STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF JANUARY 31 – FEBRUARY 1, 2013
Prepared January 8, 2013

ITEM NUMBER: **9**

SUBJECT: **Amending the Water Quality Control Plan for the Central Coastal Basin to Adopt Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in Lower Salinas River and Reclamation Canal Basin and the Moro Cojo Slough Subwatershed**

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THIS ACTION: **Adopt Resolution No. R3-2013-0008**

SUMMARY

For this agenda item, staff recommends the Regional Water Quality Control Board, Central Coast Region (Central Coast Water Board or Board) approve the resolution (Attachment 1 to this Staff Report) that establishes Total Maximum Daily Loads (TMDLs) for nitrogen compounds (nitrate and unionized ammonia) and orthophosphate for streams within the lower Salinas River and Reclamation Canal Basin and the Moro Cojo Slough Subwatershed, hereafter collectively referred to as the TMDL Project Area. Please refer to Figure 1 on page 16 for maps of the TMDL Project Area.

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 on the Central Coast's "303(d) Impaired Waters List," 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. The Central Coast Water Board is the agency responsible for protecting water quality consistent with the *Water Quality Control Plan for the Central Coastal Basin* (Basin Plan), including developing TMDLs for waterbodies identified as not meeting water quality objectives.

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 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 Water Board implements TMDLs through existing or new permits, orders, and prohibitions.

The geographic scope of this TMDL encompasses approximately 405 square miles of the lower Salinas Valley in northern Monterey County and includes the lowermost Salinas River, Moro Cojo Slough, Tembladero Slough, the Reclamation Canal, and associated upstream tributaries. Agriculture (including irrigated cropland and grazing lands) is the current, dominant land use in the

Project Area, with increasing transition to urban use. The City of Salinas and other urbanized areas account for approximately eight percent of the TMDL Project Area's land use. Grassland, shrub land, and forest also make up substantial parts of the upland reaches of the watershed within an ecosystem characterized by oak woodland, chamise-redshank chaparral, and coastal scrub.

Pollution of surface waters and groundwater due to nitrate and unionized ammonia (a nitrogen compound) has long been recognized as a problem in the lower Salinas valley. Indeed, multiple waterbodies within the TMDL Project Area are listed on the Clean Water Act section 303(d) list for water quality impairments due to nitrate and unionized ammonia, as well as nutrients, low dissolved oxygen, and chlorophyll-*a* (an algal biomass indicator).

Water Board staff also evaluated the potential for violations of the Basin Plan's biostimulatory substances water quality objective. Biostimulatory impairments can occur due to the presence of elevated nitrogen and phosphorus in waterbodies. It is well established and well documented[1] that nutrients (such as nitrate and phosphate), in combination with other physical and chemical factors, can potentially contribute to excessive growth of algae and aquatic plants in rivers, streams, and coastal waterbodies. This excess algal biomass can then potentially result in biostimulatory impairments by detrimentally affecting dissolved water column oxygen, pH, and aquatic habitat. Staff's assessment[2] indicates that seasonal biostimulatory impairments are widespread in the TMDL Project Area, and are generally associated with the dry season (May through October). These impairments are also having significant adverse downstream impacts to the ecologically sensitive Elkhorn Slough estuary as demonstrated by estuarine researchers and the peer-reviewed scientific literature (see TMDL Project Report – Attachment 2 to the Staff Report).

Based on the aforementioned information, a wide range of beneficial uses are not being supported, and the impairments therefore constitute a serious water quality problem. A comprehensive tabulation of the identified project area waterbodies and associated impairments is available in the TMDL Project Report (attachment 2 of the Staff Report). Currently, designated drinking water supply (MUN), aquatic habitat, groundwater recharge[3] (GWR), and contact recreation (REC-1) beneficial uses are not being supported in multiple waterbodies of the TMDL Project Area. Some surface waters also are not meeting non-regulatory recommended guidelines for nitrate in agricultural supply water (AGR) for sensitive crop types, indicating that designated agricultural supply beneficial uses may be detrimentally impacted[4]. Note that the designated groundwater recharge (GWR) beneficial uses of project area 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 – as

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[1] 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

[2] Staff's technical assessments, contained in the TMDL Project Report (attachment 2 to the Staff Report) have been scientifically peer-reviewed by independent academic researchers (see attachment 5 to the Staff Report).

