

**STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

STAFF REPORT FOR REGULAR MEETING OF JULY 30-31, 2015

Prepared July 2, 2015

ITEM NUMBER: 13

SUBJECT: **Amending the Water Quality Control Plan for the Central Coastal Basin to Adopt Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in Streams of the Pajaro River Basin**

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THIS ACTION: **Adopt Resolution No. R3-2015-0004**

SUMMARY

For this agenda item, staff recommends the Central Coast Regional Water Quality Control Board (Central Coast Water Board) approve the resolution (attachment 1 to this staff report) that establishes Total Maximum Daily Loads (TMDLs) for nitrogen compounds (nitrate, un-ionized ammonia, and total nitrogen) and orthophosphate for streams¹ within the Pajaro River basin. Approval of this agenda item would result in amending the Water Quality Control Plan for the Central Coastal Basin (Basin Plan) to incorporate these TMDLs. Please refer to [Figure 1](#) on page 19 of this staff report for a map of the Pajaro River basin. Also, a condensed [tabular summary](#) of the proposed TMDLs and associated implementation strategy is presented on page 20 and page 21. A [reference table](#) for recurring acronyms and recurring terms used in this staff report is presented on page 22.

Simply put, [TMDLs](#) are strategies or plans to restore clean water. Section 303(d) of the federal Clean Water Act requires every state to evaluate its waterbodies, and maintain a list of waters that are considered “impaired,” either because the water exceeds water quality standards or does not achieve its designated use. For each water body on the Central Coast’s [“303\(d\) List of Impaired Waterbodies,”](#) the Central Coast Water Board must develop and implement a plan to reduce pollutants so that the waterbody is no longer impaired and can be de-listed.

These TMDLs would constitute an update and revision of the [2005 Pajaro River nitrate TMDL](#) (adopted in December 2005 by Resolution No. R3-2005-0131). The 2005 Pajaro River nitrate TMDL addressed only nitrate stream impairments for the drinking water supply beneficial use (MUN) in the Pajaro River and Llagas Creek. Since 2005, additional nutrient-related impairments to streams in the Pajaro River basin have been identified. The current TMDLs will update and supersede the 2005 nitrate TMDL by addressing nutrient-related impairments to all relevant designated beneficial uses of streams in the river basin, including nutrient-related impairments to aquatic habitat.

TMDLs are not water quality standards, but are mechanisms to implement existing water quality standards. TMDLs are generally not self-implementing, and thus TMDL implementation is achieved

¹ In the context of this TMDL project “streams” refer to any body of running water (such as a river, creek, brook, slough, canal, ditch, ephemeral drainage) which flows on the earth’s surface within the area shown on Figure 1.

through compliance with existing or planned regulatory measures. As such, TMDLs are not directly enforceable against dischargers and do not create new enforcement authorities apart from the existing water quality standards they implement. Regulatory tools implementing a TMDL are vehicles for enforcement – the TMDL is not. The Central Coast Water Board implements TMDLs through existing or new permits, orders, and prohibitions.

The Pajaro River basin encompasses approximately 1,300 square miles, and includes parts of Santa Clara, Santa Cruz, San Benito, and Monterey counties. The river basin includes the Pajaro River and its tributaries, including the San Benito River, Pacheco Creek, Llagas Creek, Uvas Creek, Corralitos Creek, and Watsonville Slough. Agriculture (including irrigated cropland and grazing lands) is the current dominant land use in the river basin, with increasing transition to urban use. The City of Gilroy, Morgan Hill, Watsonville, Hollister, and other urbanized areas comprise 4% of the river basin's land area. Undeveloped lands, including grassland, shrubland, and woodlands, comprise substantial parts of the upland reaches of the river basin within an ecosystem characterized locally by oak woodland, annual grasslands, montane hardwood, and coastal scrub.

Nutrient pollution of surface waters has long been recognized as a problem in some parts of the Pajaro River basin². 15 streams within the Pajaro River basin are listed on the 2008-2010 Section 303(d) list of impaired waterbodies for water quality impairments due to nitrate and nutrient-related water quality problems such as low dissolved oxygen, and chlorophyll-a (an algal biomass indicator) impairments.

Central Coast Water Board staff also evaluated the potential for violations of the Basin Plan's biostimulatory substances water quality objective. Biostimulation³ refers to a state of excess growth of algae due to anthropogenic nutrient inputs into an aquatic system. It is well established and well documented⁴ that nutrients (specifically nitrogen and phosphorus), in combination with other physical and environmental factors, can potentially contribute to excessive growth of algae and aquatic plants in rivers, streams, and coastal waterbodies. This excess algal biomass may then result in biostimulatory impairments of waterbodies by adversely affecting dissolved oxygen, pH, and aquatic habitat. Staff's assessment indicates that seasonal biostimulatory impairments occur locally in parts of the Pajaro River basin, and are generally associated with the dry season (May through October).

Based on the aforementioned information, a range of beneficial uses are not supported in numerous streams of the river basin, and the impairments therefore constitute serious water quality problems. A comprehensive tabulation of the identified Pajaro River basin waterbodies and associated impairments is available in the TMDL Report (see attachment 2 of this staff report). Currently, designated drinking water supply (MUN), aquatic habitat (WARM, COLD, SPWN), and groundwater recharge⁵ (GWR) beneficial uses are not being supported in multiple waterbodies of the Pajaro River basin. Some surface waters also are not meeting non-regulatory recommended

² See for example, Central Coast Regional Water Quality Control Board. 1983. *Consideration of Basin Plan Nutrient Objectives for Pajaro River and Llagas Creek*. Staff Report dated December 15, 1983,

³ The term "biostimulation" may be considered to be synonymous or interchangeable with the term "eutrophication". California central coast researchers have noted that the word "eutrophication" is problematic because it lacks scientific specificity. Thus, these researchers recommend that the regional water quality control boards not use the word (see Rollins, Los Huertos, Krone-Davis, and Ritz, 2012, *Algae Biomonitoring and Assessment for Streams and Rivers of California's Central Coast*).

⁴ See for example, US Environmental Protection Agency, 2000, Nutrient Criteria Technical Guidance Manual, Section 1.2 *Nutrient Enrichment Problems in Rivers and Streams*. EPA-822-B-00-002.

⁵ The Basin Plan GWR beneficial use explicitly states that the designated groundwater recharge use of surface waters is to be protected to maintain groundwater quality. As such, where necessary, the GWR beneficial uses of the surface waters need to be protected to support and maintain the MUN or AGR beneficial uses of the underlying groundwater resource. Protection of the GWR beneficial use of surface waters has been recognized previously in approved California TMDLs.

guidelines for nitrate in agricultural supply water (AGR) for sensitive crop types, indicating that designated agricultural supply beneficial uses may be adversely impacted.⁶ Note that the designated groundwater recharge (GWR) beneficial uses of Pajaro River basin streams provide a nexus between water quality in both the surface water and groundwater because locally, stream reaches and the underlying groundwater resource are both designated for MUN and AGR beneficial uses.

Development and implementation of this TMDL is intended to reduce or eliminate nitrate pollution that may impact human health (drinking water) and address degradation of aquatic habitat. This is consistent with the Central Coast Water Board's highest identified priorities:

Central Coast Water Board's Top Two Priorities⁷

- 1) "Preventing and Correcting Threats to Human Health"
 - ✓ *Nitrate contamination in groundwater is by far the most widespread threat to human health in the central coast region*
- 2) "Preventing and Correcting Degradation of Aquatic Habitat"
 - ✓ *"Including requirements for aquatic habitat protection in Total Maximum Daily Load Orders"*

Also noteworthy is that the U.S. Environmental Protection Agency (USEPA) recently reported that nitrogen and phosphorus pollution, and the associated degradation of drinking and environmental water quality, has the potential to become one of the costliest and most challenging environmental problems the nation faces.⁸ More than half of the nation's streams, including some streams in the Pajaro River basin, have medium to high levels of nitrogen and phosphorus. According to USEPA, nitrate drinking water standard violations have doubled nationwide in eight years. Algal blooms, resulting from the biostimulatory effects of nutrients, are steadily on the rise nationwide; related toxins have potentially serious health and ecological effects. According to recent findings, algal toxins originating from freshwater sources within the Pajaro River basin have been implicated in the deaths of California southern sea otters.⁹

Central Coast Water Board staff has identified sources that are causing or contributing to water quality impairment, has identified parties responsible for these sources, has identified scientifically defensible numeric water quality targets, and has proposed interim and final waste load and load allocations necessary to achieve the TMDLs. The proposed waste load and load allocations for nitrate, unionized ammonia, and orthophosphate will ultimately result in attainment of water quality standards in the Pajaro River basin.

Further information outlining the technical and administrative basis for these TMDLs is provided in the TMDL Report (attachment 2 to this staff report).

⁶ High concentrations of nitrate in irrigation water can potentially create problems for sensitive crops (e.g., grapes, avocado, and citrus) by detrimentally impacting crop yield or quality. Nitrogen in the irrigation water acts the same as fertilizer nitrogen and excesses may cause problems just as fertilizer excesses cause problems. The Basin Plan contains University of California Agricultural Extension Service guideline values for nitrate in irrigation water; these guidelines are flexible, and may not necessarily be appropriate due to local conditions or special conditions of crop, soil, and method of irrigation.

⁷ See Staff Report for [Agenda Item 3](#) for the July 11, 2012 Central Coast Water Board meeting.

⁸ U.S. Environmental Protection Agency: Memorandum from Acting Assistant Administrator Nancy K. Stoner. March 16, 2011. Subject: "Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions".

⁹ Miller, M.A., et al. 2010. Evidence for a Novel Marine Harmful Algal Bloom: Cyanotoxin (Microcystin) Transfer from Land to Sea Otters. PLoS ONE 5(9): e12576. doi:10.1371/journal.pone.0012576.

DISCUSSION

Data Sources

Central Coast Water Board staff used water quality data, land use data, hydrologic data, climatic data, geologic data, soils data, ecological data, groundwater data, and other types of environmental data obtained from numerous public agency and scientific sources as described more fully in the TMDL Report (attachment 2 to this staff report).

Numeric Targets

Numeric targets are water quality thresholds. Numeric targets are identified and used to ascertain when and where water quality objectives are achieved, and hence, when designated beneficial uses of surface waters are protected.

Target for Nitrate (human health standard)

For impaired stream reaches that are required to support designated drinking water (MUN) and designated groundwater recharge (GWR) beneficial uses, the appropriate numeric target is a nitrate (as nitrogen) concentration of 10 mg/L. This numeric target is equal to the Basin Plan's numeric nitrate water quality objective that is protective of drinking water beneficial uses.

Target for Un-ionized Ammonia (toxicity)

For unionized ammonia (a nitrogen compound), Central Coast Water Board staff is proposing a numeric target of 0.025 mg/L (as nitrogen) for this TMDL, which is equal to the Basin Plan's unionized ammonia numeric water quality objective that is protective against toxicity in surface waters.

Targets for Biostimulatory Substances (nitrate and orthophosphate)

The Basin Plan contains the following narrative water quality objectives for biostimulatory substances:

“Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.”

Because of natural variability which influences biostimulatory problems, uniform national or state-wide numeric water quality criteria for nitrogen and phosphorus are not appropriate. Therefore, to implement the Basin Plan's narrative objective for biostimulatory substances, the Central Coast Water Board must develop technically defensible numeric water quality criteria to assess attainment or non-attainment of the narrative water quality objective. To develop this narrative objective, Central Coast Water Board staff evaluated available data, studies, established methodologies, technical guidance, peer-reviewed numeric criteria, and other information to estimate the levels of nitrogen and phosphorus that can be present without causing violations of the Basin Plan biostimulatory substances objective.

