



DATE: June 24, 2015

TO: Honorable Mayor and City Councilmembers

FROM: Water Utilities Department

SUBJECT: **ACCEPTANCE AND APPROPRIATION OF GRANT FUNDS AND APPROVAL OF A PROFESSIONAL SERVICES AGREEMENT FOR WATER QUALITY MONITORING SERVICES AT LOMA ALTA SLOUGH**

SYNOPSIS

Staff recommends that the City Council accept \$348,240 in grant funds from the State Water Resources Control Board awarded to the City for the Microbial Source Identification Study project; appropriate the funds to the Water Utilities Department; approve a Professional Services Agreement in the amount of \$659,461 with Weston Solutions, Inc. of Carlsbad for long-term water quality monitoring services in Loma Alta Slough and bacteria source identification; and authorize the City Manager to execute the agreement.

BACKGROUND

The Loma Alta Slough near Buccaneer Beach is listed on California's Clean Water Act 303(d) List of impaired waters due to algae growth (Exhibit A). During the summer months, stagnant conditions and nutrient inputs cause thick algae growth that degrades water quality. A determination for the Total Maximum Daily Load (TMDL) to control nutrients entering the Slough has been in development since 2008. The TMDL is a regulatory planning tool to restore water quality in Loma Alta Slough, by establishing specific numeric limits for nutrient and other constituents that impair water quality. Prior research has suggested the likely sources of nutrients are groundwater seepages into the creek and urban runoff discharges from the City storm drain system.

In early 2014, the City worked with the San Diego Regional Water Quality Control Board (SDRWQCB) to find an adaptive means to improve water quality in the Loma Alta Slough rather than through the restrictive TMDL process. As a result of this compromise, the SDRWQCB issued a Resolution (R9-2014-020) allowing the City to use its coverage under the Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) Permit to prohibit urban runoff and polluted storm water from entering Loma Alta Slough.

To achieve the desired results, the City issued a Request for Proposals (RFP) to find a qualified consultant to perform technical water quality monitoring tasks over the next seven years. The purpose of the monitoring is to assess whether the City's watershed management strategies, including comprehensive education and outreach, are effective

in improving water quality in the Slough. Failure to effectively improve water quality in the Slough could result in enforcement actions by the Regional Board, eliminating flexibility for the City.

The objective of outsourcing these services is to have a third party proficient in watershed hydrology and pollutant loading studies complete the annual water quality monitoring and reporting requirements.

In addition to this water quality monitoring component, a significant task included in the total cost of the contract is for the consultant to complete a grant-funded water quality research project in the Loma Alta Creek to identify sources of additional contamination. This is a separately funded project through the State Water Resources Control Board Clean Beaches Initiative grant program. City Council reviewed the staff report and authorized Resolution No. 14-R0722-1 associated with this project at the December 3, 2014 Council meeting. (Loma Alta Creek Microbial Source Tracking Study Project)

ANALYSIS

The primary objective of this work is to ensure that the City of Oceanside completes the Loma Alta Slough water quality monitoring consistent with the requirements in the RWQCB Resolution, and uses the results to assist in future watershed management decisions. The specific objectives include:

1. Develop a technical water quality monitoring program.
2. Complete annual water quality monitoring in the Loma Alta Slough.
3. Prepare annual reports that summarize the activities and analyses completed by the consultant.
4. Interpret the study results in relation to the City's watershed management activities.
5. Pending award of Clean Beaches Initiative grant funds, design and implement a research project to identify additional sources of contamination in the Loma Alta Creek.

In order to accomplish the above objectives, qualified environmental consulting firms were solicited to provide the technical services needed. On February 24, 2015, a RFP was made available and four proposals were received. Reviewers rated all proposals and conducted interviews with the highest scoring firms. Through the review process, it has been determined that Weston Solutions, Inc. rated highest overall, and offered the best methodology to meet the RFP objectives (Exhibit B & C).

