ana: 98, San Diego: 217.[117] Despite the widespread recognition of "groundwater recharge" as a beneficial use by Regional Water Boards, the protection of this use has been rarely acknowledge or addressed by the 303(d) listing process. This must be rectified in the 2012 list.

The State Water Board's map of high-use groundwater basins and hydrogeological areas depicts vulnerable groundwater recharge basins in every region of California.[118] In many of California's river basins, agricultural and other users divert surface stream flows to the extent their actions impair the groundwater recharge beneficial use. Similarly, in river basins with a hydrologically connected groundwater aquifer that is being pumped, large scale groundwater pumping depletes the connected surface waterway, further diverting percolation from the stream into the aquifer and impairing the "groundwater recharge" beneficial use of impacted surface water.[119] The State can and should incorporate such listings in the 2012 list, *i.e.* where readily available data provides the information needed to identify water bodies for which designated "groundwater recharge" uses are threatened or impaired.

IV. THE STATE WATER BOARD MUST COMPREHENSIVELY ADDRESS GROUNDWATER CONTAMINATION AND WITHDRAWALS THAT IMPAIR OR THREATEN SURFACE WATERS.

The State's 303(d) list must reflect instances where contaminated groundwater discharges to rivers, estuaries and other surface waters is the cause or source of surface water impairment. California's Section 303(d) list must also reflect instances where excessive withdrawals and pumping of groundwater impairs and threatens surface waters, including rivers, creeks, estuaries, and wetlands, such as through reduced flows.[120]

Actions to address groundwater sources of surface water impairment with specificity are feasible and have been undertaken by California and other states during the course of 303(d) listing and TMDL development. California and other states have shown that it is feasible—and often necessary—to identify and address groundwater sources of surface water impairment with high levels of specificity during the development of a TMDL. The State Water Board should require Regional Water Boards to identify the name of groundwater sources of surface water impairment, including the name of groundwater basins, point source discharges from cleanup and dewatering operations, and other relevant sources; assess and measure groundwater loading

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[116] The Central Valley Regional Water Quality Control Board explains that there are surface waters that have the beneficial use of Groundwater Recharge, but that they have not yet been identified: "NOTE: Surface waters with the beneficial uses of Groundwater Recharge (GWR),Freshwater Replenishment (FRSH), and Preservation of Rare and Endangered Species (RARE) have not been identified in this plan. Surface waters of the Sacramento and San Joaquin River Basins falling within these beneficial use categories will be identified in the future as part of the continuous planning process to be conducted by the State Water Resources Control Board." *See* http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr.

[117] *See* Chapter 2 of Basin Plans for Regions 1-9 at http://www.waterplan.water.ca.gov/waterquality/basin_plan.cfm.

[118] http://www.waterboards.ca.gov/water_issues/programs/gama/docs/hydro_areas.pdf.

[119] J. Daubert, R. Young, *Managing an Interrelated Stream-Aquifer System, Economics, Institutions, Hydrology*, Colorado Water Resources Research Institute, Technical Report #47, p. 1 (April 1985). Available at: http://www.cde.state.co.us/artemis/ucsu6/UCSU6141347INTERNET.pdf.

[120] A detailed discussion of flow impacts to water quality can be found in Section III.

to surface waters during the development of TMDLs; and assign wasteload allocations to groundwater sources of impairment to surface waters, to the extent possible. Please refer to Appendix B for a synopsis of TMDLs in California and elsewhere that address how to manage groundwater loadings with specificity.

A. The State Water Board Has a Duty to Address Groundwater-Related Sources of Impairment to Surface Waters under Section 303(d) of the Clean Water Act.

1. The hydrological connectivity of surface waters and groundwater triggers the Board's legal mandate under Section 303(d) of the Clean Water Act.

Because of the pervasive hydrological connectivity of surface waters and groundwater, polluted groundwater can substantially impact the quality of surface waters.[121] Streamflow may recharge alluvial aquifers, and groundwater conversely can provide substantial amounts of flows into lakes, streams, and rivers.[122] The hydrological connectivity is widely interpreted—by U.S. EPA, courts, and several states, including California—as triggering a regulatory duty under the Clean Water Act.

For example, U.S. EPA has stated that "in general, collected or channeled pollutants conveyed to surface water via groundwater can constitute a discharge subject to the Clean Water Act."[123] The determination of whether a discharge to ground water can be subject to regulation under the Clean Water Act is a determination that involves an ecological "judgment about the relationship between surface waters and groundwaters."[124]

Courts have also found that hydrologically connected groundwater and surface waters can trigger regulatory duties with respect to contaminated groundwater under the federal Clean Water Act.[125] In 2006, U.S. Supreme Court Justice Kennedy wrote in his concurring and oft-cited *Rapanos* opinion that water bodies will "come within the statutory phrase 'navigable

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[121] United States Geological Survey, Ground Water and Surface Water: A Single Resource, Circular 1139, available at: http://pubs.usgs.gov/circ/circ1139/ ("*USGS: Single Resource*"). *See also* R. Thomas, *Comment: The European Directive on the Protection of Groundwater, A Model for the United States*, 26 Pace Envtl. L. Rev. 259, 264 (Winter 2009) ("*Groundwater Protection Model*") ("… groundwater does not exist in isolation from other bodies of water; it is an integral part of the hydrological cycle and discharges into lakes and streams. Such "tributary" groundwater is vital for maintaining surface water supplies and sustaining surface ecosystems"); William M. Alley, "Tracking U.S. Groundwater: Reserves for the Future," *Environment*, pp. 10, 15 (Apr. 2006); *see also* William M. Alley *et al.*, "Flow and Storage in Groundwater Systems," 296 *Sci*. 1985, 1990 (2002).

[122] *See* Aiken, J. David, The Western Common Law of Tributary Groundwater: Implications for Nebraska. (2004) at p. 545, available at http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1032&context=ageconfacpub. *See also USGS: Single Resource*: USGS finds that groundwater contribution to surface waters has been shown to range from 10% to over 90% across the U.S., with an estimated average of over 40%.

[123] EPA, *National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations* 66 Fed. Reg. 2960, 3017 (Jan. 12, 2001).

[124] 66 Fed. Reg. at 3018 (emphasis added.)

[125] *See e.g. Greater Yellowstone Coalition v. Larson*, 641 F. Supp. 2d 1120, 1138 (D. Idaho 2009) ("[t]here is little dispute that if the ground water is hydrologically connected to surface water it can be subject to 401 certification."); *Coldani v. Hamm*, 2007 WL 2345016, at 9 (E.D. Cal. Aug. 16, 2007) ("the court finds that because Coldani has alleged that Lima Ranch polluted groundwater that is hydrologically connected to surface waters that constitute navigable waters, he has sufficiently alleged a claim within the purview of the CWA [citations]")

waters,'" and thereby fall under the Clean Water Act, if they "significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as 'navigable.'"[126]

The Ninth Circuit Court of Appeals has also repeatedly interpreted the Clean Water Act to include regulation of groundwater hydrologically connected to surface waters.[127] In *Northern Plains Resource Council v. Fidelity Exploration* the Ninth Circuit found that even the discharge of "unaltered" groundwater into a river could be considered a pollutant and subject to water quality standards where the company's discharge altered the river's water quality.[128] The *Northern Plains Resource Council* opinion went on to explain that:

> Were we to conclude otherwise, and hold that the massive pumping of salty, industrial waste water into protected waters does not involve discharge of a "pollutant," even though it would degrade the receiving waters to the detriment of farmers and ranchers, we would improperly "undermine the integrity of [the CWA's] prohibitions."[129]

Section 303(d) of the Clean Water Act, in particular, has been recognized by U.S. EPA and several states as a proper tool for addressing groundwater contaminant loading to surface waters and other groundwater-related sources of impairment. EPA has identified four potential sources of groundwater-related impairment of surface water for states' 303(d) Lists (though others are possible): "Groundwater Loadings," "Groundwater Withdrawals," "Contaminated Groundwater," and "Saltwater Intrusion."[130] EPA records reflect that several states, including California, have adopted 303(d) lists that include groundwater loadings or withdrawals as a source of impairment: **to date, 181 miles of rivers and streams, 158 square miles of bays and estuaries, 3,045 acres of wetlands, and 98,009 acres of lakes, reservoirs and ponds have been listed nationally as impaired in part due to groundwater sources of impairment.**[131]

2. Public policy concerns of efficiency and public health weigh heavily in favor of proactively addressing groundwater contamination of surface waters through the 303(d) process.

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[126] *Rapanos v. United States*, 547 U.S. 715, 779-780 (2006) (Kennedy, J., concurring).

[127] *N. Cal. River Watch v. City of Healdsburg*, 496 F.3d 993, 1000 (9th Cir. 2007) (court found that water that seeped into the river through both the surface wetlands and the underground aquifer and had significant effect on "the chemical, physical, and biological integrity" of the Russian River sufficient to confer jurisdiction under the Act pursuant to Justice Kennedy's substantial nexus test.); *Northern Plains Resource Council v. Fidelity Exploration and Dev. Co*., 325 F.3d 1155, 1162 (9th Cir. 2003).

[128] *Northern Plains Resource Council v. Fidelity Exploration and Dev. Co*., 325 F.3d 1155 (9th Cir. 2003).

[129] *Id.*, citing *APHETI*, 299 F.3d at 1016.