Definitive and unequivocal scientific certainty is not necessary in a TMDL process with regard to development of nutrient water quality targets protective against biostimulation. Numeric targets should be scientifically defensible, but are not required to be definitive. Biostimulation is an ongoing and active area of research. If the water quality objectives and numeric targets for biostimulatory substances are changed in the future, then any TMDLs and allocations that are adopted for biostimulatory substances pursuant to this project may sunset and be superseded by revised water quality objectives.

For biostimulatory substances (nitrate and orthophosphate), Central Coast Water Board staff is proposing numeric targets which were developed using a combination of recognized methodologies: USEPA-recommended statistical approaches and supplemented by the California

Nutrient Numeric Endpoint (CA NNE) approach¹⁰. According to the USEPA, using a combination of recognized nutrient target development approaches results in numeric criteria of greater scientific validity.¹¹ A summary of technical guidance used by Central Coast Water Board staff in nutrient target development is presented below:

SUMMARY OF PUBLISHED TECHNICAL GUIDANCE USED BY STAFF IN NUTRIENT TARGET DEVELOPMENT:

-Using a combination of recognized approaches (i.e., literature values, statistical approaches, predictive modeling approaches) results in criteria of greater scientific validity (source: USEPA, 2000. *Nutrient Criteria Guidance Manual*);

-Classify and group streams needing nutrient targets, based on similar characteristics (source: USEPA, 2000. *Nutrient Criteria Guidance Manual*); and

-Targets should not be lower than expected concentrations found in background/natural conditions (source: *CA NNE guidance – Tetra Tech, 2006*).

On the basis of technical guidance and established methodologies, Central Coast Water Board staff is proposing seasonal biostimulatory water quality targets for nitrate and total nitrogen which range by waterbody type-category¹² from 1.1 mg/L to 3.9 mg/L in the dry season and 8.0 mg/L in the wet season.

On the basis of technical guidance and established methodologies, Central Coast Water Board staff is proposing seasonal biostimulatory water quality targets for orthophosphate which range by waterbody type-category from 0.04 mg/L to 0.14 mg/L in the dry season and 0.3 mg/L in the wet season.

Targets for Nutrient-Response Indicators (dissolved oxygen, chlorophyll a, and microcystins)

Central Coast Water Board staff is also proposing dissolved oxygen, chlorophyll a, and microcystins numeric targets to ensure that streams do not show evidence of biostimulatory conditions, and to have primary indicator metrics to assess biological response to future nutrient water column concentration reductions. The nexus between nutrients and biological indicators such as dissolved oxygen, chlorophyll a, and microcystins are discussed in the TMDL Report.

- i. Dissolved oxygen targets: For water bodies designated as cold fresh water habitat (COLD) and spawning (SPWN) beneficial uses, the dissolved oxygen numeric targets are the same as Basin Plan numeric water quality objective, which states that dissolved oxygen concentrations shall not be reduced below 7.0 mg/L at any time. For waterbodies designated as warm fresh water habitat (WARM) beneficial use, and for waters not mentioned by a specific beneficial use, the dissolved oxygen numeric targets is the same as the Basin Plan numeric water quality objective, which states that dissolved oxygen concentrations shall not be reduced below 5.0 mg/L at any time. The Basin Plan contains an additional dissolved oxygen water quality objective that Central Coast Water Board staff proposes as a numeric target, whereby median dissolved oxygen shall not fall below 85% saturation. To address excessive dissolved oxygen gas saturation in the water column, Central Coast Water Board staff proposes a numeric target whereby dissolved oxygen concentrations are not to exceed

¹⁰ The California nutrient numeric endpoints (CA NNE) approach was developed as a methodology for the development of nutrient numeric targets for use in the water quality programs of the California's Water Boards. The CA NNE approach is a risk-based approach in which algae and nutrient targets can be evaluated based on multiple lines of evidence; the intention of the CA NNE approach is to use nutrient response indicators to develop potential nutrient water quality criteria.

¹¹ See U.S. Environmental Protection Agency (2000). *Nutrient Criteria Technical Guidance Manual – Rivers and Streams*. EPA-822-B-00-002.

¹² Waterbody categories in this TMDL project include: Alluvial basin floor and floodplain tributary creek reaches, alluvial fan & alluvial plain tributary creek reaches, coastal sloughs, alluvial flood plain river reaches, and agricultural ditches.

13 mg/L. This target is based on peer-reviewed research in California's central coast region¹³ and addresses the USEPA "Gold Book" water quality standard for excessive gas saturation.

- ii. Chlorophyll a target: Chlorophyll a is an algal biomass indicator. The Basin Plan does not contain numeric water quality objectives for chlorophyll a. A recent peer-reviewed study¹⁴ conducted by the Central Coast Ambient Monitoring Program (CCAMP) reports that in the California central coast region, inland streams that do not show evidence of biostimulation all remained below the chlorophyll a threshold of 15 µg/L. As this value is consistent with several values reported in published literature and from other regulatory programs, and as the CCAMP study is central coast-specific, Central Coast Water Board staff proposes the numeric water quality target for chlorophyll a is 15 µg/L for all water bodies (i.e., water column chlorophyll a concentrations not to exceed 15 µg/L).
- iii. Microcystin target: Microcystins are toxins produced by cyanobacteria (blue-green algae) and are associated with algal blooms and biostimulation in surface waterbodies.¹⁵ The Basin Plan does not contain numeric water quality objectives for microcystins. However, the California Office of Environmental Health Hazard Assessment (OEHHA) has published final microcystin public health action levels¹⁶ for human recreational uses of surface waters. This public health action level is 0.8 µg/L for human recreational uses of water. Therefore, Central Coast Water Board staff proposes a numeric water quality target for microcystins¹⁷ of 0.8 µg/L (i.e., microcystin not to exceed 0.8 µg/L). These targets are therefore protective of the REC-1 designated beneficial uses of surface waters. Outside of Pinto Lake, the Pajaro River basin has very limited microcystin data available for streams. The numeric targets identified for microcystins in this TMDL will be used as an indicator metric to assess primary biological response to future nutrient water column concentration reductions and to ensure compliance with the Basin Plan's biostimulatory substances objective and designated REC-1 beneficial uses.

Status of Designated Beneficial Uses

"Beneficial uses" refer to the legally-designated uses of waters of the state that may be protected against water quality degradation. Table 1 below presents a tabular summary of the proposed numeric targets and the associated identified stream impairments within the Pajaro River basin.

For geographic context, these stream reach impairments are also illustrated on maps in Figure 2 through Figure 7 on pages 23 through 28 of this staff report.

¹³ Worcester, K., D. M. Paradies, and M. Adams. 2010. *Interpreting Narrative Objectives for Biostimulatory Substances for California Central Coast Waters*. Surface Water Ambient Monitoring Program (SWAMP) Technical Report, July 2010.

¹⁴ *Ibid*

¹⁵ See: U.S. Environmental Protection Agency. Drinking Water Treatability Database.

¹⁶ California Office of Environmental Health Hazard Assessment. 2012. *Toxicological Summary and Suggested Action Levels to Reduce Potential Adverse Health Effects of Six Cyanotoxins* (Final, May 2012).

¹⁷ Includes microcystins LA, LR, RR, and YR

Table 1. Status summary of Pajaro River basin designated beneficial uses of streams that could potentially be impacted by nutrient pollution.

Designated Beneficial Use	Water Quality Objective, or Recommended Level	Beneficial Use Impaired? ^A	Stream Reaches Impacted
MUN (drinking water supply)	10 mg/L (nitrate as N)	Yes	Beach Road Ditch, Carnadero Creek, Casserly Creek, Corralitos Creek, Unnamed tributary to Corralitos Creek, Coward Creek, Furlong Creek, Tributary to Green Valley Creek, Harkins Slough, Llagas Creek, McGowan Ditch, Pajaro River, Pinto Lake outflow Ditch, San Juan Creek, West Branch San Juan Creek, Watsonville Slough (see Figure 2 on page 23)
AGR (irrigation water supply)	30 mg/L (nitrate as N) (for sensitive crops)	Yes ^B	Llagas Creek, from upstream of Luchessa Ave at Southside Dr. to Llagas Creek at Highway 152. (see Figure 4 on page 25)
AGR (livestock watering)	100 mg/L (nitrate as N)	No	All assessed stream reaches in the Pajaro River basin are supporting the nitrate as N livestock water quality objective on the basis of available data.
GWR (groundwater recharge)	10 mg/L (nitrate as N) in conjunction with situation specific lines of evidence ^C	Yes	Pajaro River from upstream of City of Watsonville to downstream of Chittenden Gap at Chittenden Road. Lower Llagas Creek from upstream of Southside Drive to downstream of Leavesley Road. (see Figure 5 on page 26)
Aquatic Habitat beneficial uses (WARM, COLD, SPWN)	Biostimulatory substances Basin Plan objective: Nitrate as N and Total Nitrogen as N: 1.1 mg/L to 8.0 mg/L Orthophosphate as P: 0.04 mg/L to 0.3 mg/L	Yes ^D	Beach Road Ditch, Carnadero Creek, Corralitos Creek, Furlong Creek, Llagas Creek, McGowan Ditch, Pajaro River, San Juan Creek, Tequisquita Slough, Watsonville Slough (see Figure 6 on page 27)
Aquatic Habitat beneficial uses (WARM, COLD, SPWN)	Un-ionized ammonia toxicity Basin Plan objective 0.025 mg/L	Yes	Pajaro River estuary and the lower Pajaro River from the estuary to downstream of Thurwatcher Rd. Lower Llagas Creek from upstream of Holsclaw Rd. to downstream of Buena Vista Rd. (see Figure 3 on page 24)
REC-1 (water contact recreation)	0.8 µg/L microcystins ^E	No ^F	Insufficient microcystin data currently available to assess streams of the Pajaro River basin, and therefore no impairments are identified at this time.

^A Based on exceedance frequencies published in the California Section 303(d) Listing Policy (SWRCB, 2004).

^B The University of California Agricultural Extension Service guideline values are flexible, and may not necessarily be appropriate due to local or special conditions of crop, soil, and method of irrigation. Staff conservatively selected the uppermost threshold value (30 mg/L) which therefore conservatively identifies stream reaches where the designated AGR use may be detrimentally impacted.

^C Refer to Section 5.10 of the TMDL report and to California Section 303(d) Listing Policy Section 3.11 (SWRCB, 2004)

^D Biostimulatory impairments include both stream reaches that are expressing a range of biostimulation-eutrophication indicators, and stream reaches that are contributing to downstream biostimulation impairment. Note that States must address downstream pollution impacts to receiving waters in accordance with federal regulations – 40 C.F.R. 131.10(b)

^E OEHHA public health action level for algal toxins – May 2012. Includes microcystins LA, LR, RR, and YR.

^F Only limited amounts of microcystin data in streams are currently available for streams of the Pajaro River basin

Source Analysis

Central Coast Water Board staff conducted source analyses to identify the contributing sources of nitrogen compounds and orthophosphate to streams of the Pajaro River basin. Discharges of nitrogen compounds and orthophosphate originating from irrigated agriculture, urban lands, stormwater sources, wastewater treatment facilities, grazing lands, golf courses, natural sources,

and atmospheric deposition are contributing nutrient loads to streams. These source categories are assigned allocations for nitrate, unionized ammonia, and orthophosphate to achieve the TMDLs. Central Coast Water Board staff estimates that irrigated agriculture contributes the majority of controllable nutrient loads to streams in the Pajaro River basin and this source category is not currently meeting its proposed load allocation. To establish additional independent lines of supporting evidence, Central Coast Water Board staff compared this source analysis to conclusions reached by other scientists in previous nutrient-water quality studies in the Pajaro River basin. Note that other researchers have similarly concluded that agriculture is the dominant source of nutrient loading to surface waters and groundwaters of the Pajaro River Basin,^{18,19} thus providing a qualitative weight-of-evidence approach to this TMDL project and adding a measure of confidence to the nutrient source analysis Central Coast Water Board staff developed.