FISCAL IMPACT

The Clean Water Program budget has \$140,000 allocated in account 750762711.5326 which will be carried into FY15/16 for the first-year costs of the Loma Alta Slough monitoring program. Thereafter, the Clean Water Program will budget \$50,000 per year to cover annual monitoring and reporting costs. The five-year contract total for the Loma Alta Slough monitoring is estimated not to exceed \$312,391.

Staff is requesting that Council appropriate funds in the amount of \$348,240 to Clean Beaches Initiative Grant account 836143614272.4376 for an optional Clean Beaches

Initiative Grant project, once the final grant award letter has been received. A preliminary funding commitment document was posted by the State Water Board on May 29, 2015, and after the public comment period ends, an official executed funding commitment will follow. While staff expects this document before the end of the fiscal year, it was not received by the publish date for this staff report. Due to the fact that Council does not have any meetings in July, staff is requesting that Council accept the preliminary award notification to appropriate the grant funds (Exhibit D). The tasks related to this optional project will be charged against this account, 836143614272.5305 and reimbursed by the State as they are paid by the City, according to the terms of the grant agreement with the State Water Resources Control Board.

COMMISSION OR COMMITTEE REPORT

The Utilities Commission received an update on this project at its meeting on May 11, 2015.

CITY ATTORNEY'S ANALYSIS

The referenced documents have been reviewed by the City Attorney and approved as to form.

RECOMMENDATIONS

Staff recommends that the City Council accept \$348,240 in grant funds from the State Water Resources Control Board awarded to the City for the Microbial Source Identification Study project; appropriate the funds to the Water Utilities Department; approve a Professional Services Agreement in the amount of \$659,461 with Weston Solutions, Inc. of Carlsbad for long-term water quality monitoring services in Loma Alta Slough and bacteria source identification; and authorize the City Manager to execute the agreement.

PREPARED BY:


Justin Gamble
Environmental Specialist

SUBMITTED BY:


Michelle Skaggs Lawrence
Interim City Manager

REVIEWED BY:

Peter Weiss, Assistant City Manager

Jason Dafforn, Interim Water Utilities Director

Jane M. McPherson, Interim Financial Services Director





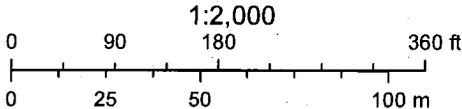


- Exhibit A: Site Map
- Exhibit B: Consultant Rating Form
- Exhibit C: Professional Services Agreement
- Exhibit D: Preliminary Grant Program Award

Exhibit A - Loma Alta Slough at Buccaneer Beach



June 11, 2015



Orthophotography by Aerometric for USGS, NGTOC III, ROLLA MO, SAN DIEGO CA

EXHIBIT A

CONSULTANT PROPOSAL - RATING FORM

NAME OF FIRM: A - Amec Foster Wheeler, B - Geosyntec Consultants, C - RBF/Michael Baker Intl, D - WESTON Inc.

DATE: 4/7/2015

PROJECT: Loma Alta Watershed Monitoring Services

PROJECT: 750762711

ITEM	POINTS	CONSULTANT'S RATING				
		A	B	C	D	E
I. QUALIFICATIONS OF FIRM AND MEMBERS:						
A. Specialized expertise of members	15	15	14	12	15	
B. Adequacy of staff and resources.	15	15	14	13	15	
II. PERFORMANCE OF WORK SIMILAR IN CHARACTER:						
A. Comparable work (local area preferred).	10	10	9	6	10	
B. Proposal submitted by Oceanside firm.	6	0	0	0	0	
C. Proposal included an Oceanside firm as part of a consulting team.	4	0	0	0	0	
D. Additional points based on abilities, qualifications, and commitment of Oceanside firm.	5	0	0	0	0	
III. ABILITY TO PROVIDE SERVICES:						
A. Ability to complete job on time.	10	10	10	9	10	
IV. QUALITY OF PROPOSAL:						
A. Satisfactorily address all objectives.	10	10	9	8	10	
B. Provide additional amplifying information.	5	4	5	4	5	
C. Presentation, clarity, neatness.	5	4	5	4	5	
V. WORK PERFORMANCE FOR THE CITY:						
A. No work in past 12 months.	10	10	10	10	10	
B. Work in past 12 months - deductions based on Contract amount.						
VI. PRICE:						
A. Overall cost.	10	8	9	7	9	
TOTALS:	105	86	85	73	89	0