[130] *See* U.S. EPA, "National Summary of State Information: National Probable Sources Contributing to Impairments," available at: http://iaspub.epa.gov/waters10/attains_nation_cy.control#causes, and U.S. EPA, "Specific State Probable Sources That Make Up the National Groundwater Loadings/Withdrawals Probable Source Group," available at: http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.source_detail?p_source_group_name=GROUNDWATER%20LOADINGS/WITHDRAWALS.

[131] *Id.* California has also recognized groundwater sources of impairment on its 303(d) List. The most recent 2010 303(d) List contains 27 waterbody-segment pollutant combinations that identify groundwater loadings as potential sources of impairment.

There are considerable practical reasons to address groundwater loadings with as much specificity as possible. For example, rapid mixing, dilution, and dispersal of pollutants, which are factors that often mitigate surface water contamination, do not occur with polluted groundwater,[132] resulting in much lengthier persistence of pollutants and their harmful effects. Moreover, the costs, difficulties, and uncertain benefits of remediation weigh strongly in favor of efficient agency action to address groundwater pollution.[133]

Additionally, addressing groundwater contamination of surface waters is necessary to protect public health.[134] Discharges from septic systems and agricultural runoff can cause waterborne diseases and chemicals found in groundwater, including pesticides, gasoline additives such as MTBE, arsenic, and other hazardous wastes, present significant threats.[135]

The state's pending public health crisis fueled by nitrate-polluted groundwater provides a particularly compelling example. Nitrate, the most common groundwater contaminant in California in drinking water can cause "blue baby syndrome," lead to miscarriages and death in infants, and may cause certain types of cancers. A recent California Watch report found that the number of California wells that exceeded the health limit for nitrates jumped from nine in 1980 to 648 in 2007. To date, the State Board has not been able to effectively regulate and ensure the cleanup of nitrates. The 303(d) process was designed to do just that and should be applied to address nitrate and other pervasive groundwater contaminants that impact surface waters. Such efforts will at the same time help establish much-needed improvements in groundwater quality itself.

B. The State Must Use All Readily Available Data to Specifically Identify Surface Waters Impaired by Contaminated Groundwater Loadings.

As discussed above, under federal law[136] and the California Listing Policy, the State and Regional Water Boards must "actively solicit, assemble, and consider all readily available data and information, including drinking water source assessments and existing and readily available water quality data and information reported by local and state agencies."[137] Information regarding groundwater impairments that contaminate surface waters, groundwater hydrological connections with surface waters, and groundwater withdrawals that impact surface waters is essential in the compilation of a complete 303(d) list that correctly identifies pollutants and sources that can then be effectively prioritized.[138] Further, groundwater data can provide valuable clues to uncover the existence of hydrologically-connected, impaired surface water bodies that the state may otherwise have missed.

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[132] 2006 Guidance.
[133] *Id.*
[134] *See* Harter, T. & Rollins, L., *Watersheds, Groundwater and Drinking Water: A Practical Guide,* University of California, Agriculture and Natural Resources, Publication 3497 (2008).
[135] *Supra* n. 121, *Groundwater Protection Model* at 263.
[136] 40 CFR 130.7(b)(5), see http://law.justia.com/us/cfr/title40/40-21.0.1.1.17.0.16.8.html
[137] *See* CA Listing Policy, Section 6.1.1 Definition of Readily Available Data and Information
[138] 40 CFR 130.7(b)(4).

The State's own 2002 305(b) Report contains an extensive catalog of efforts and available data to monitor groundwater quality in California."[139] It is worth noting that the most recent groundwater quality assessment included in the State's 305(b) Report will be a *decade* old in 2012. By contrast, EPA's 2006 Guidance contemplates the completion of such assessments every two years:

> by April 1 of all even numbered years, a description of the water quality of all waters of the state (including, rivers/stream, lakes, estuaries/oceans and wetlands). States may also include in their section 305(b) submittal a description of the nature and extent of ground water pollution and recommendations of state plans or programs needed to maintain or improve ground water quality.[140]

Updated monitoring and assessment of groundwater quality is highly relevant to the state's proper assessment of the overall health of its waterways as called for by the federal Clean Water Act. These and other readily available sources of information and data on groundwater contamination and withdrawals must be integrated into the State Water Board's analysis of impairment sources of surface waters in its biennial Integrated Report (303(d) list and 305(b) report).[141] A brief discussion of data that should be incorporated immediately in the current data scoping for the 2012 303(d) List is provided below.

First, the State Water Board should assess its own data from its Groundwater Ambient Monitoring and Assessment (GAMA) Program and Underground Storage Tank, Land Disposal, and Spills, Leaks, Investigations, and Cleanup Programs in its biennial 303(d) analysis. The GeoTracker GAMA Groundwater Database contains groundwater data searchable by chemical and is readily available, highly relevant and compatible to specify groundwater loadings to listed surface waters. Additionally, the California Water Quality Monitoring Council, which is co-chaired by Cal-EPA and the Natural Resources Agency and managed by the State Water Board, is very close to completing an interactive suite of databases to be released shortly on groundwater quality. This portal of information compiles existing groundwater quality data from USGS and others that similarly should be examined for 303(d) listing implications.

The State Water Board should also closely collaborate with and solicit groundwater quality data held by other state agencies, most notably the Department of Pesticide Regulation (DPR) and California Department of Public Health (DPH). DPR's Ground Water Protection Program[142] maintains a well inventory program that contains information about the collection and analysis of data on wells sampled for pesticides by state and local agencies, as well as DPR's own monitoring of pesticides that have the potential to pollute groundwaters.[143] Under the Safe Drinking Water Act, each state is required to assess drinking water sources, including

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[139] SWRCB, 2002 Integrated Report, Chapter IV: Groundwater Quality Assessment, available at: http://www.swrcb.ca.gov/water_issues/programs/tmdl/305b.shtml.
[140] 2006 Guidance at 9.
[141] *See* 2006 Guidance for details on U.S. EPA requirements for the inclusion of updated groundwater data in the state's biennial Integrated Report (http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/2006IRG_index.cfm).
[142] *See* California Department of Pesticide Regulation, Groundwater Protection Programs website at http://www.cdpr.ca.gov/docs/emon/grndwtr/index.htm.
[143] Well Inventory Reports on Ground Water Testing for Pesticides from 1986-2008, and other data and information is available at http://www.cdpr.ca.gov/docs/emon/grndwtr/wellinv/wirmain.htm.

groundwater wells. California DPH is currently implementing these requirements as part of the Drinking Water Source Assessment and Protection Program (DWSAP), which includes an assessment of 14,326 groundwater sources.[144] Several other state agencies implement groundwater-related monitoring and assessment programs, such as the Department of Water Resources (DWR) and Department of Toxic Substances Control (DTSC); these must be solicited for data as well.

Local groundwater management districts and banks also must be solicited for information on the contamination and overuse of groundwater basins and aquifers that are hydrologically connected to impaired surface waters. The Santa Clara Valley Water District, for example, monitors groundwater quality for common inorganic constituents and identifies which contaminants exceed Regional Water Quality Control Board agricultural water quality objectives.[145] There are also nine local groundwater management districts[146] in California that maintain groundwater data, as well as watermasters[147] and other local entities that maintain data and information about groundwater water quality.

Additionally, federal agencies that implement groundwater-related monitoring and assessment programs, such as U.S. EPA and the United States Geological Survey (USGS),[148] must be "actively solicited" for information. In 2007, USGS conducted an analysis of California's well water quality that examined the presence of 11 contaminants in groundwaters including arsenic, atrazine, benzene, nitrate, radon, and uranium.[149] California Coastkeeper Alliance created two interactive maps depicting groundwater polluted by nitrates and arsenic, primarily relying on these USGS data.[150] Other independent researchers have developed excellent maps of nitrate and other incidences of groundwater pollution that may impact surface waters.[151] This and related information should be carefully scanned for related impacts to hydrologically-connected surface water bodies.

Finally, data on groundwater withdrawals and pumping that impairs or threatens surface water beneficial uses similarly must be solicited and considered. The State Water Board's Water Rights division has such data, which could be cross-referenced with streamflow and other data from numerous other sources.[152] The Santa Clara Valley Water District monitors groundwater elevation and maintains a database of elevation data, searchable by location or well number.[153]

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[144] *See* California Department of Health, Drinking Water Source Assessment and Protection Program, January 1999. Available at http://www.cdph.ca.gov/certlic/drinkingwater/Documents/DWSAPGuidance/DWSAP_document.pdf.
[145] Table 3-3a, Santa Clara Valley Water District, 2008 Groundwater Quality Report.
[146] A list of groundwater management district can be found at DWR, Water Facts: Groundwater Management Districts or Agencies in California, available at http://www.dpla2.water.ca.gov/publications/waterfacts/water_facts_4.pdf.
[147] *See* Chino Basin Watermaster Engineering Reports: http://www.cbwm.org/rep_engineering.htm.
[148] *See, e.g.*, USGS Groundwater Information Pages, http://water.usgs.gov/ogw/ and information on what type of data USGS collects at http://www.usgs.gov/faq/index.php?action=artikel&cat=102&id=1148&artlang=en.
[149] Excerpt of California data available at http://www.cacoastkeeper.org/document/ca-domestic-well-water-quality.pdf.
[150] *See* http://www.cacoastkeeper.org/programs/mapping-initiative/nitrates-in-groundwater-maps and http://www.cacoastkeeper.org/programs/mapping-initiative/arsenic-in-groundwater-maps.
[151] *See* California Watch Report, *Nitrate Contamination Spreading in California Communities* (May 13, 2010), available at: http://www.californiawatch.org/nitrate-contamination-spreading-california-communities.
[152] *See* Section III. above for additional sources of flow- and pumping-related data. Future data collected pursuant to SB X7 6 (2009), which establishes collaborations to collect groundwater elevations statewide, will provide

If the State Water Board declines to use such readily available data and information related to groundwater loadings that threaten or impair surface waters, the Board *must* submit a formal "rationale" for the decision in its Assessment Methodology.[154] EPA requires that states' submissions of 303(d) Lists include an Assessment Methodologies section, which includes a "rationale for any decision to not use any existing and readily available data and information."[155] We urge the Water Board, however, to fully exercise its authority and mandate to comprehensively assess and report on the health of all waterways in the state, as required by the 2006 Guidance and Clean Water Act Sections 303(d) and 305(b).