TMDLs and Allocations

Practically speaking, a TMDL is basically a pollutant budget²⁰ (aka, the “loading capacity”²¹ in Clean Water Act terminology) for a surface waterbody. The TMDL distributes, or “allocates” the waterbody’s loading capacity among the various sources of that pollutant. Pollutant sources that can be characterized as point sources receive waste load allocations,²² nonpoint sources of pollution receive load allocations²³. TMDLs also include a margin safety to account for uncertainty.

In these proposed TMDLs, owners and operators of irrigated lands, NPDES–permitted municipal stormwater entities, NPDES–permitted industrial and construction stormwater entities, NPDES–permitted wastewater treatment facilities, golf courses, natural sources, and owners/operators of livestock and domestic animals are assigned unionized ammonia, nitrate, and orthophosphate allocations equal to the water quality numeric targets outlined previously in this staff report.

The proposed TMDLs are concentration–based. This means the TMDLs are equal to the receiving water numeric water quality targets described in the numeric target section above. Concentration–based TMDLs are an appropriate expression of TMDLs and meet USEPA requirements for TMDL approval.²⁴ Concentration-based allocations are also the most appropriate linkage to the loading capacities of streams in the river basin because drinking water and aquatic habitat beneficial uses are supported on the basis of concentration-based thresholds. Therefore, each waste load allocation and load allocation for these TMDLs are equal to the concentration-based nitrate, orthophosphate, and unionized ammonia water quality objective and numeric receiving water

¹⁸ Los Huertos, M., L. Gentry, and C. Shennan. 2003. Land Use and Water Quality on California’s Central Coast: Nutrient Levels in Coastal Waterways. University of California, Santa Cruz Center for Agroecology & Sustainable Food Systems, Research Brief #2.

¹⁹ Williamson et al. San Jose State University Department of Civil Engineering and Applied Mechanics and Merritt Smith Consulting. 1994. The Establishment of Nutrient Objectives, Sources, Impacts, and Best Management Practices for the Pajaro River and Llagas Creek. Final Report. Prepared for California State Water Resources Control Board and the Regional Water Quality Control Board, Central Coast Region. Contract Number 0-212-253-0.

²⁰ See: Water Research Foundation in collaboration with USEPA, 2010. *Drinking Water Source Protection Through Effective Use of TMDL Process*.

²¹ The loading capacity is the greatest amount of a pollutant that a water body can assimilate and still meet water quality standards.

²² The portion of a receiving water’s loading capacity that is allocated to NPDES-permitted point sources of pollution.

²³ The portion of the receiving water’s loading capacity attributed to (1) nonpoint sources of pollution and (2) natural background sources.

²⁴ According to USEPA guidance, states should report TMDLs on a *daily* time step basis (e.g., allowable pounds of pollutant *per day*). Concentration-based TMDLs may be appropriate where there is only limited amounts of daily flow data, which thus limits the ability to calculate a reliable daily time-step allowable pollutant load in stream reaches. There could also be a high degree of error associated with trying to estimate daily flows from limited amounts of instantaneous flow measurements. According to USEPA, the potential for error in flow estimates is particularly pronounced in arid areas, in areas with few USGS stream gages, and in areas where flows are highly modified by human activities (e.g., impoundments, regulated flows, and irrigation return flows). Therefore, according to USEPA, TMDLs based on instantaneous concentration-based loads can satisfy the federal guidance to incorporate a daily time-step pollutant load.

targets. However, consistent with USEPA guidance, Central Coast Water Board staff also developed alternative mass load pollutant loading expressions. Mass-based, non-daily load expressions may provide a meaningful connection with on-the-ground implementation efforts where expressions other than receiving water concentrations may provide a basis for water quality-based management strategies.

The TMDLs establish final load allocations that are to be attained by 25 years after the TMDL is approved by the Office of Administrative Law (OAL). To assess progress towards achieving the final allocations, Central Coast Water Board staff is proposing that some allocations be attained sooner than others. Nitrate allocations protective of the MUN beneficial use and unionized ammonia allocations preventing toxicity shall be attained in 10 years, wet-season nitrate and orthophosphate allocations protective of biostimulatory substances shall be attained in 15 years, and the more stringent dry-season nitrate and orthophosphate allocations protective of biostimulatory substances shall be attained in 25 years.

Implementation Strategy

➤ Irrigated Agriculture

Central Coast Water Board staff estimates that nutrient loads from irrigated lands are the largest source category of nutrient loading to waterbodies in the Pajaro River basin. Therefore, management measures will need to be implemented to achieve the proposed load allocations for irrigated lands. At this time, Central Coast Water Board staff proposes that implementation and compliance with the conditions and requirements of the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Agricultural Order) and any renewals or revisions thereof, would be deemed sufficient evidence that the TMDLs and load allocations for irrigated lands are being implemented. Owners and operators are required to comply with the requirements of the Agricultural Order and subsequent revisions of the Agricultural Order. Central Coast Water Board staff will prioritize implementation efforts in the Pajaro River basin aimed at addressing discharges of nutrients as described in the TMDL Report (attachment 2 to this staff report).

The goals of implementing these load allocations can be summarized as follows:

- 1) Control discharges of nitrate to impaired waterbodies and groundwater;²⁵ and
- 2) Implement management practices capable of achieving load allocations identified in this TMDL and demonstrate progress towards this goal during the TMDL implementation phase.

➤ NPDES–Permitted Municipal Stormwater System Discharges (MS4 entities)

Waste load allocations for this source category will be implemented by municipal separate storm sewer systems (MS4s) NPDES stormwater permits. MS4s are considered relatively minor loads of nitrogen compounds and orthophosphate in the Pajaro River basin as a whole, based on Central Coast Water Board staff's source analysis and available municipal storm drain runoff water quality data. However, because these sources can potentially have significant localized effects on water quality, the MS4s will be assigned waste load allocations. The Central Coast Water Board will address nitrogen compounds and orthophosphate discharged from the MS4 systems within the Pajaro River basin under the provisions of the State Water Resource Control Board's General Permit for the Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems General Permit (Order No. 2013-0001-DWQ, NPDES No. CAS000004), or any subsequent General Permits. MS4 entities in the Pajaro River basin include the cities of Watsonville, Gilroy, Morgan Hill, and Hollister, and the county MS4 jurisdictions of Santa Cruz, Santa Clara, San Benito, and Monterey counties.

²⁵ Shallow, recently-recharged groundwater is identified in this TMDL as a significant source contributor of nitrate loads locally to stream waters of the Pajaro River basin.

To address the MS4 waste load allocations, the Central Coast Water Board will require MS4 enrollees that discharge to surface waterbodies impaired by excess nutrients or by biostimulation to address these impairments by developing and implementing a Waste Load Allocation Attainment Program (WAAP). The WAAP will contain steps the MS4 will take to assess its contribution, develop a list of likely sources, prioritize them, develop and implement best management practices targeting those sources, and assess the effectiveness of the practices. MS4 entities that discharge to surface waterbodies that are currently not impaired by nutrients and biostimulation are presumed to be meeting their waste load allocations at this time, and thus would not be required to develop a WAAP for nutrients. However, because anti-degradation is an element of all water quality standards these entities should continue to implement their stormwater programs, and comply with the General Permit or any subsequent permits with the goal of maintaining existing nutrient water quality and helping to prevent any further water quality degradation.²⁶

➤ NPDES–Permitted Industrial and Construction Stormwater Discharges

Based on evidence and information provided in the TMDL report (attachment 2 to this staff report), NPDES stormwater-permitted industrial facilities and construction sites in the Pajaro River basin would not be expected to be a significant risk or cause of the observed nutrient water quality impairments, and these types of facilities are generally expected to be currently meeting proposed waste load allocations. Therefore, at this time, additional regulatory measures for this source category are not warranted.

To maintain existing water quality and prevent any further water quality degradation, these permitted industrial facilities and construction operators shall continue to implement and comply with the requirements of the statewide Industrial General Permit (Order No. 2014-0057-DWQ, NPDES No. CAS000001 or subsequent IGP) or the Construction General Permit (Order No. 2012-0006-DWQ, NPDES No. CAS000002, or subsequent CGP), respectively.

The information outlined in the TMDL report does not conclusively demonstrate that stormwater from all industrial facilities and construction sites are meeting proposed waste load allocations. More information will be obtained during the implementation phase of these TMDLs to further assess the level of nutrient contributions to surface waters from these source categories, and to identify any further regulatory actions, if warranted, to reduce nutrient loading.

➤ NPDES–Permitted Wastewater Discharges

Based on available data, discharges of treated wastewater from municipal wastewater treatment facilities are expected to be a relatively minor source of nutrient pollution to surface waters of the Pajaro River basin. However, according to the U.S. Environmental Protection Agency and the State Water Resources Control Board, all NPDES-permitted point sources identified in a TMDL must be given a waste load allocation, even if their current load to receiving waters is zero.

Watsonville Wastewater Treatment Facility (Order No. R3-2014-0006 NPDES No. CA0048216) uses an ocean discharge point in Monterey Bay and these coastal marine waters are outside the scope of these TMDLs, therefore further regulatory measures in the context of these TMDLs for this facility is not warranted. This facility will be given a generic waste load allocation, to reserve discharge capacity if there is a need for future discharge points for this facility in surface waters of the Pajaro Valley. As noted above, all NPDES-permitted point sources identified in a TMDL must be given a waste load allocation, even if their current load to receiving waters is zero, otherwise their allocation is assumed to be zero and no discharges of the identified pollutant(s) are allowed now or in the future.

²⁶ Consistent with USEPA guidance and Central Coast Water Board priorities, the goals of these TMDLs are to rectify nutrient-impaired streams *and* to prevent any further degradation in streams currently achieving or “better than” applicable nutrient water quality standards. See the TMDL report (attachment 2 to the staff report) for further explanation and detail.

The South County Wastewater Treatment Facility (Order No. R3-2010-0009, NPDES No. CA0049964) is permitted to discharge treated wastewater to the Pajaro River, but only under certain flow conditions. Based on available information, the existing effluent limitations and conditions in Order No. R3-2010-0009 would be expected to be capable of implementing and attaining the proposed waste load allocations identified in these TMDLs. Section 9.6 of the TMDL Report (attachment 2 to the staff report) provides more detail on the nexus between waste load allocations identified in a TMDL, and implementing them through effluent limits in an NPDES permit. The available information does not conclusively demonstrate that the permitted treated wastewater discharge to the Pajaro River poses no threats to aquatic habitat, and thus during the TMDL implementation phase the Central Coast Water Board may use its Water Code section 13267 authorities to require the South County Regional Wastewater Authority to estimate their current or future nutrient loading contribution to the Pajaro River. The Central Coast Water Board subsequently may assess what, if any, modifications to the nutrient effluent limitations are needed to those currently specified in Order No. R3-2010-0009.