RANKING:

1 _____
 2 _____
 3 _____
 4 _____
 5 _____

RATED BY:

Name/Title: _____
 Name/Title: _____
 Name/Title: _____
 Name/Title: _____
 Date: _____

EXHIBIT B

CITY OF OCEANSIDE

PROFESSIONAL SERVICES AGREEMENT**PROJECT: LONG-TERM WATER QUALITY MONITORING SERVICES AT
LOMA ALTA SLOUGH - 750762711**

THIS AGREEMENT, dated _____, 2015 for identification purposes, is made and entered into by and between the CITY OF OCEANSIDE, a municipal corporation, hereinafter designated as "CITY", and WESTON SOLUTIONS, INC., hereinafter designated as "CONSULTANT."

NOW THEREFORE, THE PARTIES MUTUALLY AGREE AS FOLLOWS:

1. **SCOPE OF WORK.** The CONSULTANT desired to conduct water quality monitoring of the Loma Alta Slough as is more particularly described in the CONSULTANT'S proposal dated March 24, 2015, attached hereto and incorporated herein as Exhibit A.
2. **INDEPENDENT CONTRACTOR.** CONSULTANT'S relationship to the CITY shall be that of an independent contractor. CONSULTANT shall have no authority, express or implied, to act on behalf of the CITY as an agent, or to bind the CITY to any obligation whatsoever, unless specifically authorized in writing by the City Engineer. The CONSULTANT shall not be authorized to communicate directly with, nor in any way direct the actions of, any bidder or the construction contractor for this project without the prior written authorization by the City Engineer. CONSULTANT shall be solely responsible for the performance of any of its employees, agents, or subcontractors under this Agreement. CONSULTANT shall report to the CITY any and all employees, agents, and consultants performing work in connection with this project, and all shall be subject to the approval of the CITY.
3. **WORKERS' COMPENSATION.** Pursuant to Labor Code section 1861, the CONSULTANT hereby certifies that the CONSULTANT is aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and the CONSULTANT will comply with such provisions, and provide certification of such compliance as a part of this Agreement.
4. **LIABILITY INSURANCE.**
 - 4.1. CONSULTANT shall, throughout the duration of this Agreement maintain comprehensive general liability and property damage insurance, or commercial

LONG-TERM WATER QUALITY MONITORING
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general liability insurance, covering all operations of CONSULTANT, its agents and employees, performed in connection with this Agreement including but not limited to premises and automobile.

4.2 CONSULTANT shall maintain liability insurance in the following minimum limits:

Comprehensive General Liability Insurance

(bodily injury and property damage)

Combined Single Limit Per Occurrence	\$ 1,000,000
General Aggregate	\$ 2,000,000*

Commercial General Liability Insurance

(bodily injury and property damage)

General limit per occurrence	\$ 1,000,000
General limit project specific aggregate	\$ 2,000,000

<u>Automobile Liability Insurance</u>	\$ 1,000,000
---------------------------------------	--------------

*General aggregate per year, or part thereof, with respect to losses or other acts or omissions of CONSULTANT under this Agreement.

4.3 If coverage is provided through a Commercial General Liability Insurance policy, a minimum of 50% of each of the aggregate limits shall remain available at all times. If over 50% of any aggregate limit has been paid or reserved, the CITY may require additional coverage to be purchased by the CONSULTANT to restore the required limits. The CONSULTANT shall also notify the CITY'S Project Manager promptly of all losses or claims over \$25,000 resulting from work performed under this contract, or any loss or claim against the CONSULTANT resulting from any of the CONSULTANT'S work.