[3] 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 so as to support and maintain the MUN or AGR beneficial uses of the underlying groundwater resource. Indeed, protection of the GWR beneficial use of surface waters has been recognized previously in approved California TMDLs.

[4] High concentrations of nitrate in irrigation water can potentially create problems for sensitive crops (e.g., grapes, avocado, 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 Central Coast 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.

such, this is consistent with the Water Board's highest identified priorities. For reference, the Water Board's two highest priority missions (listed in priority order) are presented below:

Water Board's Top Two Priorities (July 2012)[5]

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[6]. More than half of the nation's streams, including most streams in the lower Salinas Valley, have medium to high levels of nitrogen and phosphorus. According to USEPA, nitrate drinking water standard violations have doubled nationwide in eight years. Additionally, it has been widely demonstrated that drinking water supplies in the Salinas Valley have been substantially impacted by nitrate[7]. Algal blooms, resulting from the biostimulatory effects of nutrients, are steadily on the rise nationwide; related toxins have potentially serious health and ecological effects. These types of water quality impairments in the lower Salinas valley are also having significant adverse downstream impacts to the receiving waters of the ecologically sensitive Elkhorn Slough estuary as demonstrated by estuarine researchers and the peer-reviewed scientific literature.

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 unionized ammonia, nitrate, and orthophosphate will ultimately result in attainment of water quality standards in the TMDL Project Area.

Further information and documentation outlining the technical and administrative basis for the TMDLs is provided in the Final Project Report (Attachment 2 to this staff report). Also note that the Final Project Report, Basin Plan Amendment, and associated documents are provided at the Central Coast Water Board's website:

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

DISCUSSION

Project Development for TMDLs

The water quality data used for this TMDL project included data from several sources, as outlined below:

- Central Coast Ambient Monitoring Program (CCAMP). CCAMP is the Central Coast Water Board's regional-scaled, water quality monitoring and assessment program.

[5] See Staff Report for the July 11, 2012 Water Board meeting.

[6] 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".

[7] For example, see Univ. of Calif. Report for the SWRCB SBX2 1 Report to the Legislature, *Addressing Nitrate in California's Drinking Water*. Center for Watershed Sciences – University of California

- Cooperative Monitoring Program (Central Coast Water Quality Preservation, Inc.)[8]
- Central Coast Watershed Studies (CCoWS) Team (affiliated with the Watershed Institute at California State University-Monterey Bay)
- Elkhorn Slough National Field Reserve (ESNERR)
- Snap Shot Day monitoring program (Monterey Bay National Marine Sanctuary Citizen Watershed Monitoring Network)
- U.S. Environmental Protection Agency, Storage and Retrieval Data Warehouse (STORET) – legacy data center.
- City of Salinas NPDES Stormwater Program Annual Reports.

Staff also used land use data, hydrologic data, soils data, and groundwater data from the U.S. Geological Survey, National Hydrography Dataset, the California Department of Conservation, and the U.S. Department of Agriculture-Natural Resource Conservation Service, as well as from numerous other agency and scientific sources. Staff derived the proposed stream numeric targets for nitrate and orthophosphate using U.S. EPA-recommended approaches.

Numeric Targets

Numeric targets are water quality targets developed and used to ascertain when and where water quality objectives are achieved, and hence, when beneficial uses are protected.