The City of San Juan Bautista Wastewater Treatment Facility (Order No. R3-2009-0019 NPDES No. CA0047902), is permitted to discharge treated wastewater to an unnamed drainage ditch that is tributary to the San Juan Creek. At this time, the hydraulic connectivity of this ditch with other creeks and drainages of the San Juan Valley is uncertain; however, elevated nutrient concentrations in the treated wastewater discharged to the ditch appear to be generally exceeding water quality numeric targets identified in these TMDLs. Central Coast Water Board may use its Water Code section 13267 authorities to have the City of San Juan Bautista estimate their nutrient loading contribution and nutrient-related water quality impacts to downstream receiving waters. On the basis of this, and other information collected during TMDL implementation, the Central Coast Water Board will incorporate effluent and receiving water limitations for the surface water discharge at the San Juan Bautista Wastewater Treatment Facility.

➤ Domestic Animal and Livestock Waste Discharges

Based on available information, it is generally expected that owners and operators of livestock and domestic animals on grazing lands or in rural residential areas are currently achieving proposed nutrient load allocations. As such, new regulatory measures and formal regulatory oversight are not warranted for this source category.

To maintain existing water quality and prevent any further water quality degradation, owners and operators of unconfined livestock on rangelands or confined livestock and domestic animals in rural residential areas which do not drain to a municipal separate stormwater sewer system should begin or continue to self-assess, self-monitor and make animal management and manure management decisions which comport with accepted rangeland management practices or manure management practices recommended or published by reputable resource professionals or local agencies.

The Pajaro River basin is in fact currently subject to a Domestic Animal Waste Discharge Prohibition and livestock owners are subject to compliance with an approved indicator bacteria TMDL load allocation.²⁷ Implementation efforts by responsible parties to comply with this prohibition and with indicator bacteria load allocations will, as a practical matter, also reduce the risk of nitrogen and phosphorus loading to surface waters from domestic animal waste.

Information developed in this TMDL Report does not conclusively demonstrate that discharges from all livestock facilities are meeting proposed load allocations. More information will be obtained during the implementation phase of these TMDLs to further assess the level of nutrient contributions to surface waters from these source categories, and to identify any actions needed to reduce nutrient loading.

²⁷ Central Coast Water Board Resolution No. R3-2009-0008 (March 2009).

➤ Public and Private Golf Courses

Use of fertilizer on golf courses could conceivably be a source of nutrients to surface waters in any given watershed. Available data from golf course creeks in the Pajaro River basin, as well as information on regional and national golf course water quality data suggest that golf courses would be expected to meet proposed load allocations that are protective of designated beneficial uses in streams of the Pajaro river basin, and thus formal regulatory actions or regulatory oversight of golf courses to implement these TMDLs is unwarranted at this time. Because anti-degradation is an element of all water quality standards, owners and operators of public and private golf courses should continue to implement turf management practices which help to protect and maintain existing water quality and to prevent any further surface water quality degradation.

Available information does not conclusively demonstrate that all golf courses in the Pajaro River basin are currently meeting proposed nutrient load allocations for discharges to surface waters. The Central Coast Water Board will obtain more information, where and if merited, during the implementation phase of the TMDLs to further assess the levels of nutrient contribution from this source category, and to identify any actions if necessary to reduce nutrient loading to surface waters.

Time Schedule for Tracking Progress and Achieving the TMDLs

Discharges of nitrogen compounds and orthophosphate are occurring at levels which are impairing a wide number of beneficial uses and, therefore, constitute a serious water quality problem. As such, implementation should occur at a pace to achieve the allocations and TMDL in the shortest timeframe feasible.

Because of the nature, scale, and magnitude of the water quality problem, Central Coast Water Board staff is proposing interim temporal bench marks to establish progress towards achievement of the final waste load allocations and load allocations presented in the TMDL Report (attachment 2 to this staff report). These benchmarks can be summarized as follows:

- First Interim Waste Load and Load Allocations: Achieve the nitrate MUN nitrate standard (10 mg/L nitrate-N in receiving waters that are designated MUN) and the unionized ammonia water quality objective-based allocations within 10 years of the effective date of the TMDL (which is upon approval by the Office of Administrative Law).
- Second Interim Waste Load and Load Allocations: Achieve the wet-season (November 1 to April 30) nutrient biostimulatory target-based allocations within 15 years of the effective date of the TMDL.
- Final Interim Waste Load and Load Allocations: Achieve the more stringent dry-season (May 1 to October 31) nutrient biostimulatory target-based allocations within 25 years of the effective date of the TMDL.

The 10-year timeframe to achieve the MUN nitrate standard and the Basin Plan objective for unionized ammonia is based primarily on the expectation that nearly all landowners and operators of irrigated agricultural activities will have completed Farm Water Quality Plans and be implementing management practices by the end of the five-year term of the Agricultural Order (Order R3-2012-0011) which was adopted on March 15, 2012. Water quality benefits resulting from implementing nutrient-control management measures (e.g., grass swales and riparian buffers, etc.) may take a few years to be realized. Ten years for the first interim waste load and load allocations is a reasonable timeframe to implement management measures and reduce nitrate levels consistent with the allocations and the numeric target. The basis for this estimate considers that there is evidence that widespread improvements to irrigation efficiency and water management in recent years have occurred in the Pajaro River basin. Furthermore, pilot projects in the central coast region have demonstrated that treatment with vegetated treatment systems can effectively

and rapidly reduce nutrient pollution.²⁸ Consequently, Central Coast Water Board staff anticipates that the first interim allocations are attainable by 2025. The 10-year benchmark is also consistent with the Central Coast Water Board's vision for the region of healthy, functioning watersheds by the year 2025.

The 15-year time frame to achieve the second interim waste load and load allocations (which are based on the wet-season nutrient biostimulatory targets) was identified as a reasonable time frame and intermediate benchmark prior to achieving the final, more-stringent final allocations. The basis for this timeline is that the full effect of source controls (nutrient and irrigation efficiency improvements) and surface runoff treatment systems (e.g., constructed wetlands, buffer strips) are anticipated to be manifested and reflected in water quality response within 15 years. Surface water quality and runoff response to the full effect of source control and runoff treatment should be expected more rapidly than improvements to shallow groundwater quality. As noted previously, shallow groundwater is a contributing source of nutrients to surface waters; shallow groundwater moves slowly, and nitrate-contaminated shallow groundwater will require longer time frames to respond to the full effects of source control measures.

The 25-year timeline to meet more-stringent dry-season biostimulatory substances allocations are based on Central Coast Water Board staff's estimates that legacy nutrient loads, which are unrelated to current practices and are originating from groundwater and baseflow, likely will locally continue to contribute elevated nutrients to Pajaro River basin surface waters for several decades. See the TMDL Report (attachment 2 to this staff report) for information on groundwater quality and estimated residence time of baseflow in the subsurface. Therefore, Central Coast Water Board staff anticipates that it will take a significant amount of time for legacy pollutant loads in shallow groundwater, and the subsequent baseflow pollutant loads to stream reaches, to attenuate to acceptable levels consistent with the final TMDL allocations.^{29,30}

Reconsideration of the TMDL

Additional monitoring and voluntary special studies would be useful to evaluate the uncertainties and assumptions made in the development of this TMDL. Additionally, eutrophication is an active area of research; consequently, ongoing scientific research on eutrophication and biostimulation may further inform the Central Coast Water Board regarding waste load or load allocations that are protective against biostimulatory impairments, implementation timelines, and/or downstream impacts. At this time, based on the information and analyses presented in the TMDL Report (attachment 2 to this staff report), Central Coast Water Board staff maintains there is sufficient information to begin to implement the TMDL and make progress towards attainment of water quality standards and the proposed allocations. However, in recognition of the uncertainties regarding nutrient pollution and biostimulatory impairments, Central Coast Water Board staff proposes that the Central Coast Water Board may reconsider the waste load and load allocations, if merited by optional special studies and new research, eight years after the effective date of the TMDL, which is the date that the Office of Administrative Law (OAL) approves the TMDL.

²⁸ See information in the TMDL Report, attachment 2 to the Staff Report.

²⁹ For example, the U.S. Geological Survey (USGS) reports that in spite of many years of efforts to reduce nitrate levels in the Mississippi River Basin, concentrations have not consistently declined during the past two decades. USGS concludes that elevated nitrate in shallow groundwater is a substantial source contributing to nitrate concentrations in river water. Because nitrate moves slowly through groundwater systems to rivers, the full effect of management strategies designed to reduce loading to surface waters and groundwaters may not be seen in these rivers for decades (see "No Consistent Declines in Nitrate Levels in Large Rivers of the Mississippi River Basin" USGS News Release dated 08/09/2011).

³⁰ For example, in a recent national study USGS researchers reported that legacy nutrients present in shallow groundwater may sustain high nitrate levels in some streams which are characterized by substantial groundwater inputs for decades to come (see Tesoriero, Duff, Saad, Spahr, and Wolock, 2013, *Vulnerability of Streams to Legacy Nitrate Sources*. Environmental Science and Technology, 2013, 47(8), pp. 3623-3629).

CEQA CHECKLIST AND ANALYSIS

The California Resources Agency has certified the basin planning process in accordance with section 21080.5 of the Public Resources Code. The process is therefore exempt from Chapter 3 of the California Environmental Quality Act (CEQA). The analysis contained in the TMDL Report (attachment 2 to this staff report), the CEQA Checklist and Analysis Report (attachment 3 to this staff report), and the responses to comments comply with the requirements of the State Water Board's certified regulatory CEQA process, as set forth in California Code of Regulations, Title 23, section 3775 et seq. Furthermore, the analysis fulfills the Central Coast Water Board's obligations attendant with the adoption of regulations "requiring the installation of pollution control equipment, or a performance standard or treatment requirement," as set forth in section 21159 of the Public Resources Code. All public comments were considered.

Public Resources Code section 21159 provides that an agency shall perform, at the time of the adoption of a rule or regulation requiring the installation of pollution control equipment or a performance standard or treatment requirement:

- an environmental analysis of the reasonably foreseeable methods of compliance,
- an analysis of the reasonably foreseeable environmental impacts of the methods of compliance,
- an analysis of reasonably foreseeable mitigation measures to lessen the adverse environmental impacts, and
- an analysis of reasonably foreseeable alternative means of compliance with the rule or regulation that would have less significant adverse impacts.

Section 21159(c) requires that the environmental analysis take into account a reasonable range of environmental, economic, and technical factors; population and geographic areas; and specific sites.

The CEQA Checklist and Analysis Report (attachment 3 to this staff report) provides the environmental analysis required by Public Resources Code section 21159. The CEQA Checklist and Analysis Report identifies reasonably foreseeable methods of compliance with the TMDL and provides assessments on the basis of the CEQA environmental checklist whether there are any anticipated adverse impacts to the environment associated with the reasonably foreseeable methods of compliance.

Potentially Significant Environmental Impacts

A significant effect on the environment is defined in regulation as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project."³¹ The CEQA Environmental Checklist and Analysis Report (attachment 3 to this staff report) provide the necessary information pursuant to state law to conclude that the proposed TMDL, Implementation Plan, and the associated reasonably foreseeable methods of compliance will not have significant adverse effects on the environment with the exception of potentially significant impacts associated with Biological Resources CEQA Checklist Category IV(a), *potentially* significant impacts to habitat of fish or wildlife species associated with Mandatory Findings of Significance CEQA Checklist Category XVIII.(a). Central Coast Water Board staff has made this determination based on best available information in an effort to fully inform the interested public and the decision makers of potential environmental impacts.