4.4 All insurance companies affording coverage to the CONSULTANT for the purposes of this Section shall add the City of Oceanside as "additional insured" under the designated insurance policy for all work performed under this agreement. Insurance coverage provided to the City as additional insured shall be primary insurance and other insurance maintained by the City of Oceanside, its officers, agents, and employees shall be excess only and not contributing with insurance provided pursuant to this Section.

LONG-TERM WATER QUALITY MONITORING
SERVICES AT LOMA ALTA SLOUGH – 750762711

- 4.5 All insurance companies affording coverage to the CONSULTANT pursuant to this agreement shall be insurance organizations admitted by the Insurance Commissioner of the State of California to transact business of insurance in the state or be rated as A-X or higher by A.M. Best.
- 4.6 CONSULTANT shall provide thirty (30) days written notice to the CITY should any policy required by this Agreement be cancelled before the expiration date. For the purposes of this notice requirement, any material change in the policy prior to the expiration shall be considered a cancellation.
- 4.7 CONSULTANT shall provide evidence of compliance with the insurance requirements listed above by providing, at minimum, a Certificate of Insurance and applicable endorsements, in a form satisfactory to the City Attorney, concurrently with the submittal of this Agreement.
- 4.8 CONSULTANT shall provide a substitute Certificate of Insurance no later than thirty (30) days prior to the policy expiration date. Failure by the CONSULTANT to provide such a substitution and extend the policy expiration date shall be considered a default by CONSULTANT and may subject the CONSULTANT to a suspension or termination of work under the Agreement.
- 4.9 Maintenance of insurance by the CONSULTANT as specified in this Agreement shall in no way be interpreted as relieving the CONSULTANT of any responsibility whatsoever and the CONSULTANT may carry, at its own expense, such additional insurance as it deems necessary.
5. **PROFESSIONAL ERRORS AND OMISSIONS INSURANCE.** Throughout the duration of this Agreement and four (4) years thereafter, the CONSULTANT shall maintain professional errors and omissions insurance for work performed in connection with this Agreement in the minimum amount of One Million Dollars (\$1,000,000.00).

CONSULTANT shall provide evidence of compliance with these insurance requirements by providing a Certificate of Insurance.

6. **CONSULTANT'S INDEMNIFICATION OF CITY.** To the greatest extent allowed by law, CONSULTANT shall indemnify and hold harmless the CITY and its officers, agents and employees against all claims for damages to persons or property arising out of CONSULTANT'S work, including the negligent acts, errors or omissions or wrongful acts or conduct of the CONSULTANT, or its employees, agents, subcontractors, or others in connection with the execution of the work

LONG-TERM WATER QUALITY MONITORING
SERVICES AT LOMA ALTA SLOUGH – 750762711

covered by this Agreement, except for those claims arising from the willful misconduct, sole negligence or active negligence of the CITY, its officers, agents, or employees. CONSULTANT'S indemnification shall include any and all costs, expenses, attorneys' fees, expert fees and liability assessed against or incurred by the CITY, its officers, agents, or employees in defending against such claims or lawsuits, whether the same proceed to judgment or not. Further, CONSULTANT at its own expense shall, upon written request by the CITY, defend any such suit or action brought against the CITY, its officers, agents, or employees founded upon, resulting or arising from the conduct, tortious acts or omissions of the CONSULTANT.

CONSULTANT'S indemnification of CITY shall not be limited by any prior or subsequent declaration by the CONSULTANT.

