

IRWMP Project Prospectus: Implementing Nutrient Management in the Santa Margarita River Watershed

7-23-2010 Draft

Project Need

Rapid urbanization within the San Diego Region has resulted in increased nitrogen (N) and phosphorus (P) loads to streams and estuaries, resulting low dissolved oxygen and increased algal blooms. Addressing these adverse effects requires selecting appropriate N and P water quality objectives (WQO), based on the level of nutrients that the waterbody can assimilate. The concentrations that can be sustainably assimilated vary greatly among individual streams or estuaries, due to site-specific factors (e.g. hydrology, shading, temperature, etc.) that modulate biological response to nutrients. For this reason, nutrient WQOs that take a “one-size-fits-all” approach are problematic. Currently, the basin plan of the San Diego Regional Water Quality Control Board (SDRWQCB) contains basin-wide N and P numeric objectives. SDRWQCB staff is entertaining an alternative regulatory approach advocated by the State Water Resources Control Board (SWRCB) staff and USEPA Region 9, referred to as the nutrient numeric endpoint (NNE) framework. The SDRWQCB has stated that it would consider the development of alternative numeric nutrient WQOs during its basin plan triennial review process, based on the NNE approach.

The NNE is centered on two principal tenets: 1) development of WQOs based on the response (e.g. increased algal biomass, dissolved oxygen, etc.) rather than nutrient concentrations in order to more directly link impairments to beneficial use and 2) use of spreadsheet models to link numeric response targets back to site-specific nutrient concentration goals. While the NNE represents a significant advancement over the one-size-fits-all approach, several data gaps are apparent in science supporting the NNE: 1) numeric stream algal biomass endpoints were selected through best professional judgment of a team of international experts, with a lack of data and expertise in Mediterranean streams, 2) validation of the stream algal biomass spreadsheet tool was limited, with little data from So. California, 3) poor characterization of “natural background” concentrations of nutrients and algae in streams, and 4) while estuarine NNE algal biomass targets are under development, no spreadsheet tool is available for estuaries, thus requiring modeling to establish estuary-specific nutrient goals.

The Santa Margarita River watershed represents an ideal location to refine nutrient WQOs and begin implementation of nutrient reduction and water conservation practices. The watershed, which encompasses approximately 750 sq. miles in northern San Diego and southwestern Riverside counties, has several stream reaches and an estuary that are listed on the Clean Water Act section 303(d) list for N, P or eutrophication. Nutrient loads may come from a variety of sources including agriculture, nursery operations, urban runoff, septic systems, and golf course operations. However, natural nutrient sources may also be contributing to the basin plan objective exceedances. Further, existing nutrient targets are established based dry weather, steady state conditions, but are also applied to wet weather conditions, potentially leading to false indications of impairment. The process for setting appropriate water quality goals for this watershed must take into account the complexity of water resource management issues, multiple land owners and stakeholders. In addition, early implementation activities can target nutrient reduction and water conservation practices now, in advance of final nutrient targets in the watershed.

Project Description

The goals of the proposed project are to set nutrient WQOs for the Santa Margarita River and estuary and to begin implementation of any necessary nutrient reduction and water conservation practices. This will be done establishing the scientific basis and stakeholder consensus to support the adoption of alternative objectives through SDRWQCB triennial basin plan update and through the optimization of agricultural irrigation practices in

the Mission Resource Conservation District (MRCD) region, and in coordination with the Elsinore, Murrieta, and Anza Reesource Conservation District (EMARCD), public outreach on water conservation and reduction in nutrients. Specifically, the project consists of four major tasks: 1) form and facilitate discussions among a SMR watershed stakeholder group to guide project activities, review technical work products, and achieve consensus; 2) conduct monitoring and special studies to address data gaps identified by stakeholders to achieve project objectives 3) develop proposed nutrient WQOs for Santa Margarita River and Estuary based on the NNE approach and considerations of local data, and 4) identify and implement nutrient reduction and water conservation practices including opportunities to optimize irrigation on agricultural lands within the watershed. The geographic scope of the project would include the Santa Margarita Estuary and reaches of the River downstream of the major dams located within the watershed (see Figure 1).