- *Target for Nitrate (MUN-GWR standards)*

For impaired stream reaches that are required to support drinking water (MUN) and groundwater recharge (GWR) beneficial uses, staff is proposing a nitrate numeric target of 10 mg/L (nitrate as N) for this TMDL, which therefore is equal to the Basin Plan's numeric nitrate water quality objective protective of drinking water beneficial uses.

- *Target for Unionized Ammonia (toxicity)*

For unionized ammonia (a nitrogen compound), staff is proposing a numeric target of 0.025 mg/L (as N) for this TMDL, which therefore is equal to the Basin Plan's unionized ammonia numeric water quality objective 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, in order to implement the Basin Plan's narrative objective for biostimulatory substances the Central Coast Water Board is required to develop technically defensible numeric water quality criteria to assess attainment or non-attainment of the narrative water quality objective. To implement this narrative objective, 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. It is important to recognize that 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-eutrophication is an ongoing and active area of research. If the water quality objectives and numeric targets for biostimulatory substances are changed in the

[8] Cooperative Monitoring Program (CMP) is managed by Central Coast Water Quality Preservation, Inc. on behalf of irrigated agriculture throughout the Central Coast region.

future, then any TMDLs and allocations that are potentially adopted for biostimulatory substances pursuant to this project may sunset and be superseded by revised water quality objectives.

For biostimulatory substances (nitrate and orthophosphate), staff is proposing numeric targets that were developed using USEPA-recommended methodologies, and supplemented by the California Nutrient Numeric Endpoint (CA NNE) approach[9]. It is worth noting that according to the USEPA, using a combination of recognized nutrient target development approaches result in numeric criteria of greater scientific validity[10]. A summary of technical guidance used by 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) result 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);*

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

On the basis of technical guidance and established methodologies, staff is proposing seasonal biostimulatory water quality targets for nitrate which range by waterbody type-category[11] from 1.4 mg/L to 6.4 mg/L in the dry season and 8.0 mg/L in the wet season.

On the basis of technical guidance and established methodologies, staff is proposing seasonal biostimulatory water quality targets for orthophosphate which range by waterbody type-category from 0.07 mg/L to 0.13 mg/L in the dry season and 0.3 mg/L in the wet season.

In addition to using established and recognized methodologies in developing nutrient numeric water quality criteria, staff also submitted its technical analysis and approaches for independent scientific peer review by researchers with expertise in nutrient pollution and water quality issues. The following is a summary peer review comment received by staff regarding the proposed nutrient numeric water quality targets:

"On the whole, in my opinion the numeric targets strike a reasonable balance between being over-protective and under-protective*. *Nutrient targets in surface waters (1.4-6.4 mg-N/L for nitrate; 0.07- 0.13 mg-P/L for orthophosphate) are around an order of magnitude above ambient background levels (e.g., ~0.15 mg-N/L for nitrate; ~0.07 mg-P/L for orthophosphate), but are around an order of magnitude below current typical levels in surface waters in Project Areas (~3-25 mg-N/L for nitrate; ~0.1-1 mg-P/L for orthophosphate).* ***This is a reasonable starting point"****

Scientific Peer Review: summary comment by Dr. Marc Beutel, Associate Professor, Washington State University Department of Civil and Environmental Engineering (May 2012)

**emphasis added by Central Coast Water Board staff*

[9] The California nutrient numeric endpoints (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 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 NNE approach is to use nutrient response indicators to develop potential nutrient water quality criteria.

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

[11] Waterbody categories include: Alluvial basin floor stream and canal reaches, alluvial fan & alluvial plain creek reaches, alluvial flood plain river reaches, and tidal flat reaches

Further, as these proposed nutrient numeric targets are intended to support aquatic habitat beneficial uses, federal fisheries biologists from the U.S. National Marine Fisheries Service (NMFS) reviewed staff's proposed nutrient numeric targets and reported their support for the nutrient targets[12].

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

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 Project Report – Attachment 2 to this Staff Report.