7. **OWNERSHIP OF DOCUMENTS.** All plans and specifications, including details, computations and other documents, prepared or provided by the CONSULTANT under this Agreement shall be the property of the CITY. The CITY agrees to hold the CONSULTANT free and harmless from any claim arising from any use, other than the purpose intended, of the plans and specifications and all preliminary sketches, schematics, preliminary plans, architectural perspective renderings, working drawings, including details, computation and other documents, prepared or provided by the CONSULTANT. CONSULTANT may retain a copy of all material produced under this Agreement for the purpose of documenting their participation in this project.
8. **COMPENSATION.** CONSULTANT'S compensation for all work performed in accordance with this Agreement, shall not exceed the total contract price of \$659,461.

The base contract price shall be a not-to-exceed total of \$312,391 for the tasks listed in the "Loma Alta Slough Monitoring" component pricing.

An optional task, "Microbio Source Identification Component", with a not-to-exceed price of \$347,070 is contingent upon the City receiving a Clean Beaches Initiative Grant, and no work shall be performed under this component, and no compensation shall be paid, if the City does not receive grant funding.

No work shall be performed by CONSULTANT in excess of the total contract price without prior written approval of the City. CONSULTANT shall obtain approval by the City prior to performing any work that results in incidental expenses to CITY.

9. **TIMING REQUIREMENTS.** Time is of the essence in the performance of work under this Agreement and the timing requirements shall be strictly adhered to unless otherwise modified in writing.

All work under the “Loma Alta Slough Monitoring component” of this agreement shall be completed in every detail to the satisfaction of the City within 5 calendar years of the notice to proceed.

All work under the “microbial source identification component” of this agreement shall be completed in every detail to the satisfaction of the City within 2 calendar years, unless otherwise specified by the California Clean Beaches Initiative Grant guidelines.

10. **ENTIRE AGREEMENT.** This Agreement comprises the entire integrated understanding between CITY and CONSULTANT concerning the work to be performed for this project and supersedes all prior negotiations, representations, or agreements.
11. **INTERPRETATION OF THE AGREEMENT.** The interpretation, validity and enforcement of the Agreement shall be governed by and construed under the laws of the State of California. The Agreement does not limit any other rights or remedies available to CITY.

The CONSULTANT shall be responsible for complying with all local, state, and federal laws whether or not said laws are expressly stated or referred to herein.

Should any provision herein be found or deemed to be invalid, the Agreement shall be construed as not containing such provision, and all other provisions, which are otherwise lawful, shall remain in full force and effect, and to this end the provisions of this Agreement are severable.

12. **AGREEMENT MODIFICATION.** This Agreement may not be modified orally or in any manner other than by an agreement in writing signed by the parties hereto.
13. **TERMINATION OF AGREEMENT.** Either party may terminate this Agreement by providing thirty (30) days written notice to the other party. If any portion of the work is terminated or abandoned by the CITY, then the CITY shall pay CONSULTANT for any work completed up to and including the date of termination or abandonment of this Agreement. The CITY shall be required to compensate CONSULTANT only for work performed in accordance with the Agreement up to and including the date of termination.

LONG-TERM WATER QUALITY MONITORING
SERVICES AT LOMA ALTA SLOUGH – 750762711

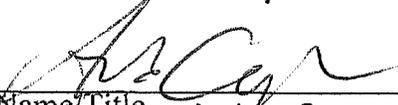
14. **SIGNATURES.** The individuals executing this Agreement represent and warrant that they have the right, power, legal capacity and authority to enter into and to execute this Agreement on behalf of the respective legal entities of the CONSULTANT and the CITY.

IN WITNESS WHEREOF, the parties hereto for themselves, their heirs, executors, administrators, successors, and assigns do hereby agree to the full performance of the covenants herein contained and have caused this Professional Services Agreement to be executed by setting hereunto their signatures on the dates set forth below.

WESTON SOLUTIONS, INC.

By: 
Name/Title Stephen Mitchell
Sr. Vice President

Date: 20 May 2015

By: 
Name/Title Andrea Crumpacker
Program Manager

Date: 20 May 2015

23-1501990
Employer ID No.

CITY OF OCEANSIDE

By: _____
Michelle Skaggs Lawrence,
Interim City Manager

Date: _____

APPROVED AS TO FORM:

, ASST.
City Attorney

NOTARY ACKNOWLEDGMENTS OF CONSULTANT MUST BE ATTACHED.