The project would provide benefits to the watershed and to the region. In the near term, this project would provide scientifically –based water quality objectives for SMR watershed that would ultimately conserve water and control eutrophication by implementing nutrient source reductions, water conservation practices, and other best management practices (BMPs). This would counteract hydromodification and lead to the improved protection and restoration of habitat and open space, optimized water-based recreational opportunities, and enhance the maintenance of water resources. Within the region, the project would further the technical foundation of water management by demonstrating a science-based approach to establishing nutrient WQOs for streams and estuaries. This effort would a template for similar efforts with the region. Finally, the effort would maximize stakeholder involvement in the all aspects of the project, fostering a sense of stewardship and consensus to further watershed management goals.

The project leverages approximately \$2 million dollar investment in data collection and other resources contributed by watershed stakeholders and other partners since 2007 including: 1) previous and ongoing monitoring by Camp Pendleton in the lower river, 2) data for the estuary collected by MS4 co-permittees for the SDRWQCB Monitoring Order (and the Bight 08 Eutrophication Assessment), 3) data collected by the SMC Regional Stream Monitoring Program, and 4) technical support by the SWRCB for the development of estuarine NNE.

Proposed Scope of Work

Task 1. Project Admin

1.1 Invoicing and subcontract administration

1.2 Plans and Compliance Requirements.

Includes GPS information for Project site and monitoring locations, Project Assessment and Evaluation Plan (PAEP), Non Point Source Pollution Reduction Project Follow-up Survey Form, **Monitoring Plan (MP)**, Monitoring Reports, **Quality Assurance Project Plan (QAPP)**, copy of final CEQA/NEPA Documentation, Land Owner Agreement(s), Applicable Permits

1.3 Reporting

Includes: Grant Summary Form, Progress Reports, Natural Resource Projects Inventory (NRPI) Project Survey Form, Draft Final Project Report, and Final Project Report

Task 2. Form and Facilitate Discussions Among Watershed Stakeholder Group

The purpose of this task is to form and facilitate a stakeholder group that will guide project activities, review and provide feedback on technical and policy elements of the project. The group will be formed from the existing SMR Executive Management Team (EMT), a group comprised of key agencies and land owners in the watershed which meet quarterly to address water management issues. One of the first tasks of the group will be to develop a

monitoring program to support the development of nutrient WQOs, the product of which will be a monitoring plan and QAPP. This will be done by identifying key questions and conceptual approach, determining specific technical activities and information required, evaluating existing data and identifying data gaps.

2.1 *Form stakeholders group*

2.2 *General meeting facilitation and logistics.* [N.B.--SCCWRP would facilitate development of monitoring workplan with SD County support; independent facilitator would be hired to take over leading stakeholder group once project funded]

Deliverables include: 2.1.1) list of stakeholders, 2.1.2) meeting agenda, notes, presentation materials, 2.1.3) PowerPoint presentation of monitoring plan

Task 3. Conduct Monitoring and Special Studies to Address Data Gaps

The purpose of this task is to address identified data gaps required to support project. Monitoring plan design and specific data gaps to be addressed will be identified in Task 2. Two potential components, pending analysis of data gaps:

- Core field data collection, including ambient nutrient concentrations, algae, and site-specific factors controlling response (canopy cover, substrate, flow, etc.)
- Special studies characterizing “natural background”, studies to inform appropriate algal biomass thresholds and indicator variability (margin of error), important sinks (denitrification), sources (groundwater), transformation, characterizing variability in numeric targets, etc. Special studies required will be better defined during work plan discussions.

3.1 *Core field data collection.* As a placeholder (pending outcome of task 2, assume 30 sites sampled 3 times per year during growing season over 2 years. Measure hydrology, SWAMP algae protocol (includes water chemistry, algal biomass, cover, biovolume, and PHAB)

3.2 *Special studies*

Deliverables: 3.1.1) QAQC'ed data uploaded to SMR watershed database, 3.1.2) technical report summarizing data quality, baseline conditions by reach, and 3.1.3) technical report summarizing special studies

Task 4. Establish nutrient WQOs for Santa Margarita River and Estuary

The purpose of this task is to establish nutrient WQOs for SMR estuary and river reaches downstream of major dams/impoundments.