While wildlife and/or sensitive or endangered species are found on or adjacent to lands which may require compliance measure to implement the TMDL, there are also likely negative effects on these species because of current water quality degradation and excess nutrients associated with agricultural discharges. In other words, while rare, sensitive, threatened or endangered species may be present in areas which may require compliance measures, low dissolved oxygen, and

³¹ Title 14 California Code of Regulations Section 15382

toxicity due to unionized ammonia and water quality degradation are not considered to be a desirable condition for the health and long term sustainability of these species. It is widely acknowledged by many resource professionals and in the scientific literature³² that water quality degradation, stream alteration, and human activities, on balance, have constituted an adverse impact to the natural biodiversity of the Pajaro River basin. Consequently, while sensitive species or other wildlife may be present in some areas because of the discharged water, continuing to discharge water of low quality is not an environmentally-desirable or sustainable practice with respect to the viability of sensitive species.

Also noteworthy is the fact that nutrient control strategies and measures have been underway for many years in various agricultural watersheds throughout the United States and in Europe. Based on the literature, research, and information Central Coast Water Board staff has surveyed for this project, we are unaware of any cases where nutrient control strategies have been directly responsible for substantial or widespread adverse impacts resulting in the degradation of the environment, substantial reductions in the habitat of fish and wildlife, or have caused a fish or wildlife population to drop below self-sustaining levels, threatened to eliminate a plant or animal community, reduced the number or restrict the range of a rare or endangered plant or animal or eliminated important examples of the major periods of California history or prehistory.

Statement of Overriding Consideration

Although there may be potential for significant adverse impacts to Biological Resources it is impossible based on current information to know whether those potential impacts may be able to be mitigated to less than significant levels; or alternatively if the impacts ultimately turn out to be less than significant. The Central Coast Water Board, when considering approval Basin Plan amendments will balance the economic, legal, social, technological, or other benefits of TMDL implementation against the potentially significant adverse effects when determining whether to approve the Basin Plan amendment, and has the authority, pursuant to CEQA guidelines Section 15093 (14 CCR § 15093), to make a statement of overriding considerations, if it finds that the adverse environmental effects are acceptable given the identified benefits.

For this agenda item, staff recommends that the Central Coast Water Board approve a statement of overriding consideration (as articulated in Section 8 of the CEQA Checklist and Analysis Report, attachment 3 to the staff report). The statement of overriding consideration finds that the benefits of the *Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in Stream of the Pajaro River Basin* (Resolution No. R3-2015-0004) override and outweigh the potential significant adverse impacts of these TMDLs, for the reasons more fully set forth in the staff report and attachments.

ANTI-DEGRADATION

This Basin Plan amendment is consistent with the provisions of the State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" and 40 CFR 131.12. The adoption of the proposed Basin Plan amendment and TMDL implantation plan will not de-designate or limit beneficial use designations, will not relax any water quality standard, and will not result in lowering of water quality. This proposal will result in water quality improvements; therefore, state and federal anti-degradation analyses are not required.

SCIENTIFIC PEER REVIEW

Health and Safety Code section 57004 requires external scientific peer review for certain water quality control policies. Policy and guidance for peer review states that scientific review is not required if a new application of an adequately peer reviewed work product does not significantly

³² Refer to TMDL Report (attachment 2 to this Staff Report)

depart from the reviewed approach.³³ The State of California and USEPA have approved several TMDLs where the scientific basis was drawn from previously reviewed TMDLs, thereby negating the need for further review; such a practice is in the best interest of conserving and efficiently utilizing state resources.

The scientific portions of this TMDL are drawn exclusively from the Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in the lower Salinas River and Reclamation Canal Basin, and the Moro Cojo Slough Subwatershed, which has undergone the required external scientific peer review. As a result, the scientific portions of this TMDL have already undergone external, scientific peer review. Consequently, the Central Coast Water Board has fulfilled the requirements of Health and Safety Code section 57004, and the proposed amendment does not require further peer review.

PUBLIC INVOLVEMENT

Public outreach and public involvement are a part of TMDL development and the [basin planning process](#). Over the past three years, staff of the Central Coast Water Board implemented a process to inform and engage interested persons about this TMDL project. We provided regular TMDL updates and solicited public feedback via our stakeholder [email subscription list](#) consisting of over 350 stakeholders representing a wide range of interests. We periodically posted interim TMDL progress reports on the Central Coast Water Board's website with the intent of sharing our progress with stakeholders as we moved forward with TMDL development. We conducted public workshops in the City of Watsonville in August 2012, and in December 2013, and in the City of Gilroy in April 2015, and Central Coast Water Board staff engaged with stakeholders during the development of the TMDL through email correspondence and telephone contact. Individuals and entities Central Coast Water Board staff engaged with during public workshops or during TMDL development included representatives of the following:

- Pajaro Valley Water Management Agency
- Central Coast Water Quality Preservation, Inc.
- County of Santa Cruz staff
- South County Regional Wastewater Authority
- City of Watsonville staff
- City of Gilroy staff
- City of Hollister staff
- Central Coast Ag Water Quality Coalition
- U.S. Department of Agriculture, Natural Resources Conservation Service
- Santa Clara County Division of Agriculture
- Representatives of commercial farms, vineyards, nurseries, and ranches
- Agricultural consultants
- Consultants representing County of Santa Clara's stormwater program
- U.S. Environmental Protection Agency
- Fisheries biologists from San Jose State University and the National Marine Fisheries Service
- Coastal Watershed Council
- Friends of Pinto Lake
- Other individuals and local residents interested in Pajaro River basin water quality

Central Coast Water Board staff conducted a California Environmental Quality Act (CEQA) stakeholder scoping meeting on December 17, 2013. Central Coast Water Board staff addressed questions and comments from attendees.

³³ State of California: Unified California Environmental Protection Agency Policy and Guiding Principles For External Scientific Peer Review, March 13, 1998.

Central Coast Water Board staff's efforts to inform and involve the public included a public comment period. The staff report, resolution, basin plan amendment, and TMDL report were made available for a 45-day public comment period commencing on March 11, 2015. This provided interested parties an opportunity to provide comment prior to any Central Coast Water Board hearing regarding these TMDLs. Staff solicited public comments from a wide range of stakeholders including owners/operators of agricultural operations, representatives of the agricultural industry, representatives of environmental groups, academic researchers and resource professionals, representatives of local, state, and federal agencies, representatives of municipal wastewater treatment facilities, representatives of city and county stormwater programs, representatives of NPDES-permitted [industrial](#) and [construction](#) facilities, ranchers and representatives of the livestock industry, managers and representatives of local golf courses, representatives of [Native American](#) tribal groups, representatives of [environmental justice](#) groups, and other individuals and groups interested in the water quality of streams in the Pajaro River basin.

Central Coast Water Board staff received two comment letters from:

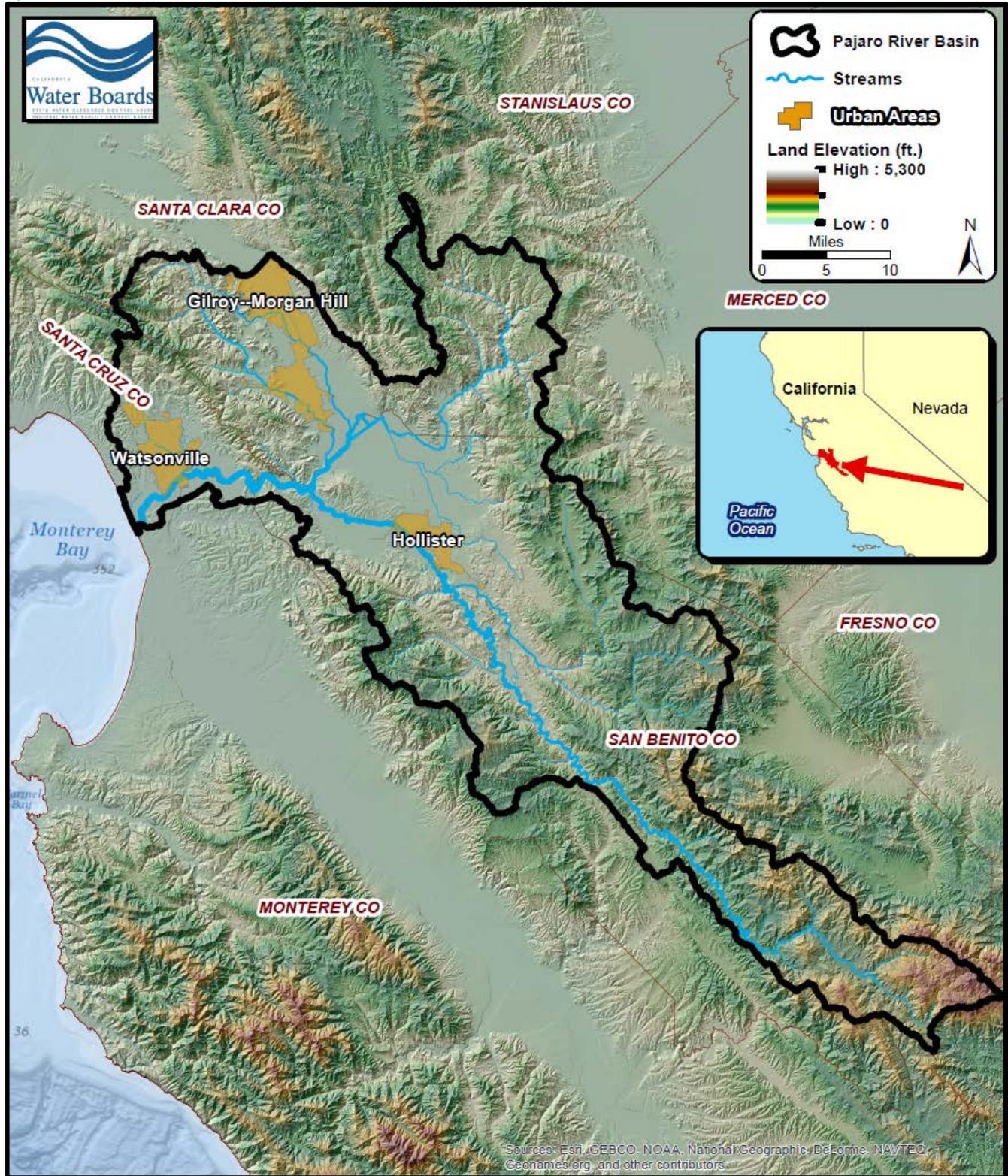
1. Mr. Saeid Vaziry, P.E., Environmental Programs Manager, South County Regional Wastewater Authority, Gilroy, in an email attachment received April 22, 2015.
2. Ms. Janet Parrish, TMDL Liaison, U.S. Environmental Protection Agency Region IX, San Francisco, in an email attachment received April 23, 2015.

The public comments received and Central Coast Water Board staff responses are included in attachment 4 to this staff report.

Central Coast Water Board staff appreciates the comments provided by these interested parties. Some of the comments prompted us to clarify and improve information and narrative in the TMDL project documents, as discussed in attachment 4 to this staff report.