OFFICIAL SEAL
JANE E. CUDNEY
NOTARY PUBLIC - STATE OF NEW MEXICO
My Commission Expires: 12 June 2015





WESTON SOLUTIONS, INC.
5817 Dryden Place, Suite 101
Carlsbad, CA 92008
(760) 795-6900 / (760) 931-1580 FAX
www.westonsolutions.com

March 24, 2015

City of Oceanside Water Utilities Department
Attn: Justin Gamble
300 North Coast Highway
Oceanside, CA 92054

Subject: Proposal to Provide City of Oceanside Technical Assistance, Water Quality Monitoring and Optional Microbial Source Identification for the Loma Alta Creek Watershed [750762711]

Dear Mr. Gamble:

Weston Solutions, Inc. (WESTON[®]) is pleased to provide our qualifications to assist the City of Oceanside with implementation of the Loma Alta Slough Alternative to a TMDL, and a potential microbial source tracking study (MST) for the Loma Alta Watershed. We are committed to the success of your program, and look forward to supporting you during these exciting projects.

We understand that the Loma Alta alternative to a TMDL is the first of its kind in Southern California, and therefore we have augmented our team with additional technical expertise to assist with development and implementation the program, including Larry Walker and Associates (LWA) and SCCWRP.

In order to provide you the best service, we have also formed a team for the implementation of the optional MST study, including Dr. Rachel Noble (Noble, LLC) and Dr. Kelly Goodwin of NOAA. They will augment our existing staff, including Dr. Alex Schriewer, to design and implement a scientifically defensible MST study.

Thank you for consideration of our proposal, and please contact me if you have any questions regarding our submittal. I can be reached at (760) 795-6987 or andrea.crumpacker@westonsolutions.com.

Kind regards,

A handwritten signature in black ink, appearing to read "Andrea Crumpacker". The signature is fluid and cursive, written over a white background.

Andrea Crumpacker, Southern California Regional Manager
WESTON SOLUTIONS, INC.

Proposer Identification:

WESTON SOLUTIONS, INC.

Company

Andrea Crumpacker

By

5817 Dryden Place, Suite 101, Carlsbad, CA 92008

Address

andrea.crumpacker@westonsolutions.com

E-mail

(760) 795-6987

Telephone Number

Exceptions to the Request for Proposals

Exceptions to the specifications of any Proposal items stated herein shall be fully described in writing by the Vendor in the space provided below (If none, mark as N/A.):

N/A

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1.0 Introduction

Established in 1957, Weston Solutions, Inc. (WESTON) is a leading international environmental consulting, engineering, and redevelopment firm, headquartered in West Chester, Pennsylvania, with 40 offices strategically located nationwide including our nearby location in Carlsbad, California. As a 100% employee-owned company, WESTON delivers integrated, sustainable solutions for watershed management, water and sediment quality management, environmental restoration, property redevelopment, design-build construction, green buildings, and clean energy.

WESTON has maintained offices in Southern California since 1986. Our Carlsbad office provides staff with proven project experience including municipal stormwater programs, total maximum daily load (TMDL) development and implementation, as well as environmental surveys and testing programs. WESTON has conducted the regional stormwater monitoring program for the County of San Diego and 21 municipal Copermittees since 2001, including monitoring in San Luis Rey, Loma Alta Creek, and Buena Vista Creek watersheds. Additionally, WESTON has held contracts with the City of Vista since 2004 to perform municipal stormwater support, including jurisdictional runoff management plan (JRMP) updates and MS4 dry weather monitoring, as well as TMDL support for the Loma Alta Creek and upcoming Buena Vista Lagoon TMDLs. WESTON recently supported the City of Oceanside (City) with development of the Loma Alta Slough TMDL, as well as partnering with the City during proposal and implementation of the Talone Lake vector control grant.