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 water bodies 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 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, staff proposes a numeric target whereby dissolved oxygen concentrations are not to exceed 13 mg/L. This target is based on peer-reviewed research in California's central coast region[13] and addresses the USEPA "Gold Book" water quality standard for excessive gas saturation.

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 study[14] 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-eutrophication 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, staff proposes the numeric water quality target for chlorophyll *a* is 15 micrograms per liter (μg/L) for all water bodies (i.e., water column chlorophyll *a* concentrations not to exceed 15 μg/L).

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 levels[16] for human recreational uses of surface waters. This public health action level is 0.8 μg/L for human recreational uses of water. Therefore, staff proposes a numeric water quality target for microcystins[17] of 0.8 μg/L (i.e., microcystin not to exceed 0.8 μg/L). These targets are

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[12] Letter to Water Board staff dated Nov. 10, 2011, from Steven A. Edmondson, Southwest Regional Habitat Manager, National Oceanic and Atmospheric Administration – National Marine Fisheries Service.

[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

therefore protective of the REC-1 designated beneficial uses of surface waters. Based on available data, the Old Salinas River is impaired by microcystins on the basis of the OEHAA public health action level and listing criteria and methodologies identified in the *California 303(d) Listing Policy*. The numeric targets identified for microcystins in the 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.

Table 1 presents a tabular summary of the proposed numeric targets and associated identified water body impairments within the TMDL project area.

Table 1. Summary of TMDL numeric targets and identified impairments.

Designated Beneficial Use	Water Quality Objective, numeric targets, or recommended levels	Beneficial Use Impaired?	Stream Reaches Impaired
MUN (drinking water supply)	10 mg/L ($N0_3$-N)	Yes	Lower Salinas River (downstream of Spreckels), Old Salinas River, Merrit Ditch, Alisal Slough, Santa Rita Creek, Gabilan Creek, Natividad Creek, Alisal Creek, Quail Creek, Esperanza Creek, Chualar Creek
AGR (irrigation water supply)	30 mg/L ($N0_3$-N) *for sensitive crops* *(see Basin Plan Table 3-3)*	Yes[A]	Salinas River *Downstream of Spreckels (Site 309SSP) to Lagoon* Gabilan Creek *Downstream of Crazy Horse Rd. to Veterans Park Bridge*
AGR (livestock watering)	100 mg/L ($N0_3$-N) *(see Basin Plan Table 3-4)*	Yes	Gabilan Creek *Downstream of Natividad Rd. to Veterans Park bridge*
GWR (groundwater recharge)	10 mg/L (NO_3-N) in conjunction with situation specific lines of evidence [B]	Yes	Gabilan Creek *All reaches downstream of Crazy Horse Road* Alisal Creek *All Reaches*
Aquatic Habitat beneficial uses (WARM, COLD, SPWN)	*Basin Plan Biostimulatory substances objective* Nitrate: 1.4 mg/l to 8.0 mg/L Orthophosphate: 0.07 mg/L to 0.3 mg/L *Unionized ammonia objective:* 0.025 mg/L	Yes[D]	Lower Salinas River, Blanco Drain, Moro Cojo Slough, Old Salinas River, Tembladero Slough, Merrit Ditch, Reclamation Canal, Espinosa Slough, Santa Rita, Gabilan Creek, Natividad Creek, Alisal Creek, Alisal Slough
REC-1 (water contact recreation)	0.8 μg/L microcystins [C]	Yes[F]	Old Salinas River *All Reaches* *Only Old Salinas River, Salinas River Lagoon, Tembladero Slough and Lower Salinas River have been assessed at this time*

[A] The University of Calif. 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. Consistent with previous 303(d) assessments, staff used the threshold value (30 mg/L) which therefore conservatively identifies stream reaches where the designated AGR use may be detrimentally impacted.