Figures and Tables
Supplementing the Staff Report for
Resolution No. R3-2015-0004
Item No. 13

Figure 1. Relief map of the Pajaro River basin



Total Maximum Daily Loads Summary

TMDLs for Nitrogen Compounds and Orthophosphate in Streams of the Pajaro River Basin Central Coast Regional Water Quality Control Board																																															
TMDL Pollutants	Nitrogen compounds (nitrate, total nitrogen, un-ionized ammonia), orthophosphate																																														
Other Pollutants Addressed	Biological response indicators – dissolved oxygen, oxygen saturation, chlorophyll a, microcystins																																														
TMDL Goals	Reduce nutrient pollution and un-ionized ammonia toxicity in streams to restore and enhance viable freshwater habitat for fish, wildlife, invertebrates; restore domestic and municipal supply beneficial uses of impaired streams and restore groundwater recharge beneficial uses of impaired streams, with the goal of enhanced drinking water source protection. Protect existing high quality waters and prevent any further nutrient water quality degradation in streams not currently impaired by nutrient-related pollution.																																														
Location & Watershed	Parts of Santa Cruz, Santa Clara, San Benito, and Monterey counties Pajaro River basin (federal hydrologic cataloging unit # 18060002)																																														
Sources of Nutrients to Streams of the River Basin	Fertilizer application on irrigated cropland Shallow groundwater inputs to streams Urban runoff – stormwater sewer system discharges Natural sources (ambient background loading) Livestock and domestic animal manure NPDES-permitted municipal wastewater treatment facilities NPDES-permitted industrial and construction stormwater discharges Fertilizer application on golf courses Direct atmospheric deposition to streams (negligible source) Onsite wastewater treatment systems (negligible source)																																														
Impaired Streams <i>On the basis of nutrient water quality criteria and biostimulation indicators</i>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Stream</th> <th style="text-align: left; border-bottom: 1px solid black;">Waterbody Identification (WBID, unless otherwise noted)</th> </tr> </thead> <tbody> <tr><td>Pajaro River</td><td>WBID: CAR3051003019980826115152</td></tr> <tr><td>Pajaro River Estuary</td><td>NHDplus reach code 18060002001843</td></tr> <tr><td>Watsonville Slough</td><td>WBID: CAR3051003019981209150043</td></tr> <tr><td>Harkins Slough</td><td>WBID: CAR3051001320080603122917</td></tr> <tr><td>Struve Slough</td><td>WBID: CAR3051003020080603125227</td></tr> <tr><td>Struve Slough</td><td>WBID: CAR3051003020080603125227</td></tr> <tr><td>Corralitos Creek</td><td>WBID: CAR3051001019990225102704</td></tr> <tr><td>Tributary to Corralitos Creek</td><td>NHDplus reach code 18060002001662</td></tr> <tr><td>Salsipuedes Creek</td><td>WBID: CAR3051003020080603123522</td></tr> <tr><td>Cassery Creek</td><td>NHDplus reach code 18060002001643</td></tr> <tr><td>Pinto Lake outflow ditch</td><td>NHDplus reach code 18060002001656</td></tr> <tr><td>Beach Road Ditch</td><td>WBID: CAR3051003020080603123839</td></tr> <tr><td>McGowan Ditch</td><td>WBID: CAR3051003020100620223644</td></tr> <tr><td>Coward Creek</td><td>NHDplus reach code 18060002000394</td></tr> <tr><td>Tributary to Green Valley Creek</td><td>NHDplus reach code 18060002001638</td></tr> <tr><td>Carnadero Creek</td><td>WBID: CAR3053002019990223155037</td></tr> <tr><td>San Juan Creek</td><td>WBID: CAR3052005020090204001958</td></tr> <tr><td>West Branch San Juan Creek</td><td>NHDplus reach code 18060002000611</td></tr> <tr><td>Millers Canal</td><td>WBID: CAR3053002020080603171000</td></tr> <tr><td>Llagas Creek</td><td>WBID: CAR3053002020020319075726</td></tr> <tr><td>Furlong Creek</td><td>WBID: CAR3053002019990222111932</td></tr> <tr><td>Tequisquita Slough</td><td>WBID: CAR3053002020011121091332</td></tr> </tbody> </table>	Stream	Waterbody Identification (WBID, unless otherwise noted)	Pajaro River	WBID: CAR3051003019980826115152	Pajaro River Estuary	NHDplus reach code 18060002001843	Watsonville Slough	WBID: CAR3051003019981209150043	Harkins Slough	WBID: CAR3051001320080603122917	Struve Slough	WBID: CAR3051003020080603125227	Struve Slough	WBID: CAR3051003020080603125227	Corralitos Creek	WBID: CAR3051001019990225102704	Tributary to Corralitos Creek	NHDplus reach code 18060002001662	Salsipuedes Creek	WBID: CAR3051003020080603123522	Cassery Creek	NHDplus reach code 18060002001643	Pinto Lake outflow ditch	NHDplus reach code 18060002001656	Beach Road Ditch	WBID: CAR3051003020080603123839	McGowan Ditch	WBID: CAR3051003020100620223644	Coward Creek	NHDplus reach code 18060002000394	Tributary to Green Valley Creek	NHDplus reach code 18060002001638	Carnadero Creek	WBID: CAR3053002019990223155037	San Juan Creek	WBID: CAR3052005020090204001958	West Branch San Juan Creek	NHDplus reach code 18060002000611	Millers Canal	WBID: CAR3053002020080603171000	Llagas Creek	WBID: CAR3053002020020319075726	Furlong Creek	WBID: CAR3053002019990222111932	Tequisquita Slough	WBID: CAR3053002020011121091332
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High Quality Waters^B and Waters Not Currently Showing Nutrient-Related Impairments	For waterbodies assessed as high quality waters and those not currently identified as impaired, anti-degradation requirements apply. The goal of anti-degradation in the context of nutrient pollution is to protect and maintain existing high quality waters, prevent any further degradation, and provide protection for downstream waters (for more information, please see Figure 7 on page 28 of this staff report) . <i style="text-align: center;">This table is continued on the next page</i>																																														

TMDLs for Nitrogen Compounds and Orthophosphate in Streams of the Pajaro River Basin Central Coast Regional Water Quality Control Board	
Beneficial Uses Impaired and Water Quality Standards Violations	Numerous impairments in streams designated for domestic and municipal water supply (MUN) Widespread impairments in streams designated for aquatic habitat beneficial uses (WARM, COLD, SPWN) on the basis of violations of the biostimulatory substances water quality objective. Localized violations of the general toxicity objective for surface waters, on the basis of exceedances of the un-ionized ammonia numeric water quality objective. Localized impairments in streams designated for groundwater recharge beneficial use (GWR). Localized impairment in Llagas Creek for designated agricultural supply beneficial use (AGR).
Loading Capacity (TMDL)	- <u>Dry Season (May 1 – Oct. 31) nitrate as N</u> range not to exceed 1.8 to 3.9 mg/L in impaired receiving waters, depending on specific stream reach. - <u>Dry Season (May 1 – Oct. 31) total nitrogen (N)</u> range not to exceed 1.1 mg/L in Millers Canal and not to exceed 2.1 mg/L in the sloughs of the Watsonville Slough subwatershed. - <u>Wet Season (Nov. 1 – Apr. 30) nitrate as N</u> not to exceed 8 mg/L in impaired receiving waters. - <u>Dry Season (May 1 – Oct. 31) orthophosphate as P</u> range not to exceed 0.4 to 0.14 mg/L in impaired receiving waters, depending on specific stream reach. - <u>Wet Season (Nov. 1 – Apr. 30) orthophosphate as P</u> not to exceed 0.3 mg/L in impaired receiving waters - <u>Year Round, nitrate as N</u> not to exceed 10 mg/L in all receiving waters designated for MUN. - <u>Year Round, un-ionized ammonia as N</u> not to exceed 0.025 mg/L in all receiving waters.
TMDL Milestones	10 and 15 year interim milestones established with interim water quality goals Water Board may reconsider TMDL in 10 years, to consider new research, data, & information. TMDL achievement of final water quality goals in receiving waters anticipated in 25 years.
Implementation Strategy: Proposed Actions To Correct 303(d)-Listed Impairments	<u>Owners/operators of irrigated lands:</u> Implement and comply with the Central Coast Water Board's Agricultural Order to minimize nutrient loading to receiving waters from fertilizers and irrigation, and to make incremental progress towards attaining load allocations. <u>Municipal separate storm sewer system (MS4) entities:</u> Waste load allocations for this source category will be implemented through existing NPDES permits. Nutrient pollution discharged from MS4s will be addressed by regulating the MS4 entities under the provisions State Water Resources Control Board's General Permit for the Discharges of Storm Water from Small MS4s (General Permit). <u>NPDES-permitted industrial and construction stormwater discharges:</u> Maintain existing water quality and prevent any further water quality degradation by implementing and complying with the requirements of the statewide Industrial General and the statewide Construction General Permit, or their revisions and renewals. <u>NPDES-permitted municipal wastewater discharges:</u> Waste load allocations for this source category will be implemented by existing NPDES wastewater permitting authorities. Where warranted, waste load allocations identified in the TMDL will be implemented by existing, new, or revised effluent limits in the NPDES permits. <u>Owners/operators of livestock and domestic animals:</u> Maintain existing water quality and prevent further water quality degradation by beginning or continuing to self-monitor and self-asses consistent with technical guidance from existing rangeland water quality management plans. <u>Owners/operators of golf courses:</u> Continue to implement turf management practices which help protect and maintain existing water quality and to prevent any further surface water quality degradation.

^A Anti-degradation policy is a component and expectation of all water quality standards, Also noteworthy, U.S. Environmental Protection Agency guidance indicates that while TMDLs, are typically written for restoring impaired waterbodies, states can also prepare TMDLs geared towards maintaining a “better than water quality standard” conditions for a given waterbody–pollutant combination (see: USEPA, 2014a. *Opportunities to Protect Drinking Water Sources and Advance Watershed Goals Through the Clean Water Act: A Toolkit for State, Interstate, Tribal and Federal Water Program Managers*. November 2014).

^B For purposes of anti-degradation policy, “high quality waters” are defined on a constituent-by-constituent basis. The State Water Resources Control Board and appellate court decisions indicate that water can be considered high quality for purposes of the anti-degradation policy on a constituent by constituent basis. Therefore, water can be of high quality under the anti-degradation policy for some constituents or beneficial uses, but not for others (see Court of Appeal of the State of California, Third Appellate District, Appeal Case C066410, Acociacion de Gente Unida, etc. et al. v. Central Valley Regional Water Quality Control Board).

Reference Table

B Reference Table for Recurring Acronyms & Recurring Terms Used in this Staff Report (the hyperlinks will take you to a webpage with more information about the acronym or the term)	
AGR	Agricultural Supply – Uses of water for farming, horticulture, or ranching including but not limited to irrigation, stock watering, or support of vegetation for range grazing.
anti-degradation	Provisions of federal and state law which require that wherever the existing quality of water is <i>better</i> than the quality of water established by water quality objectives, such existing water quality shall be maintained unless otherwise provided by the provisions of the state anti-degradation policy (see Basin Plan section II.A.)
Basin Plan	Water Quality Control Plan for the Central Coastal Basin.
biostimulation	As used herein, “biostimulation” refers to a state of excess growth of algae due to anthropogenic nutrient inputs into an aquatic system. Biostimulation is characterized by a number of other factors in addition to nitrogen and phosphorus inputs; for example, dissolved oxygen levels, chlorophyll <i>a</i> , sunlight availability, and pH ^{A,B} .
beneficial uses	Legally designated uses of waters of the state that may be protected against water quality degradation including, but not limited to, drinking water supply, agricultural supply, aquatic habitat.
CEQA	California Environmental Quality Act
COLD	Cold Freshwater Habitat – Uses of surface waters that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife including invertebrates.
GWR	Groundwater Recharge – Uses of surface waters for natural or artificial recharge of groundwater for purposes of future extraction and maintenance of water quality.
MS4	Municipal separate storm sewer systems
MUN	Municipal and Domestic Supply – Uses of water for community, military, or individual water supply systems, including but not limited to drinking water supply.
NPDES	National pollutant discharge elimination system
numeric target	Quantifiable and measurable water quality thresholds that will ensure compliance with water quality standards (i.e., beneficial uses and water quality objectives)
TMDL	Total maximum daily load
WARM	Warm Freshwater Habitat – Uses of surface waters that support water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife including invertebrates.