The approach to developing WQOs for streams would involve two steps: 1) regional validation of stream NNE framework, and 2) refinement of nutrient targets at specified reaches. The first step (Task 4.1.) leverages ongoing regional research to validate the stream NNE framework, using the Stormwater Monitoring Coalition's (SMC) Regional Stream Bioassessment Program, which has data collected on algae, benthic macroinvertebrates, water quality, flow and other site specific factors. This work, supported by USEPA Region 9 and the County of San Diego, would accomplish two things: 1) evaluate the validity of the existing NNE biomass thresholds via examining the relationship between algal biomass/taxonomy and benthic macroinvertebrates, and 2) validate the NNE spreadsheet model, estimate accuracy and precision, and identify sources of error that be explored in further

detail with in-stream modeling. Existing SMR watershed data will be used in the regional validation. The second step (4.2) would involve applying the NNE spreadsheet tools to specified SMR reaches, and developing in-stream models to support refinement of stream nutrient WQOs in instances where NNE spreadsheet models do not appear to work well, or better precision is required to lower margin of error. The output will be specific N and P WQOs for specified reaches.

The approach for developing nutrient WQOs for the SMR estuary leverages two major activities: 1) data collected to support modeling in the estuary and watershed to develop TMDLs and 2) ongoing research to develop the estuarine NNE framework, based on dissolved oxygen and macroalgae as endpoints. In 2007, the SDRWQCB issued a Monitoring Order to San Diego Co-permittees to collect data to support the calibration and validation of watershed loading and lagoon water quality models, with the specific purpose of calculating the “maximum load” of nutrients that the estuary can sustain and establishing the TMDL (load and waste load allocations, implementation plan, etc.). To assist in this effort, SCCWRP was funded by a Prop 50 grant to conduct special studies to complement the monitoring order. Data collection is complete and a final baseline report will be issued in December 2010. In addition, SCCWRP is providing technical support to the SWRCB by conducting literature review and studies to refine estuarine water column dissolved oxygen objectives and develop NNE thresholds for macroalgal blooms on mudflats. Final deliverables for this statewide estuarine NNE project will be available in Spring 2012, but a preliminary assessment framework will be available in Spring 2011.

This project will build on these existing efforts by reviewing with stakeholders available data for selection of a macroalgal NNE target, and calibrating and validating the estuarine water quality model in order to estimate the “maximum sustainable load” of N and P. This work will form the basis for selecting N and P water quality objectives for the estuary and will inform the river nutrient WQOs by determining the concentrations required to protect downstream (i.e. estuarine) beneficial uses. The calibrated/validated lagoon water quality model can then be used to complete the estuary.

- 4.1 Validate stream NNE framework with SMC data for southern California coastal watersheds, including any existing data from SMR
- 4.2 Refine nutrient water quality objectives for specified SMR River reaches, using a combination of the NNE spreadsheet tool and dynamic simulation models of in-stream processes. *Note that budget allocated for in-stream modeling of 7 reaches.*
- 4.3 Conduct modeling studies to support refinement of estuary nutrient water quality goals.
- 4.4 Propose recommended nutrient water quality objectives to update the SDRWQCB basin plan

Deliverables: 4.1.1) report on regional validation of NNE framework, 4.2.1) report synthesizing in-stream and estuary model calibration, validation, and scenario analyses, 4.3.1) report synthesizing lagoon water quality model calibration and validation, and 4.4.1) stakeholder report supporting proposed SMR water quality goals

Task 5. Implement Practices to Optimize Irrigation on Agricultural Lands

The purpose of this task is to reduce nutrient runoff and conserve water through the optimization of irrigation practices on agricultural lands. The Mission Resource Conservation District (MRCD) will conduct individual