C. The State Water Board Must Ensure that Groundwater Sources of Surface Water Impairment Are Specifically Identified in All Affected Regions of California.

The State Water Board has made progress in identifying groundwater "sources" of surface water impairment in its 303(d) assessment and listing process.[156] Whereas the 2006 303(d) List contained only two references to groundwater as a source of impairment,[157] the 2010 303(d) List contains 27 water body-pollutant segments which identify groundwater as a source of impairment. This type of information is extremely useful in prioritizing waters for action and setting appropriate loads.

Despite the Board's progress, though, groundwater sources of contamination are not identified consistently throughout California's nine regions, nor is there enough information included about groundwater loadings on the List as with other listed sources of impairment. The majority of groundwater-related listings in the 2010 303(d) List are limited to Regions 3 and 4, with only one listing each in Regions 5, 6, and 8. Further, where the Board has identified groundwater contamination as a source of impairment, the groundwater basins and the extent of contaminant loading has not been identified specifically.

The problem of contaminated groundwater loadings to surface waters is not limited to 27 waterbody-pollutant segments, nor is it limited to Regions 3 and 4; it is a pervasive issue that must be proactively addressed throughout the State's 303(d) Listing Process. There are myriad examples spanning the entire state of contaminated groundwater impacts to surface waters. For example, researchers working in San Francisco Bay found that excess levels of certain dissolved

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additional information (DWR is in the process of launching the California Statewide Groundwater Elevation program).

[153] Santa Clara Valley Water District Online Groundwater Elevation Query, available at: https://gis.valleywater.org/GroundwaterElevations/index.asp.

[154] 40 CFR 130.7(b)(6)(iii); U.S. EPA 2006 Guidance, Section C.2, p. 18 ("The assessment methodology should be consistent with the state's WQSs and include a description of the following as part of their section 303(d) list submissions … Rationales for any decision to not use any existing and readily available data and information."). Note that EPA's subsequent Guidance documents for 2008 and 2010 incorporate the 2006 Integrated Reporting Guidance.

[155] 2006 Guidance at 18.

[156] *See* discussion of Source versus Cause in Section III. above.

[157] "Groundwater withdrawal" was listed as a source of impairment of a surface water in only one listing in 2006 (Mendota Pool in Region 5). Lake Tahoe listed "groundwater loadings" as a source of impairment. See www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/state_06_303d_reqtmdls.pdf.

metals in the Bay resulted in large part from groundwater seepage.[158] Similarly, nitrate contamination of groundwaters in California Central Coast valleys, such as Salinas, has become a national example of how fertilizers can impact public health and water quality.[159] For example, the Salinas River is severely impaired by nutrients and nitrates, flows of which often originate from groundwater tainted by irrigation releases.[160] In 2007, the Central Coast Regional Quality Control Board staff investigated reports of heavily nutrient-contaminated discharges from greenhouses near the City of Carpinteria, finding that such discharges of groundwater contribute to existing nutrient impairments in the Carpinteria Salt Marsh and its tributary streams.[161]

Data from the Malibu Watershed,[162] Los Osos,[163] and San Francisco Bay Area[164] demonstrate another pervasive form of surface water pollution caused by groundwater: septic tank releases that reach coastal waters, estuaries and other surface waters. For example, a recent Stanford study found that contaminated groundwater discharging from a small stretch of Stinson Beach was contributing as much nutrient flux to nearshore coastal waters as *all* local creeks and streams in the Bolinas Lagoon drainage.[165]

Southern California surface waters are particularly impacted by contaminated groundwater and excessive withdrawals and pumping. In particular, a number of Orange

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[158] Spinelli, G.A. *et al*., "Groundwater seepage into northern San Francisco Bay: Implications for dissolved metals budgets," *Water Resources Research*, 38(10.1029/2001WR000827) (2002). The researchers sought to quantify groundwater seepage and bioirrigation rates in the area to determine their roles in transporting dissolved metals from benthic sediments to surface waters. After applying their groundwater flow seepage model to northern San Francisco Bay, the researchers found that "benthic fluxes of dissolved metals to the surface waters could account for a relatively large amount (<60%) of the unknown sources of dissolved cobalt and a relatively small amount (<4%) of the unknown sources of dissolved silver, cadmium, copper, nickel, and zinc." *Id.* at 1 (Abstract).

[159] Robert E. Criss "Fertilizers, water quality, and human health," *Environmental Health Perspectives*. FindArticles.com. Aug 23, 2010. http://findarticles.com/p/articles/mi_m0CYP/is_10_112/ai_n15688580/.

[160] *See* USGS, J. Kulongoski, K. Belitz, *Ground-Water Quality Data in the Monterey Bay and Salinas Valley Basins, California, 2005—Results from the California GAMA Programs*, Data Series 258, available at: http://pubs.usgs.gov/ds/2007/258/pdf/DS_258.pdf.

[161] Staff concluded that the discharges were either the result of sump pumping activities conducted by greenhouse operators or groundwater leaching into the storm drain system and then Arroyo Paradon creek. These discharges of groundwater contribute to existing nutrient impairments in the Carpinteria Salt Marsh and its tributary streams. Data and information on file with Santa Barbara Channelkeeper.

[162] Santa Monica Bay Restoration Commission, "Risk assessment of septic systems in lower Malibu Creek watershed" (2001) (Characterizes vulnerability of Malibu Creek and Lagoon and Surfrider Beach to contamination from on-site septic systems in the Malibu Civic Center).

[163] Central Coast Regional Water Quality Control Board, "Los Osos Water Quality Project and Status of Sewer Project" (October 2005), available at: http://www.swrcb.ca.gov/rwqcb3/water_issues/programs/los_osos/docs/master_docs/2005_10_los_osos_water_quality_impacts_and_status_of_sewer_project.pdf ("Los Osos septic tanks are causing severe environmental problems in Morro Bay and surrounding areas. This is a surface water (Morro Bay National Estuary) problem in addition to a groundwater problem").

[160] Alexandria B. Boehm, Gregory G. Shellenbarger, Adina Paytan, "Groundwater Discharge: Potential Association with Fecal Indicator Bacteria in the Surf Zone" *Environmental Science & Technology* 38 (13), 3558-3566 (2004) (this work establishes a mechanism for the subterranean delivery of fecal indicator bacteria pollution to the surf zone from the surficial aquifer and presents evidence that supports an association between groundwater discharge and FIB). See http://www.stanford.edu/~aboehm/research.htm for this and additional information.

[165] N. de Sieyes, *et al*., "Submarine Groundwater Discharge to a High-Energy Surf Zone at Stinson Beach, California, Estimated Using Radium Isotopes," *Estuaries and Coasts*, DOI 10.1007/s12237-010-9305-2 (Apr. 2010).

County's coastal creeks and waterways receive significant amounts of groundwater and have been seriously impacted by contamination.[166] The Chino Basin, one of the largest groundwater basins in Southern California,[167] contains a high concentration of dairies that contribute high concentrations of salts and nitrates that degrade the water quality of Orange County's groundwater basin, and ultimately, the Santa Ana River, resulting in significant water treatment costs for residents.[168]

The State Water Board's "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" makes clear that for each water body-pollutant combination proposed for the 303(d) list, the Regional Water Quality Control Board must prepare fact sheets. These fact sheets must identify a pollutant's potential source, and "the source category should be identified as specifically as possible."[169] As Regional Water Boards increasingly identify groundwater loadings as a source of surface water impairments, the State Water Board should encourage this progress and work to ensure that the Regional Boards specify the name, location, size, and other identifying data for the groundwater basins at issue as much as possible in the proposed 2012 303(d) list. This information is necessary in order to identify, analyze, and clean up ground water sources of surface water impairment.

This progression in increasing specificity of information is contemplated by U.S. EPA, which recommends in its 2006 Integrated Report Guidance that states use a combination of monitoring and assessment techniques to "increase the percentage and types of waters assessed,"[170] waters that "may include, but are not limited to . . . *ground water*."[171]

As described in Appendix B, there is significant precedent around the country for actively using groundwater data to ensure the proper identification of the extent and sources of surface water impairments, and cleaning up all of those sources (including the groundwater), with the goal of ensuring healthy waterways. The state can and should follow this path to healthy waterways. To do this, the state *must* update its 2002 Groundwater Quality Assessment[172] in the 2012 Integrated Report. Further, the State Water Board, in close collaboration with Regional Water Boards, must go beyond recognizing where groundwater contamination is a possible source of impairment. The State and Regional Water Boards should proactively identify, analyze, and clean up groundwater sources of surface water impairment to ensure the full health of both its groundwater and surface water bodies.