[B] Refer to TMDL Project Report (attachment 2) and the California Listing Policy Section 3.11 (SWRCB, 2004)

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

[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)

[F] Limited amounts of microcystin data are currently available for the lower Salinas River, Salinas River lagoon, Old Salinas River, and Tembladero Slough

Source Analysis

Staff conducted source analyses to identify the contributing sources of nitrogen compounds and phosphate to the project area waterbodies. Discharges of unionized ammonia, nitrate, and orthophosphate originating from irrigated agriculture, urban lands, grazing lands, and natural sources are contributing loads to receiving waters. These source categories are assigned allocations for unionized ammonia, nitrate, and orthophosphate to achieve the TMDL. Staff estimates that irrigated agriculture provides the overwhelming majority of controllable water column loads in the TMDL project area and this source category is not currently meeting its proposed load allocation. In an effort to establish additional lines of supporting evidence, staff compared its source analysis to conclusions reached by other scientists in previous nutrient-water quality studies in the lower Salinas Valley. Note that other researchers have similarly concluded that agriculture is the dominant source of nutrient loading to surface waters and groundwaters of the lower Salinas Valley[18], which provides a qualitative weight-of-evidence approach to the TMDL and adds a measure of confidence to the source analysis staff developed.

TMDLs and Allocations

The TMDL represents the loading capacity of a waterbody—the amount of a pollutant that the waterbody can assimilate and still support beneficial uses. The TMDL is the sum of allocations for nonpoint and point sources and any allocations for a margin of safety. Owners and operators of irrigated lands, municipal storm water entities, natural sources, and owners/operators of livestock and domestic animals are assigned unionized ammonia, nitrate, and orthophosphate load allocations equal to the TMDL and numeric targets.

TMDLs are often expressed as a mass load of the pollutant but can also be expressed as a unit of concentration. The proposed TMDLs are concentration based, and they are equal to the numeric targets described in the numeric target section above. Concentration-based TMDLs are an appropriate expression of TMDLs and meet USEPA requirements for TMDL approval. Concentration-based allocations are also appropriate because drinking water and aquatic habitat beneficial uses are supported on the basis of concentration-based metrics. Therefore, loading capacities for this TMDL are composed of concentration-based nitrate, orthophosphate, and unionized ammonia water quality objective and numeric targets.

The TMDLs establish final load allocations that are to be attained by 30 years after the TMDL is approved by the Office of Administrative Law (OAL). To assess progress towards achieving the final allocations, 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 12 years, wet-season nitrate and orthophosphate allocations protective of biostimulatory substances shall be attained in 20 years, and the more stringent dry-season nitrate and orthophosphate allocations protective of biostimulatory substances shall be attained in 30 years.

[18] Anderson et al. (2003). *Nutrients in Surface Waters of Southern Monterey Bay Watershed* (California State University, Monterey Bay – Watershed Institute, Publication No. WI-2003-11); and Moran et al. (2011). *Nitrate Fate and Transport in the Salinas Valley: Final Report for the SWRCB*. (Lawrence Livermore National Lab LLNL-TR-484186)

Implementation and Monitoring

- *Irrigated Agriculture*

Staff estimates that nutrient loads from irrigated lands overwhelmingly are the largest source category of nutrient loading to waterbodies in the TMDL project area. Therefore, management measures will need to be implemented to achieve the proposed load allocations for irrigated lands. TMDL implementation and load allocations for owners and operators of irrigated lands will be implemented and achieved by complying 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. 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 TMDL Project Area aimed at addressing discharges of nutrients as described in the TMDL Final Project Report (Attachment 2).

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

1) Control discharges of nitrate to impaired waterbodies and groundwater[19].
2) Implement management practices capable of achieving load allocations identified in this TMDL and demonstrate progress towards this goal during the TMDL implementation phase.