The WESTON Carlsbad office includes molecular source tracking biology (MST) and benthic laboratories, which are staffed by local experts with decades of experience performing and developing tests used to assess MST sources and benthic infaunal community health using the highest quality of equipment and professionally-acceptable methods.

WESTON has entered into a Cooperative Research and Development Agreement (CRADA) with the Atlantic Oceanographic and Meteorological Laboratory, a research laboratory within the National Oceanic and Atmospheric Administration's (NOAA) Office of Oceanic and Atmospheric Research located in Miami, Florida. Under the CRADA, WESTON's MST expertise and unique holistic approach to watershed studies are combined with cutting-edge molecular assays and pathogen detection. WESTON scientists have partnered with renowned NOAA environmental molecular biologist, Dr. Kelly Goodwin, to tackle key water quality issues throughout the United States, including the need to rapidly detect fecal indicator bacteria, quantitative MST, development and implementation of bacteria TMDLs, natural source exclusion, and support for quantitative microbial risk assessment.

Consultant's Name & Contact Information

Weston Solutions, Inc.

Local Office

Contact: Andrea Crumpacker
Address: 5817 Dryden Pl, Suite 101
 Carlsbad, CA 92008
Phone: 760-795-6987
Fax: 760-931-1580

Corporate Office

Address: 1400 Weston Way
 PO Box 2653
 West Chester, PA 19380-1492
Phone: 610-701-3000
Fax: 610-701-3186

2.0 Team Organization & Task Roles

WESTON will serve as prime contractor for this contract. We strategically crafted a Team to meet your need for a strong, local focus on the scientific and regulatory dynamics driving compliance and water quality improvement throughout the City's jurisdiction. Key personnel from WESTON, D-MAX Engineering, Inc. (D-MAX), Environmental Science Associates (ESA), Larry Walker and Associates (LWA), Noble Environmental, LLC (Noble), and the Southern California Coastal Water Research Project (SCCWRP) will provide specific expertise to fully address each potential task in the City's scope of work (SOW). WESTON brings hands-on experience with development of monitoring programs for TMDL implementation and National Pollutant Discharge Elimination System (NPDES) MS4 Permit compliance.



Established in 1957, **WESTON** is a leading environmental consulting and engineering firm with more than 30 offices located nationwide. As a 100% employee-owned corporation, we deliver integrated, sustainable solutions for watershed management, water and sediment quality management, and environmental restoration.

We build strong relationships with government, industry, and local communities, blending proven strategies with groundbreaking technology to produce solutions that work.

WESTON has maintained offices in Southern California since 1975, and our Carlsbad and Los Angeles offices provide over 30 experts in watershed management, water resource management, multi-media sampling and assessment, NPDES regulatory support and TMDL development and implementation. WESTON is particularly well respected in Southern California for our exemplary history of water resource services to city and county agencies. Our solutions are based on sound science approaches and proven cost effectiveness that include pollutant source tracking, true source controls, site specific objectives SSOs, and natural and bio-engineering solutions.

WESTON has recently supported the City with development of the Loma Alta Slough TMDL, San Diego Copermittee Regional Monitoring Program (Loma Alta Creek, Buena Vista Creek, and San Luis Rey), and historically with the Loma Alta Watershed Management Plan.

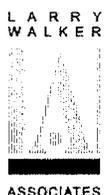


D-MAX Engineering, Inc. (D-MAX) is a San Diego-based environmental consulting firm specializing in storm water services for municipalities. Their multidisciplinary team includes civil engineers, environmental scientists, environmental chemists, and biologists. Since 1996, D-MAX has completed storm water projects for 18 NPDES municipal permittees in San Diego and Orange Counties, developing a reputation for practical solutions, cost-effectiveness, responsiveness, and flexibility. D-MAX is recognized across the region for our expertise in jurisdictional storm water program development and reporting, water quality monitoring, development and construction services, and inspections of businesses, municipal facilities, construction sites, and treatment control best management practices (BMPs).