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[166] *See* "Orange County Water District adopts resolution targeted at dairies in Chino Basin" *U.S. Water News Online* (December 1999), available at http://www.uswaternews.com/archives/arcpolicy/9oracou12.html.
[167] The Chino Basin contains approximately 5,000,000 acre-feet of water. *See* Chino Basin Watermaster Overview http://www.cbwm.org/overview.htm.
[168] *Supra* note 166.
[169] 2006 Guidance at p. 19 (Section 6.1.2.2(K)).
[170] *Supra* n. 1, 2006 Guidance, at Appendix: Data Elements for 2006 Integrated Water Quality Monitoring and Assessment Report and Documentation for Defining and Linking Segments to the National Hydrography Dataset, p. A-8, available at: http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-appendix.pdf.
[171] *Id.*at A-1 (emphasis added).
[172] http://www.swrcb.ca.gov/water_issues/programs/tmdl/305b.shtml.

D. The State Must Specifically Identify Surface Waters Impaired by Excessive Groundwater Withdrawals and Pumping.

As described in detail in Section III. above, Clean Water Act Section 303(d) lists must also reflect instances where excessive withdrawals and pumping of groundwater impair and threaten surface waters, particularly through flow alterations. Large-scale pumping and withdrawals of groundwater for agricultural irrigation threaten entire hydrological systems in many areas of California and reduce surface water flows to the detriment of a waterway's beneficial uses.[173]

For example, Northern California's Scott River is so dependent on groundwater that the Legislature amended the California Water Code to formally declare that "by reason of the geology and hydrology of the Scott River, it is necessary to include interconnected ground waters in any determination of the rights to the water of the Scott River as a foundation for a fair and effective judgment of such rights."[174] The State Water Board's assessment of groundwater withdrawal impacts on surface water quality is equally necessary.

The expansion of groundwater-fed agriculture in the Scott Valley is draining the connected, once-mighty Scott River dry. Decreased base flow during summer months increases water temperature and decreases surface water depth, velocity, connectivity which prevents the necessary pollutant load reductions from being realized.[175] Severely reduced flows in the Scott River from groundwater pumping recently prompted legal action by the Pacific Coast Federation of Fisherman's Association and Environmental Law Foundation.[176] In summer 2009, reduced flows in the Scott Valley caused the salmon population to drop down to 81 adults, down from many tens of thousands decades earlier.[177] The groups filed suit against the State Water Board and Siskiyou County for violating the public trust doctrine by allowing unchecked groundwater use to the detriment of the Scott River and several dependent special status fish and wildlife. In addition to having a public trust duty, the State has a legal duty under Section 303(d) of the Clean Water Act to address all sources of surface water impairment.

The lesson of the Scott River and other affected surface waters is that when excessive groundwater withdrawals outpace water recharge, groundwater overdraft occurs, which can directly impact surface waters by diminishing the amount of groundwater that flows into surface waters.[178] Pumping groundwater without regard to streamflow can "turn gaining streams into

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[173] Macdonnel, *supra* n. 31 at 1090, citing Glennon, R., *infra* n. 179.
[174] Cal. Water Code Section 2500.5(b) (2005).
[175] *See* para. 21-22, Pet. for Writ of Mandamus and Complaint for Declaratory and Injunctive Relief filed on June 23, 2010 by Environmental Law Foundation, Pacific Coast Federation of Fisherman's Association, Institute of Fisheries Resources ("PCFFA Scott River Petition") available at http://www.envirolaw.org/documents/WRITPETITIONCOMPLAINT.pdf.
[176] *Id.*
[177] *See* entire PCFFA Scott River Petition, *supra* n. 110. *See also* text and photo accompanying "A Watery Balancing Act" http://www.sfgate.com/cgi-bin/blogs/lsheehan/detail?entry_id=66993.
[178] *See* Glennon, R., *Water Follies: Groundwater Pumping and the Fate of America's Freshwaters*, p. 32 (Island Press, Washington, D.C 2004) ("Along coastal areas, overdrafting may cause the intrusion of salt water into the aquifer, rendering the water no longer potable. This problem is quite serious in California, Florida, and South Carolina."). *See also* Howard J., Merrifield M., *Mapping Groundwater Dependent Ecosystems in California* (2010)

losing streams, and perennial streams into intermittent streams."[179] This alteration to a water body's natural flow creates a cascade of negative impacts on aquatic life and ecosystems, and can destroy a water body's beneficial uses.

Nationally, by far the largest number of groundwater-related impairments of surface waters occurs as a result of groundwater withdrawals, including 97,546 acres of lakes, reservoirs, and ponds, and 3,456 acres of wetlands.[180] As described in Appendix B, other states are taking action to protect surface waters from harmful groundwater withdrawals. For example, in 2000, the Washington Supreme Court upheld the state Department of Ecology's denial of applications for new groundwater withdrawals that would diminish protected stream flows in *Postema v. Pollution Control Hearings Board*.[181] The Michigan Legislature is currently considering a bill that would codify the applicability of the public trust doctrine to groundwater[182] to protect water supplies and connected surface waters from excessive groundwater withdrawals.[183]

Despite a growing movement nationwide to address groundwater withdrawals that affect the health of surface waters, "Groundwater withdrawal" is listed as a source of impairment of a surface water body in only two listings in the State Water Board's 2010 List (Blosser Channel in Region 3 and Mendota Pool in Region 5).[184] Belying these limited listings, satellite-based findings show that large-scale groundwater withdrawals in California[185] are draining surface waters around the state. California's annual statewide overdraft is estimated by the Department of Water Resources to be approximately 1.4 million acre-feet on average, with the majority of overdraft occurring in the San Joaquin Valley and Central Coast.[186] Since October 2003, the aquifers that supply Central Valley and the Sierra Nevada have lost nearly enough water combined to fill Lake Mead.[187] More than 75 percent of this is due to groundwater pumping in the southern Central Valley, primarily to irrigate crops.[188]

PLoS ONE 5(6): e11249. doi:10.1371/journal.pone.0011249, available at: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0011249.

[179] *Supra* note 122, Aiken at 546.

[180] U.S. EPA, "Specific State Probable Sources that make up the National Groundwater Loadings/Withdrawals Probable Source Group," available at: http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.source_detail?p_source_group_name=GROUNDWATER%20LOADINGS/WITHDRAWALS.

[181] *Postema v. Pollution Control Hearings Board*, 11 P.3d 726 (Wash. 2000).

[182] Michigan law already recognizes the doctrine's applicability to surface waters. *See e.g.*, Article IX, Sec. 40 of the Michigan Constitution of 1963; MCL 324.30111; 324.32502; 324.32505, etc.). The Great Lakes - St. Lawrence River Basin Water Resources Compact (codified at MCL 324.34201) also explicitly recognizes that "the Waters of the Basin are precious natural resources shared and held in trust by the states."

[183] Proposed House Bill No. 5319, available at http://www.legislature.mi.gov/documents/2009-2010/billintroduced/House/pdf/2009-HIB-5319.pdf.

[184] "Domestic ground water" use is also listed twice; *see* http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml.

[185] University of California – Irvine, "California's troubled waters: Satellite-based findings reveal significant groundwater loss in Central Valley," *Science Daily* (Dec. 15, 2009), retrieved August 2, 2010, from http://www.sciencedaily.com/releases/2009/12/091214152022.htm.

[186] California Department of Water Resources, "California's Ground Water," Bulletin 118, Update 2003, Sacramento, CA (2003).

[187] *Id.*

[188] *Id.*

The State Water Board can and must ensure full compliance with Sections 303(d) and 305(b), and the 2006 Guidance, by listing these and other surface waters impaired by low flow caused by excessive groundwater withdrawals and pumping.[189]

V. THE STATE WATER BOARD MUST INCLUDE IN ITS 2012 303(D) LIST ANTHROPOGENIC CLIMATE CHANGE-DRIVEN SOURCES AND IMPAIRMENTS OF CALIFORNIA WATERWAYS.

Global climate change is altering the biological, chemical, and physical properties of California waterways. Projected impacts in California provide an added impetus for the State Water Board to take swift action on flows and groundwater, as described above. For example, California's total water demand is projected to increase by up to 12% or more between 2000 and 2050, and the impacts of climate change will greatly increase the number of areas where water demands will exceed supplies.[190]

Climate change will not only increase the number and severity of existing waterway impairments, it will also drive new sources and causes of impairments. Data and information in the California Climate Change Adaptation Strategy[191] and other analyses generated by the state[192] strongly suggest that climate change will have demonstrable impacts on beneficial uses of California waterways. The most immediate impairments, and those with the strongest causal connection to global climate change, are driven by four principal dynamics: oceanic and estuarine carbon absorption, sea level rise, air and water temperatures increases, and shifting precipitation patterns.

We respectfully request that the State Water Board ensure that the 303(d) list identifies climate change driven-impairments to waterway health, and consider including reference data and information contained herein in your pending "Guidance Document on Climate Change."[193] An initial identification of climate change-driven impairments is provided below as a starting point for the State Water Board's analysis of surface waters that should be included on the 2012 303(d) List as either threatened or impaired:

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[189] Excessive groundwater withdrawals can also cause groundwater levels to decline below sea level, causing seawater to intrude into fresh water aquifers. Saltwater intrusion into groundwater aquifers is likely to become a pressing threat in many watersheds as sea level rises. (*See* AMEC Earth & Environmental (2005) Santa Clara River Enhancement and Management Plan. 260 p. Prepared for the Ventura County Watershed Protection District and Los Angeles Department of Public Works, Santa Barbara, Riverside, San Diego, California.) This threat is described in more detail in the climate change section below.