- *Stormwater*

Waste load allocations (WLAs) will be incorporated into NPDES MS4 stormwater permits. Municipal separate storm sewer systems (MS4s) are considered relatively minor loads of nitrogen compounds and orthophosphate in the TMDL Project Area as a whole, based on staff's source analysis and on available storm drain effluent data. However, because these sources can potentially have significant localized effects on water quality, the MS4s are allocated waste load allocations. The Central Coast Water Board will address nitrogen compounds and orthophosphate discharged from the City of Salinas's and the County of Monterey's municipal separate storm sewer systems by regulating the MS4 entities under the provisions of an individual municipal stormwater permit or by the State Water Resource Control Board's General Permit for the Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (General Permit). To address the MS4 TMDL waste load allocations, the Central Coast Water Board will require the permittees to specifically address nitrogen compounds and orthophosphate in urban runoff through incorporation of a Waste Load Allocation Attainment Program (WAAP) in their Storm Water Management Plans (SWMPs). 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. The MS4 will submit the WAAP to the Central Coast Water Board and will report during the implementation phase.

- *Grazing Lands-Domestic Animal Manure*

Based on available information, owners and operators of grazing operations and domestic animals on grazing lands are in compliance with their load allocation. As such, new regulatory mechanisms, reporting requirements, and formal regulatory oversight are deemed unnecessary for this source category, and are not being proposed. To maintain and protect existing water quality, owners and operators of grazing operations should begin or continue to self-monitor, self-assess, and make management decisions consistent with technical guidance from existing rangeland water quality management plans, for example, the California Rangeland Water Quality Management Plan, the Central Coast Cattlemen's Grazing Lands Nonpoint Source Approach, or in conjunction with other resources appropriate to private grazing lands. It is important to note that lower Salinas

[19] Shallow, recently recharged groundwater is identified in this TMDL as a substantial source contributor of nitrate loads to stream waters of the TMDL project area.

River Watershed is in fact currently subject to the Domestic Animal Waste Discharge Prohibition and livestock owners are subject to compliance with an approved indicator bacteria TMDL load allocation[20]. 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. It should be noted that information developed in this project report does not conclusively demonstrate that all domestic animal operations are currently meeting load allocations; there are potentially unpermitted confined animal facilities, equestrian facilities, and grazing animal operations that do not meet load allocations. More information will be obtained, if merited, during the implementation phase of the TMDL to further assess the level of nutrient contribution from these source categories and to identify any actions if necessary to reduce loading.

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, 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 Project Report (attachment 2). 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 12 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 less stringent wet-season (Nov. 1 to Apr. 30) nutrient biostimulatory target-based allocations within 20 years of the effective date of the TMDL.
- Final Interim Waste Load and Load Allocations: Achieve the more stringent dry-season (May 1 to Oct. 31) nutrient biostimulatory target-based allocations within 30 years of the effective date of the TMDL.

The 12-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 Order No. R3-2012-0011 Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands 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. Twelve 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 includes there have been many years that implementation should have occurred since the first Agricultural Order in 2004; there is evidence that widespread improvements to irrigation efficiency and water management in recent years have occurred in the TMDL project area; and pilot projects have demonstrated that relatively rapid reductions in nutrient pollution by treatment with vegetated treatment systems are viable[21]. Consequently, staff anticipates that the first interim allocations are attainable by 2025. The 12-

[20] Central Coast Water Board Resolution No. R3-2010-0017 (Sept. 2010).

[21] See information in the TMDL Project Report, attachment 2 to the Staff Report.

year benchmark is also consistent with the Water Board's vision for the central coast region of healthy, functioning watersheds by the year 2025.

The 20-year timeframe to achieve the second interim waste load and load allocations (which are based on the less stringent 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 20 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 30-year timeline to meet more-stringent dry-season biostimulatory substances allocations are based on 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 project area surface waters for several decades. See the TDML Project Report (attachment 2) for information on groundwater quality and estimated residence time of baseflow in the subsurface. Therefore, 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[22].