^A See: U.S. Fish and Wildlife Service, 2011. 5-Year Review, Summary and Evaluation: *Rorippa gambellii* [*Nasturtium gambellii*] (Gambel's watercress). September 2011, Ventura Fish and Wildlife Office.

^B The term “eutrophication” has often been considered to be synonymous or interchangeable with the term “biostimulation”. California central coast researchers have noted that the word “eutrophication” is problematic because it lacks scientific specificity. These researchers recommend that the regional water quality control boards not use the word (see Rollins, Los Huertos, Krone-Davis, and Ritz, 2012, Algae Biomonitoring and Assessment for Streams and Rivers of California’s Central Coast)

Figure 3 illustrates the spatial distribution of stream reaches impaired by toxicity associated with elevated levels of un-ionized ammonia.

Figure 3. Stream reaches impaired by toxicity due to un-ionized ammonia.

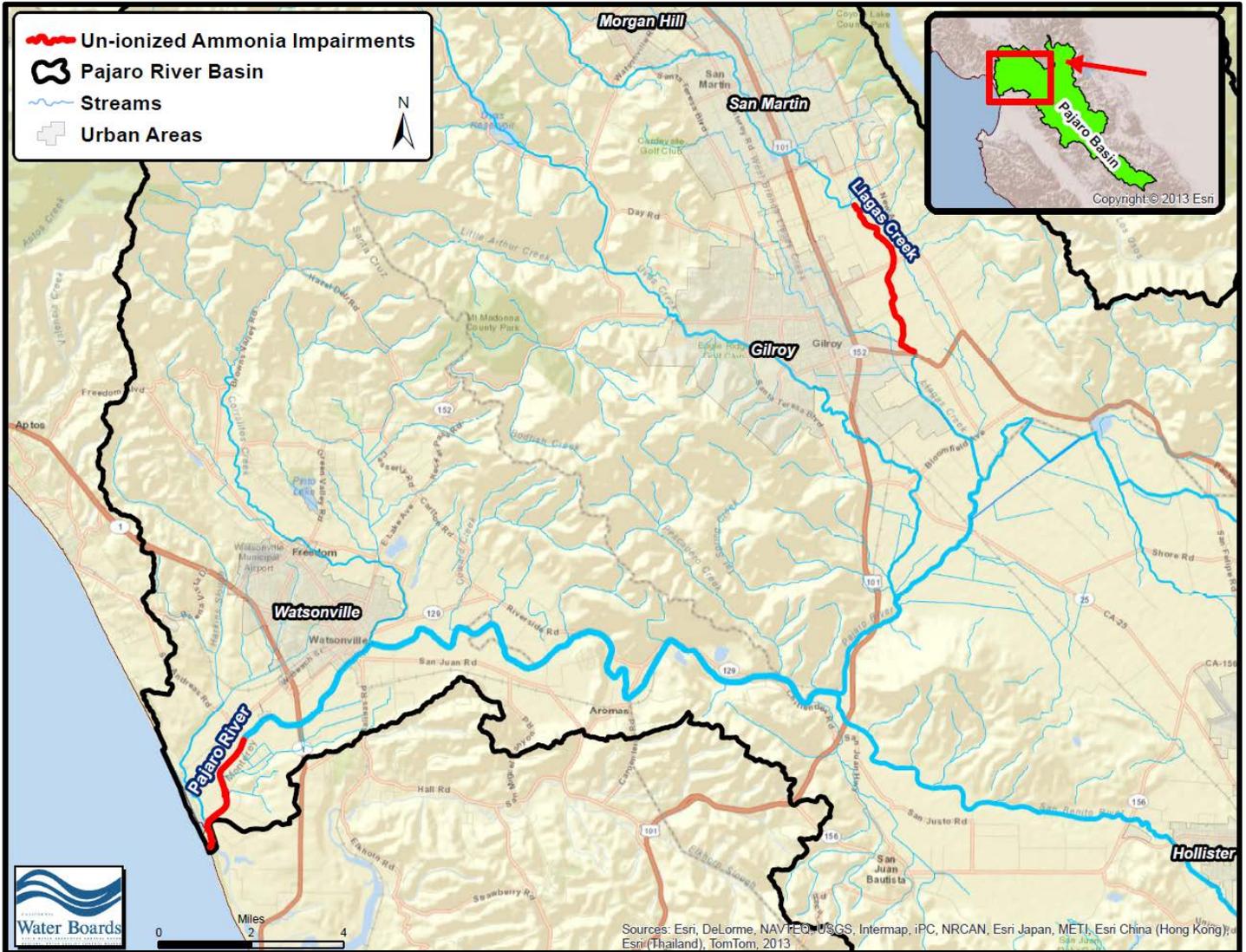


Figure 4 illustrates the spatial distribution of AGR-designated stream reaches impaired for the nitrate as N agricultural supply (irrigation water watering) criterion (AGR).

Figure 4. Nitrate impairment of designated agricultural supply (AGR) beneficial uses.

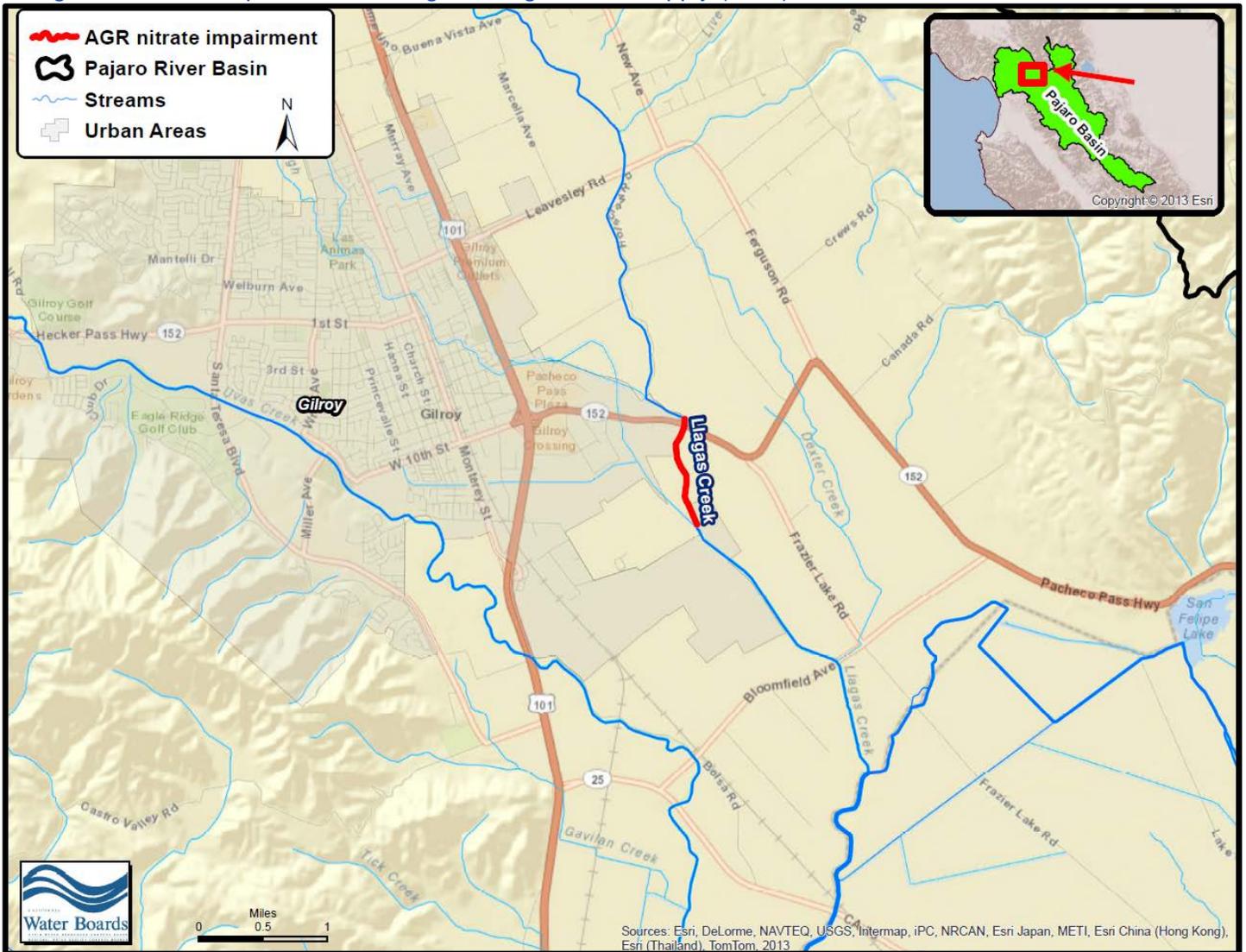


Figure 5 illustrates the spatial distribution of nitrate impairments of stream reaches designated for groundwater recharge (GWR) beneficial uses.

Figure 5. Nitrate impairments of stream reaches designated for groundwater recharge (GWR) uses.