[190] Natural Resources Defense Council, *Water Facts: Climate Change, Water, and Risk: Current Water Demands Are Not Sustainable*, p. 2 (July 2010) ("NRDC Climate & Water Risk"). Available at http://www.nrdc.org/global-Warming/watersustainability/.

[191] The California Climate Adaptation Strategy, released in December 2009, summarizes the best known science on climate change impacts in California and outlines possible solutions that can be implemented within and across state agencies to promote resiliency. California Natural Resources Agency, "2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2006," (CA Climate Adaptation Strategy), available at www.climatechange.ca.gov/adaptation.

[192] *See* documents referenced in Section IV.A.

[193] *See* http://www.waterboards.ca.gov/water_issues/programs/climate/index.shtml#.

Ocean Acidification:
- decreased pH of oceanic and estuarine waters
- acidification impacts to nearshore coastal waters, bays and estuaries

Sea level rise:
- salinity intrusion into groundwaters hydrologically connected to surface waters
- salinity intrusion into estuaries, bays, and coastal rivers
- increased contaminant flows in waterways surrounding wastewater treatment plants and sewer outfalls
- habitat alterations

Air and water temperature increases:
- rivers, streams, and creeks: climate change-driven temperature listings
- decrease in dissolved oxygen
- loss of temperature-dependant beneficial uses (*e.g.* cold freshwater habitat)

Shifting precipitation patterns:
- decreased reservoir levels and spring-fall flows (increased water temperature, decreased dilution of pollutants)
- increase in winter flows, flooding, and runoff (increase in sedimentation and pollutant runoff)

These and other climate change-driven impacts are discussed in more detail below.

A. The State Must Use All Readily Available Data to Identify Climate Change-Driven Sources and Causes of Surface Waters Impairment.

As noted above, the State and Regional Water Boards must "actively solicit, assemble, and consider all readily available data and information," including information reported by local, state, and federal agencies.[194] Given the global and quickly-evolving nature of climate change, the State Water Board should also consider information from international bodies, such as the Water Quality Section of the Intergovernmental Panel on Climate Change's Assessment Report, which provides a useful overview of projected and already-occurring impacts to water quality. Additionally, local, state, and federal agencies have amassed a tremendous amount of regionally-scaled studies and analyses regarding climate change impacts to California water quality that have not yet been integrated into the State's biennial 303(d) (or 305(b)) data collection. In particular, there is a significant amount of modeling and data on how climate change will impact the water quality and water supply of the San Francisco-San Joaquin Delta that should be considered.

More specifically, the State Water Board must examine and consider all readily available information that could inform 303(d) decisions related to climate change-driven impacts to California waterways, including but by no means limited to the following:

- Pertinent reports from the Department of Water Resources' (DWR) Integrated Regional Water Management Climate Change Document Clearinghouse.[195] This Clearinghouse

[194] *See* CA Listing Policy, Section 6.1.1 Definition of Readily Available Data and Information.
[195] A complete list of climate change publications written by DWR is available at http://www.water.ca.gov/climatechange/articles.cfm.

references dozens of pertinent reports that detail projected climate impacts to water quality, flow and species, including several recent DWR reports on how impaired water bodies and water quality will be impacted by climate change, including sea level rise;

- Analysis in the *California Water Plan Update 2009*[196] on how impaired water bodies and water quality will be impacted by climate change;
- Information from DWR's *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*[197] on waterways hydrologically connected to groundwater basins and on waterways vulnerable to sea level rise;
- Data and information in the Public Policy Institute of California's *Adapting Water Management to Climate Change*[198] on sea level rise and temperature impairments, as well as information on changes in the timing and amount of precipitation;
- Information regarding impairments stemming from salinity intrusion, inundation of wastewater treatment plants, and other impairments stemming from sea level rise in the Pacific Institute's *The Impacts of Sea-Level Rise on the California Coast*;[199]
- Ocean carbon data from NOAA's Pacific Marine Environmental Laboratory[200] and the U.S. Department of Energy's Carbon Dioxide Information Analysis Center;[201] and
- Data on changes in precipitation and temperature in the California Climate Tracker,[202] which is maintained by the Western Regional Climate Center, which would be extremely useful to identify related climate change-driven impairments as described below.

Information specific to the San Francisco-San Joaquin Delta includes, but is not limited to:

- Water quality monitoring data in the Central Valley Watershed Monitoring Directory, a joint effort by the San Francisco Estuary Institute (SFEI), the Central Valley Regional Water Quality Control Board Surface Water Ambient Monitoring Program (SWAMP) and the U.S. EPA;[203]
- Water quality and water supply studies from the CALFED Bay-Delta Program;[204] including the Delta Regional Ecosystem Restoration Implementation Plan models;[205]
- Reports and resources from the Water Quality, Supply and Reliability Workgroup of the California Partnership for the San Joaquin Valley;[206]

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[196] California Department of Water Resources (DWR), *California Water Plan Update 2009* (October 2009), available at http://www.waterplan.water.ca.gov/cwpu2009/index.cfm.
[197] DWR, *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water* (October 2008), available at http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf.
[198] Public Policy Institute of California, *Adapting Water Management to Climate Change* (November 2008), available at http://www.ppic.org/content/pubs/report/R_1108JLR.pdf.
[199] California Climate Change Center, The Impacts of Sea-Level Rise on the California Coast ("Impacts of Sea Level Rise on CA"), May 2009, available at www.pacinst.org/reports/sea_level_rise/report.pdf.
[200] *See* Pacific Marine Environmental Laboratory homepage at http://www.pmel.noaa.gov/co2/OA/.
[201] Global Ocean Data Analysis Project, http://cdiac.ornl.gov/oceans/.
[202] *See* California Climate Tracker at http://www.wrcc.dri.edu/monitor/cal-mon/. Abatzoglou, J.T., K.T. Redmond, L.M. Edwards, "Classification of Regional Climate Variability in the State of California," *Journal of Applied Meteorology and Climatology*, 48, 1527-1541 (2009).
[203] Central Valley Watershed Monitoring Directory: http://www.centralvalleymonitoring.org/.
[204] CALFED Bay-Delta Program: http://www.science.calwater.ca.gov/science_index.html.
[205] Delta Regional Ecosystem Restoration Implementation Plan at http://www.science.calwater.ca.gov/drerip/drerip_index.html.
[206] California Partnership for the San Joaquin Valley Water Quality, Supply and Reliability Document Library http://www.sjvpartnership.org/wg_doc_lib.php?wg_id=10.

- The SWRCB's Final Report on Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem and studies supporting the recently-adopted Delta flow criteria;[207] and
- DFG biological opinions on Delta smelt and other endangered species.

The State Water Board should solicit, assemble and consider all readily available data relating to climate change-driven impairments for the 2012 303(d) List, with a particular focus on developing appropriate 303(d) listings for which a large amount of data currently exists, such as for ocean acidification impairments and climate change-driven Delta waterway impairments. The Board should also use and consider data regarding potential sources and causes of impairment cased by climate change-driven sea level rise, warming and shifting precipitation. Finally, the Board should augment its "Climate Change and Water Resources" website with data and information regarding the aforementioned climate change-driven impairments.[208]

B. The State Water Board Must Take Immediate Action to Ensure That the 2012 303(d) List Reflects Data on Climate Change-Driven Impairments Related to Ocean Acidification.

There is a significant amount of data and information currently available with requisite specificity for assessing which waterways are impaired by ocean acidification for the 2012 303(d) List. The State must collect data regarding the pH of bays, estuaries, the ocean, near-coastal areas, and coastal shorelines, and list waterways impaired or threatened by ocean acidification. The State Board must take action to ensure that the 2012 303(d) List contains pertinent data and lists impaired waterways as appropriate. If the State declines to do so, it must submit a "rationale" for not doing so, as required by the Clean Water Act, though we urge the State to implement its responsibilities and authorities fully in ensuring comprehensive listings.

Ocean acidification, a decrease in ocean pH fueled by the ocean's absorption of carbon dioxide, threatens the seawater quality of California's bays and estuaries. The ocean absorbs about half of all anthropogenic carbon dioxide emissions, an estimated 22 million tons of carbon dioxide (CO_2) every day.[209] When CO_2 dissolves in seawater it forms carbonic acid, which decreases ocean pH and causes "ocean acidification."[210] Global average surface pH has already decreased by approximately 0.1 units, and is expected to decrease by another 0.3-0.4 units by the end of the century, depending on future levels of atmospheric carbon dioxide.[211]

The latest science indicates that ocean acidification impacts to the seawater quality of California bays, estuaries and near coastal areas may already be occurring, and are projected to

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[207] http://www.swrcb.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/
[208] *See* http://www.waterboards.ca.gov/water_issues/programs/climate/index.shtml.
[209] Feely, R. A., C. L. Sabine, K. Lee, W. Berelson, J. Kleypas, V. J. Fabry, and F. J. Millero. "Impact of anthropogenic CO2 on the CaCO3 system in the oceans," *Science* 305:362-366 (2004).
[210] Orr, J.C. *et al*. "Research Priorities for Understanding Ocean Acidification," *Oceanography*, 22(4): 182 (2009).
[211] Hauri, Claudine, Gruber, N, Lachkar, Z., Plattner, G. Abstract. "Accelerated acidification in eastern boundary current systems," Goldschmidt Conference Abstracts (2009); citing Orr, J.C., V.J. Fabry, O. Aumont, L. Bopp, S.C. Doney, R.A. Feely, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, et al, "Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms," 437 *Nature* 681-86 (2005), http://www.nature.com/nature/journal/v437/n7059/full/nature04095.html.