Estimated Budget

Task Budget	Grant	Match	Total
Task 1 Project Administration			
1.1 invoicing	\$20,000		\$20,000
1.2 plans and compliance (includes monitoring plan and QAPP)	\$11,000	\$40,000	\$51,000
1.3 quarterly, draft and final project reporting, grant summary form	\$43,000		\$43,000
Task 2 Form Watershed Stakeholder Group			\$0
2.1 Form stakeholders group	\$2,000		\$2,000
2.2 Meeting facilitation and logistics	\$130,000		\$130,000
2.3 Facilitate development of monitoring plan and QAPP		\$30,000	\$30,000
Task 3 Address data gaps with monitoring and special studies			
3.1 Conduct core field studies	\$465,000		\$465,000
3.2 Special studies	\$149,000	\$150,000	\$299,000
Task 4 Refine numeric targets			
4.1 Regional Validation of NNE			\$0
4.2 Refine numeric targets in SMR River	\$400,000	\$70,000	\$470,000
4.3 Refine SMR estuary nutrient targets	\$250,000	\$260,000	\$510,000
4.4 Propose WQOs to update basin plan objectives	\$130,000		\$130,000
Task 5.			
5.1 Water surveys	\$25,000		\$25,000
5.2 Public outreach	\$25,000		\$25,000
Totals	\$1,650,000	\$550,000	\$2,200,000

Line Item Budget	Grant	Match	Totals
Personnel	\$63,000		
Travel and per diem	?		
Supplies	?		
Equipment	?		
Contract Services			
Contract Laboratories	\$50,000		\$50,000
Stetson Engineering	\$459,000	\$40,000	\$499,000
Facilitator/TMDL Support	\$93,000	\$0	\$93,000
SCCWRP	\$555,000	\$250,000	\$795,000
Estuary Modeler	\$250,000	\$0	\$250,000
SDRWCB	\$180,000		\$180,000
MRCB	\$50,000		\$50,000
SPAWAR		\$200,000	\$200,000
Tetra Tech Inc.		\$60,000	\$60,000
Total	\$1,650,000	\$550,000	\$2,200,000

Brief justification:

Task 1.2 includes support for SCCWRP and Stetson to write monitoring plan and QAPP (\$11K), with a match of \$40K from Camp Pendleton

Task 1.1, 1.3 includes \$63,000 for admin to project lead.

Task 2.1 - 2.2 includes support for independent facilitator (to be determined) for general meeting facilitation, and match of \$30,000 for SCCWRP to facilitate monitoring plan development from the County of San Diego.

Task 3.1 represents a placeholder for new data to be collected. Specific monitoring plan and associated costs will be determined in Task 2 (fall 2010). \$465K (\$390K to Stetson, \$25K to SCCWRP, and \$50,000 to contract labs) represents data collection, based QA and "summary" analysis and reporting for 30 sites at 3 times per years for 2 years (per site event cost of ~\$2600).

Task 3.2 represents a placeholder for special studies to be determined in Task 2 (fall 2010); costs are likely to be higher, but reduced to keep total budget low; additional funding may come from SEP or other sources. Match on this task is \$150K for special studies from the County of San Diego to SCCWRP (related to Rainbow Creek nutrient TMDL)

Task 4.1 is being conducted with external EPA ORD funding to SCCWRP and support from the SMC to SCCWRP (not documented as match).

Task 4.2 includes \$385K for SCCWRP and \$15K for Stetson to conduct NNE spreadsheet validation with new monitoring data and modeling for 7 reaches of the river. Task includes \$70K in match from County of San Diego to SCCWRP.

Task 4.3 includes \$250K for estuary modeling (firm to be determined). Includes match of \$60K from SDRWQCB for TetraTech to calibrate and validate the watershed loading model, and \$200K match from Camp Pendleton (\$152K) and the MS4 Co-permittees (\$48K).

Task 4.4 includes \$130K for SDRWQCB staff to develop documents to update basin plan.

Task 5 includes \$50K for MRCD for agricultural water surveys and public outreach workshops