Reconsideration of the TMDL

Additional monitoring and voluntary optional 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 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 Project Report (attachment 2 to the Staff Report), 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, staff proposes that the Water Board reconsider the waste load and load allocations, if merited by optional special studies and new research, ten years after the effective date of the TMDL, which is the date that the Office of Administrative Law (OAL) approves the TMDL.

ENVIRONMENTAL SUMMARY

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 Final Project Report (attachment 2), the CEQA Substitute Environmental Document (attachment 3, 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

[22] 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 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)

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:

1) an environmental analysis of the reasonably foreseeable methods of compliance,
2) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance,
3) an analysis of reasonably foreseeable mitigation measures to lessen the adverse environmental impacts, and
4) 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 Substitute Document Report (attachment 3) provides the environmental analysis required by Public Resources Code section 21159. The CEQA Substitute Document 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 impacts to the environment associated with the reasonably foreseeable methods of compliance.

The CEQA Environmental Checklist and associated analysis 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 a significant adverse effect on the environment with the exception of *potentially* significant impacts associated with Biological Resources – CEQA Checklist Category IV(a). and *potentially* significant impacts to habitat of fish or wildlife species associated with Mandatory Findings of Significance – CEQA Checklist Category XVII.(a). Central Coast Water Board staff have 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, it should be noted 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 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 literature[23] that water quality degradation, stream alteration, and human activities have, on balance, have constituted an adverse impact to the natural biodiversity of the lower Salinas Valley. 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.

[23] Refer to TMDL Project Report (attachment 2 to the Staff Report)

Also noteworthy is the fact that nutrient control strategies and measures in agricultural watersheds have been underway for many years in various agricultural watersheds in the State and throughout the nation. Based on the literature, research, and information staff has surveyed for this project, we are unaware of any cases where nutrient control strategies have directly been 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 eliminates important examples of the major periods of California history or prehistory

Although potentially significant adverse impacts to Biological Resources IV(a) were identified, 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 to make a statement of overriding considerations, if it finds that the adverse environmental effects are acceptable given the identified benefits.

The Project Report (attachment 2) evaluated environmental, economic, and technical factors, including the water quality of the project area, the impacted population, the technical issues affecting the reasons for the impairment and that would affect the ability to comply with the TMDL, and the reasonably expected cost of compliance..

ANTI-DEGRADATION

These Basin Plan amendments are 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

Independent scientific peer review was conducted for this TMDL project. Two individuals were selected to review this document for scientific adequacy: Dr. Glenn E. Moglen, Professor, Virginia Tech University–Department of Civil and Environmental Engineering; and Dr. Marc W. Beutel, Associate Professor, Washington State University–Department of Civil and Environmental Engineering. These researchers collectively have substantial research experience in water quality, nutrient pollution, hydrology, and aquatic habitat.

Peer reviewer selection was facilitated through the University of California. The detailed step-by-step guidance for setting up and obtaining reviews appears as Exhibit F[24] in an Interagency Agreement between the California Environmental Protection Agency and the University of California. A January 7, 2009 Supplement to the Guidelines[25], in part, provides guidance to ensure confidentiality of the process.

[24] Online linkage: http://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/exhibit_f.pdf

[25] http://www.waterboards.ca.gov/water_issues/programs/peer_review/docs/rb1_klamath_river/peer_review_guide_010709.pdf

The two peer reviewers provided comments to staff between April and May 2012. Staff prepared responses and revised the Project Report in response to these comments prior to distributing it for a public comment. Peer review comments and staff responses are included in attachment 5. As a result of these comments, staff made several changes to technical information contained in the Project Report; these changes are discussed in staff responses described in attachment 5.