accelerate.[212] In 2008, scientists discovered high levels of acidified ocean water within 20 miles of the Pacific Coast.[213] Given that atmospheric levels of carbon dioxide have increased drastically in the last half century, and are likely to increase further, such acidification trends are projected to increase, a trend that should be considered in projecting "threatened" waterways in particular.[214] Natural upwelling in nearshore waters, coupled with oceanic uptake of anthropogenic CO_2, mean that "ocean acidification has already decreased mean surface water pH in the California Current System to a level that was not expected to happen for open-ocean surface waters for several decades."[215] Projections indicate that the Humboldt Current System, another eastern boundary upwelling system that impacts ocean waters off of California, may be subject to the same conditions.[216]

There is precedent both for listing waterways impaired or threatened by atmospheric sources of pollution and for listing waterways impaired for pH. U.S. EPA maintains a list of waterways impaired for pH under the 303(d) program, with more than 3,500 waterbodies so listed as of May 2010.[217] Section 303(d) of the Clean Water Act also has been interpreted by both U.S. EPA and states to cover waterways impaired by atmospheric sources of pollution (such as carbon deposits). Specifically, in March 2007, EPA issued information on listing waters impaired by mercury from atmospheric sources under Section 303(d) of the Clean Water Act.[218] Subsequent to EPA's action, in October 2007, a group of Northeast states established the Northeast Regional Mercury TMDL, a regional cleanup plan to reduce mercury entering the states' watershed from a range of pollution sources, including atmospheric deposition of mercury.[219]

In response to legal action from the Center for Biological Diversity directly on the issue of climate change, the U.S. EPA solicited public comment on how to address listing of waters as threatened or impaired for ocean acidification under the 303(d) program.[220] California need not wait for EPA's issuance of guidance on listing waters impaired by ocean acidification. The State should immediately assemble and consider all readily available evidence regarding waters impaired by ocean acidification and list waters accordingly.

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[212] Byrne, R. H., S. Mecking, R. A. Feely, and X. Liu (2010), "Direct observations of basin-wide acidification of the North Pacific Ocean," 37 *Geophys. Res. Lett.* (2010), L02601, doi:10.1029/2009GL040999, http://www.agu.org/journals/ABS/2010/2009GL040999.shtml.

[213] Feely, R. A., C. L. Sabine, J. M. Hernandez-Ayon, D. Ianson, and B. Hales, "Evidence for upwelling of corrosive "acidified" water onto the continental shelf," *Science* 320:1490-1492 (2008), http://www.sciencemag.org/cgi/content/abstract/sci;320/5882/1490. *See also* Hauri *et al*. at p. 66.

[214] *Id. See also* http://www.sciencedaily.com/releases/2008/05/080522181511.htm.

[215] Hauri *et al*. at p. 69.

[216] *Id.*

[217] *See* Environmental Protection Agency Watershed Assessment, Tracking & Environmental Results webpage, Specific State Causes of Impairment That Make up the National pH/Acidity/Caustic Conditions Cause of Impairment, available at: http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.cause_detail_303d?p_cause_group_id=1188.

[218] Hooks, Craig, EPA Office of Wetlands, Oceans, and Watersheds, "Memorandum: Listing Waters Impaired by Atmospheric Mercury Under Clean Water Act Section 303(d): Voluntary Subcategory 5m for States with Comprehensive Reduction Programs" (March 8, 2007).

[219] New England Interstate Water Pollution Control Commission, "Northeast Regional Mercury Total Maximum Daily Load," p. 32 (October 24, 2007), available at http://www.neiwpcc.org/mercury/mercurytmdl.asp.

[220] *See* EPA's Federal Register Notice at http://www.epa.gov/owowwtr1/tmdl/oceanfrMarch_2010/.

C. The State Water Board Must Use and Consider Data on Sea Level Rise, Warming, and Precipitation Changes That Cause or Are Potential Sources of Impairments.

Projections of climate change-driven sea level rise, increased temperature, and shifting precipitation patterns will continue to have a major impact on California's water quality. The water quality impacts of climate change-driven sea level rise will be felt throughout California. In particular, a change in sea level will substantially alter San Francisco Bay-Delta conditions, where water surface elevations and associated fluctuations drive Bay-Delta hydrodynamics, which in turn dictate the location and nature of physical habitat and the quantity and quality of water.[221] Even under modest sea level rise and climate warming projections, an increase in the frequency, duration, and magnitude of water level extremes is expected in the Delta, to the detriment of numerous waterway beneficial uses.[222]

As for ocean acidification, we respectfully request that the State Water Board review and assess whether water bodies are impaired or threatened by climate change and also to list climate change as a potential source of impairment, where appropriate, on the 2012 303(d) List.[223] As outlined at the beginning of this section, we bring the following impairments to the Board's attention, although review of climate change impairments should by no means be limited to the impairments described below.

1. Sea Level Rise

Climate change is projected to result in sea level rise in California of 16 inches by 2050 and 55 inches by the end of the century.[224] In the Bay Area, 180,000 acres of shoreline are vulnerable to flooding by 2050, putting 21 wastewater treatment plants at risk of inundation.[225] Sea level rise also will substantially impair California's waterways by causing saltwater intrusion into estuaries and hydrologically connected groundwaters, inundating or eroding habitats, altering species composition, changing freshwater inflow, and impairing water quality.

a. Saltwater intrusion of hydrologically connected groundwaters.

Saltwater intrusion into aquifers is a man-made problem in many places in California, resulting from over-pumping and excessive withdrawals from groundwater aquifers.[226] Pumping coastal aquifers in excess of natural recharge rates draws down the surface of the aquifer, allowing surface water to move inland into a freshwater aquifer and contaminate it with salts.[227] When the ocean has a higher water elevation, it causes the saltwater wedge to intrude further

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[221] CALFED Bay-Delta Program Independent Science Board, Memorandum: *Sea Level Rise and Delta Planning* (September 6, 2007).
[222] *Id*. at 2.
[223] *See* discussion in Section III. above regarding "causes" versus "sources" of impairment.
[224] California Climate Change Center, "Climate Change Scenarios and Sea Level Rise Estimates for the California 2008 Climate Change Scenarios Assessment (Draft Paper)," available at www.energy.ca.gov/2009publications/CEC-500-2009-014/CEC-500-2009-014-D.PDF.
[225] *Id*.
[226] *Impacts of Sea Level Rise on CA* at 80.
[227] *Id.*

inland.[228] Seawater intrusion is already problematic in California's coastal aquifers throughout Central and Southern California, including the Pajaro and Salinas Valleys and aquifers in Orange and Los Angeles Counties. Groundwater supplies in the Santa Clara Subbasin are also vulnerable to salinity intrusion.[229]

Overdraft and saltwater intrusion into groundwater aquifers will be accelerated and made worse by sea level rise. Where these groundwater aquifers are hydrologically connected to surface waters, and thus affect the water quality of those surface waters, the State Water Board should list climate change/sea level rise as a source or cause of impairment so that appropriate remedial action can be taken.

b. Salinity intrusion into estuaries

Sea-level rise and changes in the intensity of storm events will impact low-lying coastal areas and result in the loss or inundation of coastal wetlands and dune habitat, resulting in salt water intrusion and loss of freshwater habitat for fish and wildlife.[230] Changes in salinity from reduced freshwater inflow will affect fish, wildlife and other aquatic organisms in intertidal and subtidal habitats. Increasing rates of saltwater intrusion into groundwater that impacts the beneficial uses of connected surface waters will need to be addressed in water quality management decisions, including the 303(d) List.[231]

c. Increased contamination from inundation of wastewater treatment facilities and sewer outfalls.

A recent Pacific Institute study found that a 1.4 meter sea level rise makes 28 wastewater treatment plants vulnerable to inundation: 21 plants around the San Francisco Bay and 7 other plants on the Pacific coast.[232] The combined capacity of these plants is 530 million gallons per day.[233] Some wastewater treatment plants are preparing for projected inundation,[234] but many more are not taking any action. Inundation from sea level rise, as well as an increased number of extreme weather events, could damage pumps and other treatment plant equipment and interfere with discharges from outfalls sited on coast and bay shorelines.[235] This will lead to an increased

[228] *Id.*
[229] Santa Clara Valley Water District, "Groundwater Quality Report," p. 19 (2008) ("Saltwater intrusion of the Santa Clara Subbasin shallow aquifer zone adjacent to the southern shore of the San Francisco Bay has been studied and monitored for many years by the District. Although the contamination has been somewhat widespread in the shallow aquifer zone, fortunately, the lower aquifer has not been affected significantly.")
[230] *CA Climate Adaptation Strategy* at 73.
[231] *Id.* at 70.
[232] *Impacts of Sea Level Rise on CA* at 62-63, *see* Figure 24: Wastewater treatment plants on the Pacific coast vulnerable to a 100-year flood with a 1.4m sea-level rise.
[233] *Id.* at 63.
[234] In 2009, the City of Morro Bay commissioned a *Wastewater Treatment Plant Flood Hazard Analysis* and concluded that the existing wastewater treatment plant (WWTP) was subject to inundation from the Morro Creek watershed. The City recommended that the new site for a WWTP be developed with the placement of engineered fill to raise the new site above the 100-year flood elevation. *See* City of Morro Bay and Cayucos Sanitary District Wastewater Treatment Plant Upgrade Project, Facility Master Plan Draft Amendment No. 2, p. 12 (July 2010).
[235] *Id.* at 63.

number of untreated and partially treated sewage discharges and increased contamination and impairment of proximate waterways.