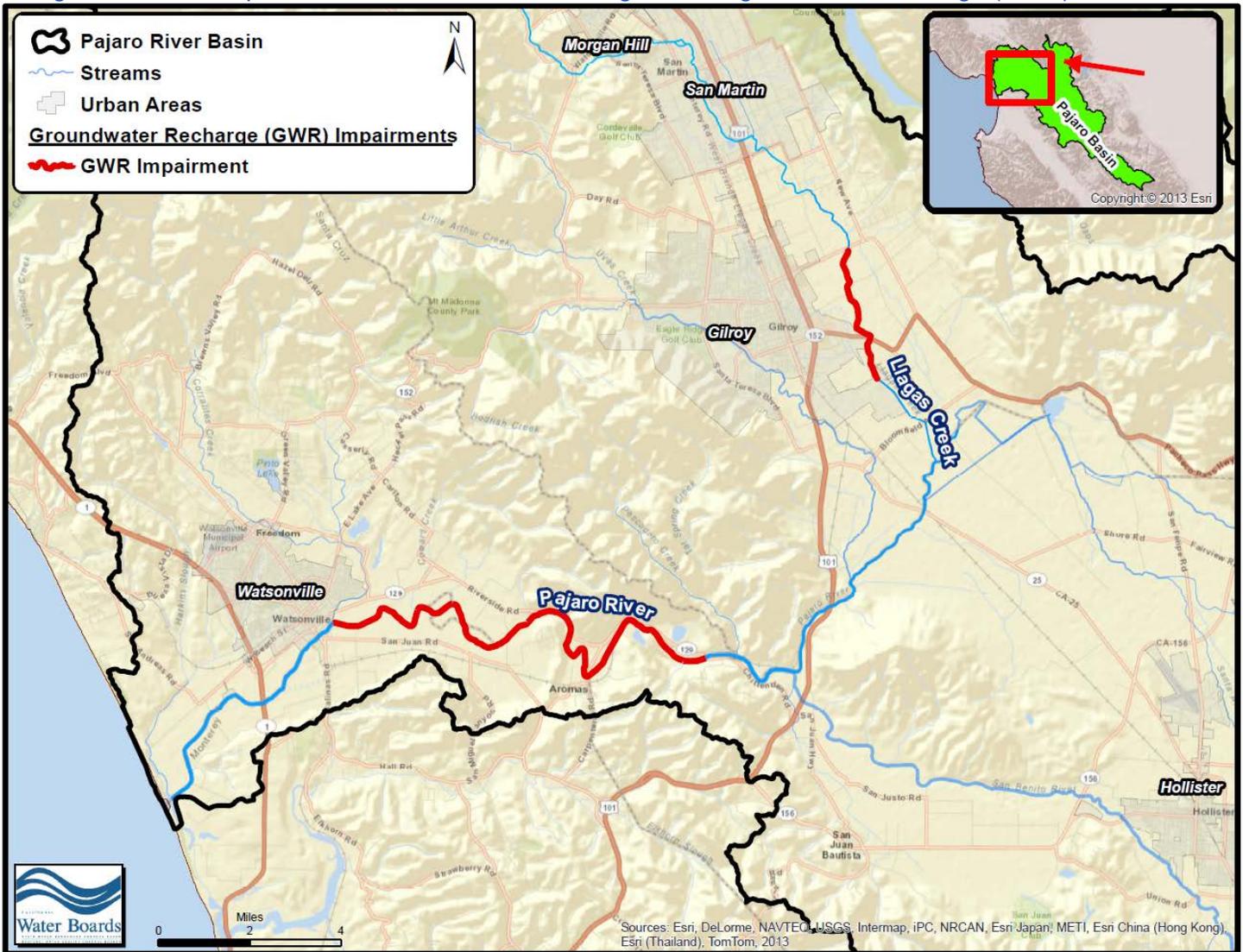
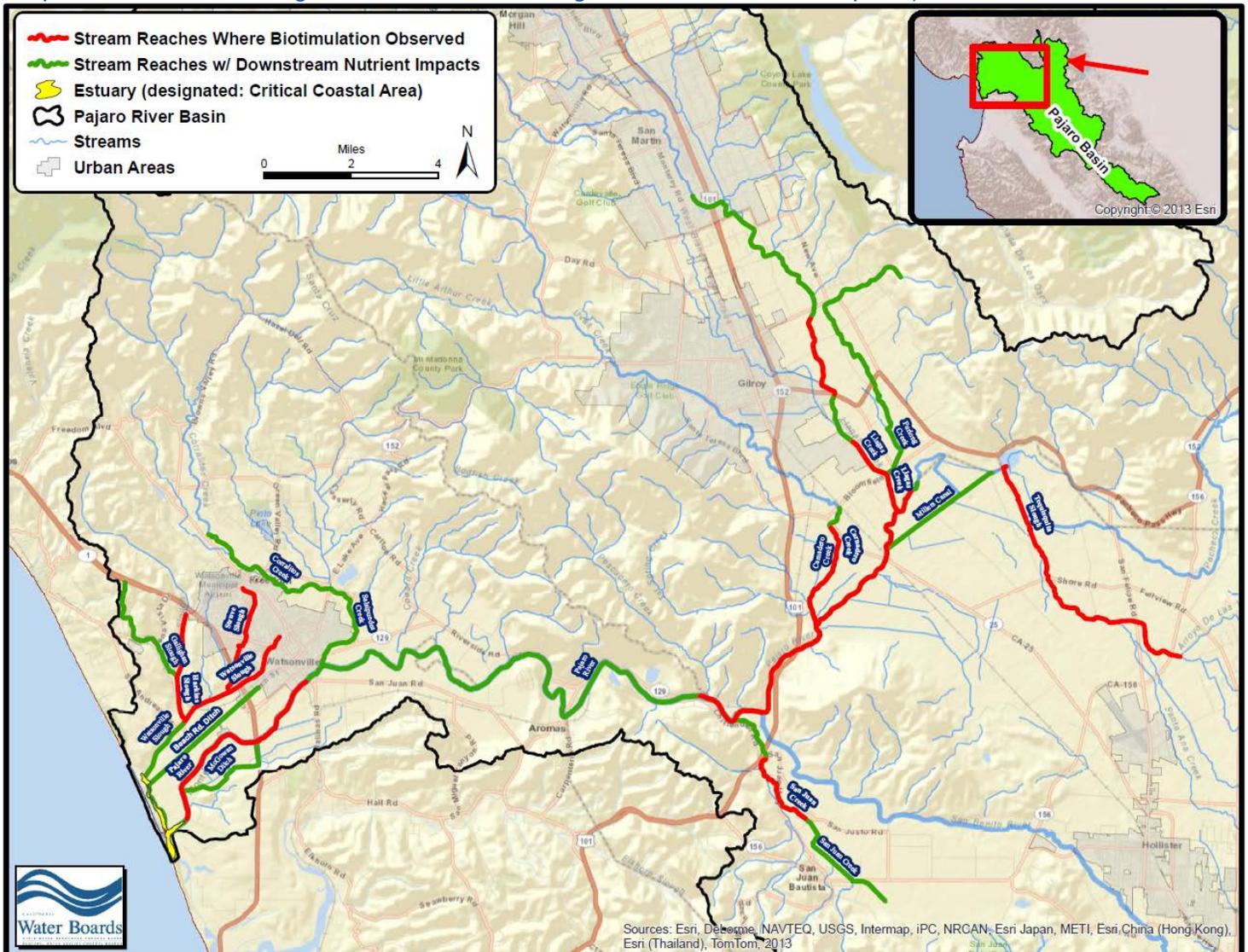


Figure 6 illustrates the spatial distribution of biostimulatory impairments in the Pajaro River basin on the basis of the biostimulation assessment presented in the TMDL report (attachment 2 to the staff report). The extent of impairment shown on this map includes downstream impacts; i.e., stream reaches that are nutrient-enriched and yet do not show signs of biostimulation, but they flow downstream and discharge their nutrient loads into receiving waters where biostimulation problems are observed).

Figure 6. Stream reaches exhibiting biostimulatory impairments (elevated nutrients + dissolved oxygen problems + elevated algal biomass, and including downstream nutrient impacts).



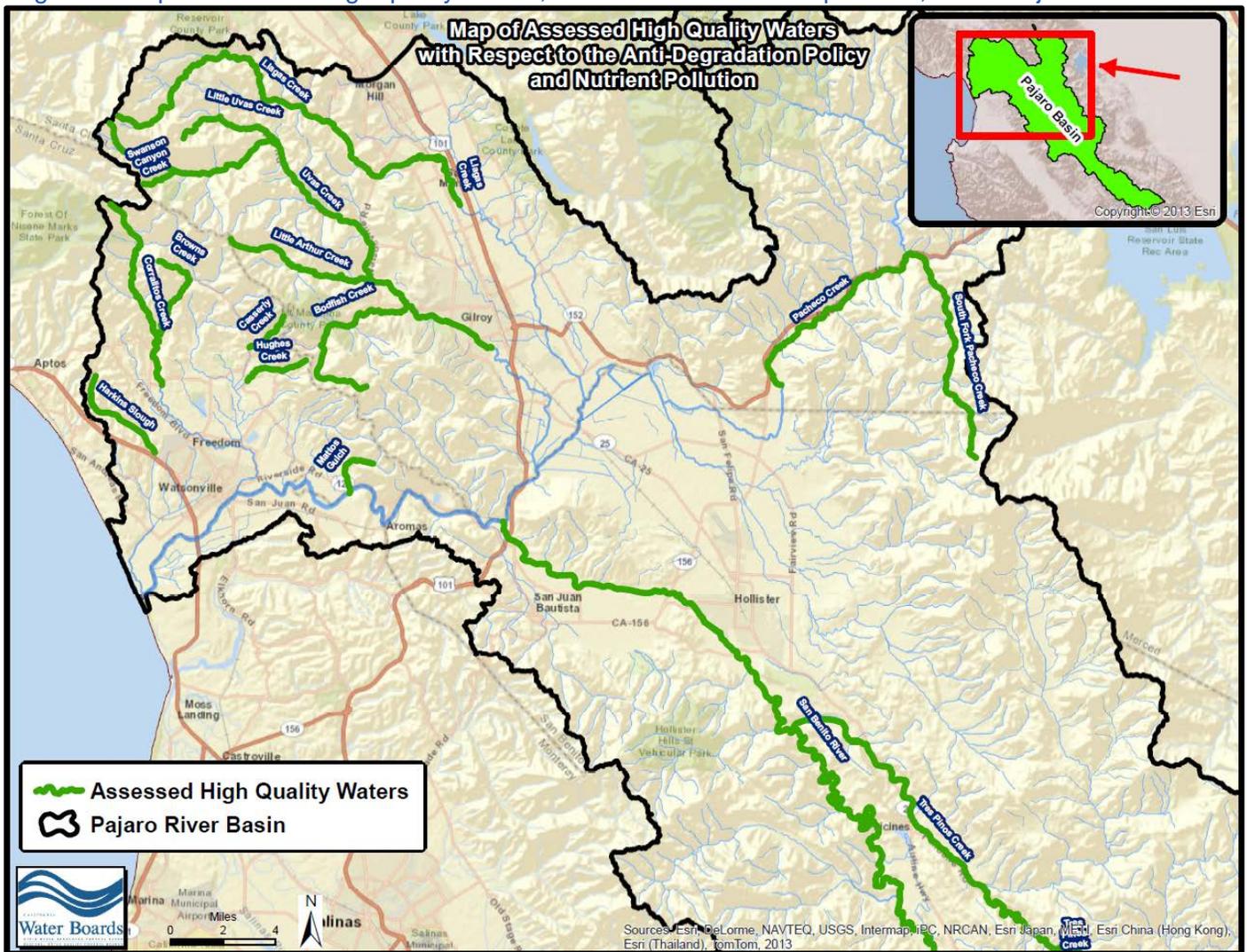
While improvements to impaired waters is a goal of TMDLs, protection of existing high quality waters and prevention of any further degradation is also high priority for the Central Coast Water Board, and can be identified as a consideration in TMDLs. For purposes of the anti-degradation policy, “high quality waters” are defined on a constituent-by-constituent basis. From the water quality management perspective, it is simply not enough to improve impaired waters – protection of existing high quality waters and prevention of any further water quality degradation should be identified as a high priority goal.³⁴ Simply put, TMDL implementation efforts are justified in considering improved protection of high quality waters and addressing anti-degradation concerns, as well as focusing on improving impaired stream reaches.

States can prepare TMDLs geared towards maintaining a “better than water quality standard” condition for a given waterbody-pollutant combination, and they can be a useful tool for high quality waters.

From: USEPA, 2014. Opportunities to Protect Drinking Water Sources and Advance Watershed Goals Through the Clean Water Act: A Toolkit for State, Interstate, Tribal and Federal Water Program Managers. A State-USEPA collaboration initiative, November 2014.

Figure 7 illustrates assessed high quality waters in the Pajaro River basin in the context of nutrient pollution on the basis of available water quality data. Undoubtedly, there are additional high quality water stream reaches that do not currently have water quality data.

Figure 7. Map of assessed high quality waters, on the basis of nutrient pollution, in the Pajaro River basin.



³⁴ The Central Coast Water Board considers *preventing* impairment of waterbodies to be as important a priority as *correcting* impairments of waterbodies (see staff report for agenda item 3, July 11, 2012 Water Board meeting).

RECOMMENDATION

Adopt Resolution No. R3-2015-0004

ATTACHMENTS TO THIS STAFF REPORT:

The following seven attachments to this staff report are listed below and are available at on the Central Coast Water Boards [website](#) at:

http://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/docs/pajaro/nutrients/index.shtml

1. Resolution No. R3-2015-0004 and Basin Plan Amendment Language
2. TMDL Report: "Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in Streams in the Pajaro River Basin"
3. California Environmental Quality Act (CEQA) Checklist and Analysis
4. Public Comments and Staff Responses
5. Changes made to the TMDL Documentation Subsequent to the Public Comment Period
6. Notice of Opportunity for Public Comment
7. Notice of Public Hearing