PUBLIC INVOLVEMENT

Staff conducted stakeholder outreach efforts during TMDL development. Staff conducted public workshops in the city of Salinas in June 2010, April 2011, October 2011, and November 2012, and staff engaged with stakeholders during the development of the TMDL through informal meetings, correspondence, and telephone contact. In particular, extremely helpful information, feedback, and assistance were provided by individuals and researchers affiliated with the Elkhorn Slough National Estuarine Research Reserve, the Monterey County Water Resources Agency, the California State University Monterey Bay Watershed Institute, the Central Coast Wetlands Group at Moss Landing Marine Labs, the Monterey Bay Aquarium Research Institute, and the Monterey County Water Quality and Operations Committee. Other individuals and entities staff engaged with during public workshops or during TMDL development included representatives of the following:

- Monterey County Water Resources Agency
- City of Salinas
- Costa Farms, Inc.
- Monterey Bay Aquarium Research Institute
- University of California Cooperative Extension
- Resource Conservation District of Monterey County
- Representatives of commercial farms and ranches
- Agricultural consultants
- Representative of State Senator Sam Blakeslee
- Monterey County of Public Works
- Researchers and resource professionals from the Elkhorn Slough National Estuarine Research Reserve
- Researchers from California State University-Monterey Bay and the University of West Florida
- Central Coast Water Quality Preservation, Inc.
- U.S. National Marine Fisheries Service
- Monterey Coast Keeper
- Monterey County Farm Bureau
- Monterey Bay National Marine Sanctuary
- Moss Landing Marine Labs
- Monterey County Water Quality and Operations Committee

Valuable input, information, feedback and contributions provided by stakeholders that assisted in TMDL development are outlined in the TMDL Project Report (see attachment 2 to the Staff Report).

Staff conducted a California Environmental Quality Act (CEQA) stakeholder scoping meeting on October 3, 2011. Staff addressed questions and comments from attendees.

The Staff Report, Resolution, and technical project reports were made available for a 50-day public comment period commencing on **October 8, 2012.** Central Coast Water Board staff solicited public comments from a wide range of stakeholders including owners/operators of agricultural operations, agricultural representatives, environmental groups, resource professionals, public agencies and representatives of city and county storm water programs.

Comments were received from:

1. Mr. Norman Groot, Executive Director, Monterey County Farm Bureau, Salinas
2. Mr. Kirk F. Schmidt, Executive Director, Central Coast Water Quality Preservation, Inc., Watsonville
3. Mr. Steve Shimek, Chief Executive, The Otter Project, Monterey, in an email attachment received November 26, 2012.
4. Ms. Darlene Din, Ag Land Use & Public Policy Consultant, in an email received November 26, 2012.
5. Ms. Sarah Lopez, Technical Program Manager, Central Coast Water Quality Preservation, Inc., Watsonville, in an email attachment received November 26, 2012.
6. Ms. Abby Taylor-Silva, Grower Shipper Associations of Central California, and Ms. Kay Mercer, KMI, in an email attachment received November 26, 2012.
7. Dr. Marc Los Huertos, Associate Professor, Calf. State University Monterey Bay, in an email attachment received November 27, 2012.
8. Ms. Jennifer Biringer, Central Coast Project Director – The Nature Conservancy, and Ms. Sarah Newkirk, Coastal Project Director – The Nature Conservancy, Monterey, in an email attachment received November 27, 2012.

Public comments and staff responses are included in attachment 6 to this Staff Report. Staff clarified and improved technical information in this TMDL project in several areas based on public comment.

RECOMMENDATION

Adopt Resolution No. R3-2013-0008

ATTACHMENTS:

The attachments are available at:

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

1. Resolution No. R3-2013-0008 and Basin Plan Amendment Language
2. Final Project Report: "Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in Lower Salinas River and Reclamation Canal Basin, and the Moro Cojo Slough Subwatershed"
3. CEQA Substitute Document
4. Notice of Opportunity for Public Comment
5. Scientific Peer Review Comments
6. Public Comment and Staff Responses
7. Notice of Public Hearing / Notice of Filing

Figure 1. Relief map of the TMDL Project Area and Regional Map