Discharges from sewage treatment plants already impair waterbodies throughout California. Pathogen impairments, which are linked to discharges from wastewater treatment plants among other sources, represent the second highest number of impairments for California waterways.[236] High concentrations of bacteria such as fecal coliform and E. coli raise the risk of waterborne diseases and starve fish of the oxygen they require, destroying several beneficial uses for affected waterbodies.

d. Sea level rise-caused habitat alterations

EPA records show 699 waterbody-segments listed nationwide as impaired due to "habitat alteration." This habitat alteration impairment group captures numerous impacts to waterways, including but not limited to alterations to wetland habitats, habitat barriers, degraded habitat and other forms of habitat alterations. Projected sea level rise similarly could result in a large number of habitat alteration impairments, both directly from sea level rise alteration to coastal wetland and other habitats, and indirectly by prompting construction of hard structures on the coastline such as seawalls and levees.

For example, according to the report *Impacts of Sea Level Rise on the California Coast* rising seas threaten to substantially modify or destroy wetland habitats.[237] More specifically:

> Vast areas of wetlands and other natural ecosystems are vulnerable to sea level rise. An estimated 550 square miles, or 350,000 acres, of wetlands exist along the California coast, but additional work is needed to evaluate the extent to which these wetlands would be destroyed, degraded, or modified over time. A sea level rise of 1.4 m would flood approximately 150 square miles of land immediately adjacent to current wetlands, potentially creating new wetland habitat if those lands are protected from further development."[238]

2. Air and water temperature increases

a. Warming of streams and rivers

New research shows that water temperatures are increasing in many streams and rivers throughout the United States,[239] with less water available for ecosystem flow and temperature needs in spring and summer. [240] In many low- and middle-elevation streams today, summer temperatures often approach the upper tolerance limits for salmon and trout; higher air and water

[236] http://iaspub.epa.gov/waters10/state_rept.control?p_state=CA&p_cycle=.
[237] *Impacts of Sea Level Rise on CA* at 27.
[238] *Id.* at 17.
[239] Kaushal et al., "Rising stream and river temperatures in the United States," *Frontiers in Ecology and the Environment*, 2010; 100323112848094 DOI: 10.1890/090037; University of Maryland Center for Environmental Science, "Rising water temperatures found in US streams and rivers" (April 7, 2010), available at: http://www.sciencedaily.com/releases/2010/04/100406101444.htm.
[240] *CA Climate Adaptation Strategy* at 80.

temperatures will exacerbate this problem.[241] Thus, climate change might require dedication of more water, especially cold water stored behind reservoirs, to simply maintain existing fish habitat.[242] The 303(d) List should reflect instances where scientific evidence suggests that climate change is a cause or source of temperature impairments. Doing so would ensure that appropriate mitigating and prevention measures can be taken.

b. Decrease in dissolved oxygen

An inverse correlation between water temperature and the amount of dissolved oxygen in a waterbody is well-known and understood by water quality managers. Many California waterbodies that are impaired for temperature are also impaired because of low dissolved oxygen. Where waterbodies experience unnaturally high temperatures, the amount of dissolved oxygen can drop to levels that negatively impact water quality and aquatic species. Studies suggest that climate change-driven warming of streams, rivers, and other waterways could similarly decrease dissolved oxygen levels.[243] This is a phenomena the State Water Board must track and address in its 303(d) list, as appropriate.

3. Shifting precipitation patterns

Observational records and climate projections provide abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted by climate change.[244] The decrease in precipitation and increase in potential evapotranspiration will have a significant affect on California's "available precipitation," which means water falling as rain or snow.[245] Projections suggest that precipitation will decline five inches per year by 2050 in California.[246] The Department of Water Resources projects that the Sierra Nevada snowpack may be reduced from its mid-20th century average by 25 to 40 percent by 2050.[247]

a. Longer low flow conditions

Climate change should be specifically identified as the source of low flow conditions where data so indicate. For example, projected declines in summer stream flows may impair Delta waterways through low-flow conditions and higher stream water temperatures.[248] As freshwater inputs decrease, Delta water quality may also be degraded as saltwater intrudes further upstream from the Pacific Ocean.[249] Salinity intrusion, low-flow conditions and higher

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[241] *Id.*
[242] *Id.*
[243] *See* IPCC Assessment Report, Working Group II: "Impacts, Adaptation and Vulnerability," Section 4.3.10 available at http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=173.; B. A. Cox and P. G. Whitehead, "Impacts of climate change scenarios on dissolved oxygen in the River Thames, UK, Hydrology Research," 40(2-3): 138–152 © IWA Publishing 2009 doi:10.2166/nh.2009.096.
[244] Climate Change and Water: Intergovernmental Panel on Climate Change Technical Report VI – June 2008, available at: http://www.ipcc.ch/publications_and_data/publications_and_data_technical_papers_climate_change_and_water.htm.
[245] *NRDC Climate & Water Risk* at 2.
[246] *Id.*
[247] CA Climate Adaptation Strategy at 82.
[248] *Id.* at 86.
[249] *Id.*

stream water temperatures are all sources and causes of waterway impairment that could and should be addressed under the State Water Board's 2012 303(d) process.

The California Natural Resources Agency made an initial determination that mitigating these impacts requires more freshwater releases from upstream reservoirs.[250] The State Water Board should work with the Central Valley Regional Water Quality Control Board to examine data on climate change-driven impairments of Delta waterways and tributaries so that impaired waterways can be correctly identified and appropriate mitigating actions can be implemented to restore waterway health.

b. Increased contamination from stormwater runoff

Many models project higher contaminant concentrations in waterways as less frequent but more intense rainfall patterns change water quality.[251] An increased number and severity of extreme weather events and storm surges are also predicted. These climate change-driven phenomena will increase runoff and flooding, thus exacerbating levels of storm water pollution and sediment runoff.

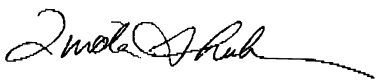
* * *

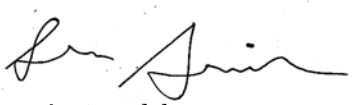
Thank you for the opportunity to provide this information in support of a comprehensive 2012 Section 303(d) list that meets the mandates of the Clean Water Act. California's 303(s) list cannot be limited to "traditional" Category 5 listings. To comply with the Act, and to help lead the state to achieving its goals of clean waters with healthy flows and biodiverse aquatic ecosystem, the 2012 303(d) list must also include waterways impaired or threatened by: altered natural flows in surface waters, groundwater contamination and excessive groundwater withdrawals that impact surface water health, and anthropogenic climate change-caused impacts to surface waters. The data and information contained and referenced in this letter, as well as extensive other databases and peer-reviewed reports that are readily available to the State and Regional Water Boards, should provide more than adequate support for the listing of numerous waterways that are impaired and threatened and that therefore require the state's attention under the Clean Water Act and Porter-Cologne.

If you have any questions, please do not hesitate to contact us.

[250] *Id.*
[251] *CA Climate Adaptation Strategy* at 82.

Sincerely,





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APPENDIX A

FLOW IMPAIRMENT DATA AND INFORMATION

CONTENTS

Carmel River and San Clemente Creek

- Patrick Higgins, Consulting Fisheries Biologist, "Historic and Present Angler Impacts on Carmel River Steelhead Trout Relative to Other Stressors on the Population" (Aug. 2010)

Eel River

- Patrick Higgins, Consulting Fisheries Biologist, "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" (Feb. 2010)

Gualala River

- Letter from Patrick Higgins, Consulting Fisheries Biologist to Allen Robertson, California Department of Forestry and Fire Protection, "Negative Declaration for Sugarloaf Farming Corporation dba Peter Michael Winery" (Dec. 12, 2003)
- Letter from Patrick Higgins, Consulting Fisheries Biologist to Allen Robertson, California Department of Forestry and Fire Protection, "Negative Declaration for THP 1-04-030SON, Hanson/Whistler Timberland Conversion Permit" (April 14, 2004)
- Letter from Patrick Higgins, Consulting Fisheries Biologist to Allen Robertson, California Department of Forestry and Fire Protection, "Negative Declaration for Timber Harvest Plan (THP 1-04-059)/ Martin Timberland Conversion Permit" (July 17, 2004)
- Letter from Patrick Higgins, Consulting Fisheries Biologist to Leslie Markham, California Department of Forestry and Fire Protection, "Response to Comments on Timber Harvest Permit THP 1-04-030 SON, Hansen/Whistler and Timberland Conversion Permit" (Dec. 19, 2004)
- Letter from Patrick Higgins, Consulting Fisheries Biologist to Allen Robertson, California Department of Forestry and Fire Protection, "Comments on Artesa Vineyard Conversion Draft Environmental Impact Report" (July 28, 2009)
- Letter from Patrick Higgins, Consulting Fisheries Biologist to William Snyder, California Department of Forestry and Fire Protection, "Comments on THP 1-04-260 MEN - Robinson Creek Calwater Planning Watershed, Dry Creek, North Fork Gualala River" (April 13, 2007)

Mark West Creek

- Jim Doerksen, Save the Mark West Creek, "2012 Integrated Report Data Submittal Information Form"
- Memorandum from Jim Doerksen to Board of Zoning Adjustment, Dave Hardy, Supervising Planner, PRMD, "Proposed Henry Cornell Winery" (Nov. 13, 2008)
- CA Dep't of Fish and Game, Stream Survey: Mark West Creek, from Headwaters to Confluence with Russian River (Sept. 4, 1969)
- Community Clean Water Institute, "Mark West Creek Flow Study Report" (Nov. 14, 2008)
- Kate Wilson, Russian Riverkeeper, "Photos of Mark West Creek, Russian River Watershed, Santa Rosa, California"
- Mark West Creek Flow Data, compiled by Grif Okie with Community Clean Water Institute, www.ccwi.org
- Dry Season Creek Flow 2005-09, Jim Doersken

Appendix A (cont'd)

Mattole River

- Randy D. Klein, Hydrologist, "Hydrologic Assessment of Low Flows in the Mattole River Basin 2004-2006" (March, 2007)

Napa River

- Letter from Patrick Higgins, Consulting Fisheries Biologist to Thomas Lippe, Living Rivers Council, "Sufficiency of SFBRWQCB Staff *Napa River Sediment TMDL Appendix D: Responses to Comments*" (Aug. 17, 2010)

Navarro River

- Letter from Patrick Higgins, Consulting Fisheries Biologist to SWRCB, "Comments on *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams*," (April 2, 2008)
- KRIS Navarro Project: "Hypothesis #5: Surface flows in the Navarro River basin have been diminished in recent decades, which reduces salmon and steelhead productivity," available at: http://www.krisweb.com/krisnavarro/krisdb/html/krisweb/analysis/hypoth5_nav.htm.

Redwood and Maacama Creeks

- Letter from Patrick Higgins, Consulting Fisheries Biologist to Traci Tesconi, County of Sonoma, "Pelton House Winery Application #PLP05-0010," (Dec. 29, 2008)

Salinas River

- Letter from Patrick Higgins, Consulting Fisheries Biologist to Curtis Weeks, Monterey County Resources Agency, Comments on Salinas River Channel Maintenance Project (CMP) 404 Permit Application and Mitigated Negative Declaration (Aug. 6, 2009)

Scott River

- California Dep't of Fish and Game, "Stream Flow Needs for Anadromous Salmon in the Scott River Basin, Siskiyou County – A Summarized Report" (1974)
- Memorandum from Mark Hampton, CDFG to Mark Pisano, CDFG, "Chinook salmon reconnaissance survey on the Scott River" (Dec. 28, 2009)
- Letter from PCFFA *et al* to Tam Doduc, SWRCB, "Joint Comments on the Proposed Action Plan for the Scott River Watershed Sediment and Temperature TMDL" (June 12, 2006)

Shasta River

- Letter from Pacific Coast Federation of Fishermen's Associations and the Institute for Fisheries Resources to SWRCB, "Comment Letter - Shasta River Watershed DO and Temperature TMDLs" (Oct. 29, 2006)

The Sacramento-San Joaquin Delta

- SWRCB, "Final Report on Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" (Aug. 3, 2010)
- SWRCB, **"**Draft Water Quality Control Plan for Salinity" (Oct. 1998)

APPENDIX B:
TMDL PROGRAMS THAT ADDRESS GROUNDWATER POLLUTION WITH SPECIFICITY

California

In 2002, EPA adopted Total Maximum Daily Loads (TMDL) for Toxic Pollutants in San Diego Creek and Newport Bay, California.[1] The TMDLs Source Analysis found that groundwater was a "significant and constant source of selenium to surface waters in the San Diego Creek watershed."[2] The TMDL recognized that "groundwater may seep into surface waters via natural processes, or it may be pumped as part of groundwater cleanup or dewatering operations which discharge into surface waters; thus selenium contributions to the watershed include both non-point sources (seepage) and point sources (cleanup and dewatering)."[3] The TMDL assigned allocations to groundwater cleanup and dewatering, with a recommendation to monitor flow and selenium concentrations to establish effluent limits in permits consistent with the TMDLs. The TMDL also assigned a wasteload allocation to a specifically named groundwater basin, the Silverado groundwater basin.[4]

In December 2005, the North Coast Regional Water Board adopted the Scott River Temperature TMDL, with an Action Plan that laid out the "Scott Valley Groundwater Study Plan."[5] In that case, Siskiyou County and the Regional Water Board found that hydrology of the entire valley needed to be understood in order to know the possible array of solutions to water issues in the Scott Valley. Siskiyou County, with its management jurisdiction over local groundwater, and the North Coast Regional Water Board pursued a community-based approach to groundwater management planning and study, the results of which the Regional Board subsequently used.

In another example, a study was initiated to develop a groundwater-surface water model for the Upper Santa Clara River Watershed through the "Upper Santa Clara River Chloride TMDL Collaborative Process."[6] Through a serious of technical reports, data gathering and analyses, models, monitoring and sampling, consultants determined the interaction between surface water and groundwater and its linkage to surface water and groundwater quality.[7] The model assessed the assimilative capacity of the surface water and groundwater systems in relation to existing Basin Plan water quality objectives for both groundwater and surface water with respect to chloride and total dissolved solids. In combination with the other TMDL studies, the Groundwater-Surface Water Interaction Model was used by the Regional Board to develop a site-specific chloride objective for the Upper Santa Clara River Watershed.[8]

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[1] U.S. Environmental Protection Agency, Region 9, Total Maximum Daily Loads For Toxic Pollutants San Diego Creek and Newport Bay, California (April 12, 2002) p. 34-37 ("*San Diego Creek and Newport Bay TMDL*"), available at http://www.pw.ucr.edu/textfiles/Newport_TMDL_summary0402.pdf.

[2] *San Diego Creek and Newport Bay TMDL* citing Hibbs, BJ and MM Lee. (2000) Sources of Selenium in the San Diego Creek Watershed.

[3] *Id.*

[4] *San Diego Creek and Newport Bay TMDL*; See Table 4-5 Wasteload and Load Allocations of Selenium for Newport Bay Watershed.

[5] *See* Scott Valley Community Groundwater Study Plan Website at http://groundwater.ucdavis.edu/ScottValley.htm.

[6] *See* documents and analysis at the website for the Upper Santa Clara River Chloride TMDL Collaborative Process http://www.santaclarariver.org/Content/10001/gwsim.html.

[7] *See* UCSR Collaborative Process Documentation, TMDL Task 5 – Groundwater Surface Water Interaction Model Study, http://www.santaclarariver.org/Content/10045/_.html.

[8] *Id.*

As one more example, the Lake Tahoe TMDL for phosphorous and nitrogen recognized that "groundwater flow contributes phosphorus and nitrogen to the lake at the aquifer-lake interface" and evaluated data to ensure that nutrient loading from groundwater was incorporated into the Lake Clarity model.[9]

Other States: Oregon, Florida, Washington

Other states have taken even more aggressive action to specifically identify and address groundwater contamination affecting surface water quality. For instance, after finding high levels of nitrates and other contamination in its groundwater wells, the Oregon Department of Environmental Quality created the Southern Willamette Valley Groundwater Management Area Action Plan. The Oregon Plan specifically cites the **"need for integration of groundwater quality protection strategies with other ongoing water quality improvement efforts, such as the total maximum daily load allocations for impaired waterways,"** as a primary purpose for initiating such an action.[10] For example, implementation of Oregon's Willamette Basin TMDL required consideration of groundwater management because of the close link between groundwater and surface water, especially regarding bacteria and nutrients.[11]

The Florida Department of Environmental Protection found that ground water contribution to surface waters "could obviously result in significant miscalculations in allocating waste loads to surface waters; thus in listing or delisting of water bodies respectively as 'impaired' or 'recovered' by the regulatory agencies."[12] To address this dilemma, the Hydrogeology Section commissioned research to develop a scientifically-based, yet simplified and economical, method of estimating groundwater contribution to surface waters.

In the state of Washington, the "Lower Yakima River Valley" is listed as impaired by nitrates.[13] The implementation plan for this impaired waterway region has a significant groundwater quality component due to nitrate contamination of the underlying groundwater basin, which many rely on for drinking water.[14]

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[9] California Regional Water Quality Control Board, Lahontan Region, Final Lake Tahoe Total Maximum Daily Load Report, Draft: June 2010 http://ndep.nv.gov/bwqp/file/LTTMDL_Final_v15.pdf *See* Section 7.2 Groundwater.
[10] Oregon Department of Environmental Quality, Southern Willamette Valley Groundwater Management Action Plan (August 2006), available at http://www.deq.state.or.us/WQ/groundwater/docs/swvgwma/draftactionplan.pdf (emphasis added).
[11] *See* Oregon Water Quality TMDL Program Implementation Guidelines and Tools: http://www.deq.state.or.us/WQ/TMDLs/implementation.htm.
[12] Florida Department of Environmental Protection, Simplified Method for Estimating Ground Water Discharge to Surface Water for the purpose of Total Maximum Daily Loads (TMDL) Allocation, available at http://www.dep.state.fl.us/geology/programs/hydrogeology/tmdl_radon.htm
[13] State of Washington Department of Ecology, Lower Yakima Valley Groundwater Quality, http://www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/LowerYak-gw.html.
[14] *See* State of Washington Department of Ecology Groundwater Quality Information at http://www.ecy.wa.gov/programs/wq/grndwtr/index.html.