Founded over 40 years ago, **Environmental Science Associates (ESA)** is one of the largest and oldest California-based environmental consulting firms. Our local San Diego office has a focus on urban runoff management program development and implementation, watershed management, regulatory support, tidal wetland and creek restoration, environmental hydrology, sediment and pollutant transport modeling, hydromodification modeling and planning, environmental impact assessments, and permitting support services.

ESA's Team has direct experience in supporting the City during the development of the draft bacteria and nutrient TMDL for Loma Alta Slough and the understanding of the long-term water quality issues and goals. Additionally, ESA brings a new perspective to what has and has not worked with regard to nutrient management and TMDLs through our Florida water quality team. Florida leads the nation in the collection, analysis and interpretation of water quality data, accounting for approximately one-third of all the water quality data collected in the U.S. Florida is also the only state with numeric nutrient concentration (NNC) criteria for every lake, river and estuary. Based on our extensive experience in Florida, we bring expertise related to ways to revise or replace TMDLs so that local governments and stakeholder groups can spend limited resources on strategies that more effectively address their various water quality concerns.



Larry Walker Associates (LWA) is a privately-owned firm established in 1979 and headquartered in Davis, California. There are currently 42 staff members in the firm, with employees in Davis, Oakland, San Jose, Santa Monica, Carlsbad and Ventura, California as well as Seattle, Washington. LWA's service capabilities include, but are not limited to, highly specialized water quality, stormwater management, watershed management activities, and traditional water and wastewater engineering. LWA has been a partner, innovator,

and industry leader, assisting municipalities and private businesses in navigating and solving complex and important environmental and public policy challenges. LWA's technical expertise and services include regulatory assistance, wastewater, ambient water quality monitoring, stormwater, watershed management and TMDLs, agricultural water quality monitoring, and data management. LWA recently worked closely with the City of Oceanside in the negotiation and adoption of Resolution No. R9-2014-0020, an alternative process for achieving water quality objectives for nutrients in Loma Alta Slough (TMDL alternative). LWA has also provided support in the development of Water Quality Improvement Plans (WQIP) in multiple watersheds in the region, including leading the San Luis Rey WQIP effort, and is well versed in the many nuances of the bacteria TMDL. Our in depth understanding of the MS4 permit, watershed planning, TMDL requirements, regulatory, and technical work gives us the platform to provide outstanding support for the City's Clean Water Program in the development and implementation of a monitoring plan for Loma Alta Slough.

Noble Environmental LLC—Dr. Rachel Noble has conducted water quality work in southern California for over 25 years, and she has specific expertise in the areas of Southern Orange County, Oceanside and northern San Diego County, and the City of San Diego. She is an internationally recognized experience in microbial source tracking for human and animal fecal source identification for the purposes of stormwater system prioritization and mitigation, and BMP identification and selection and development of TMDLs. She has been active in the collaborative assessment of freshwater outlets such as the San Luis Rey and Tijuana Rivers, along with active work in the Mission Bay region of the County of San Diego. She recently completed a project in the San Luis Rey River where she worked with the project team to design, implement, and interpret molecular source identification analyses toward identification and mitigation of major sources of human fecal contamination to Oceanside beaches. She has also worked with County of San Diego personnel in the areas of rapid molecular methods and source identification for over a decade.



The Southern California Coastal Water Research Project (SCCWRP) is a research institute focusing on the coastal ecosystems of Southern California from watersheds to the ocean. SCCWRP was formed in 1969 to enhance the scientific understanding of linkages among human activities, natural events, and the health of the Southern California coastal environment; to communicate this understanding to decision makers and other stakeholders; and to suggest strategies for protecting the coastal environment for this and future generations.

Following our organizational chart (Figure 1), brief bio sketches summarize pertinent knowledge and experience of our key personnel. Assigned personnel substitutions will not occur without prior City approval. Full resumes are included in Section 3.0.

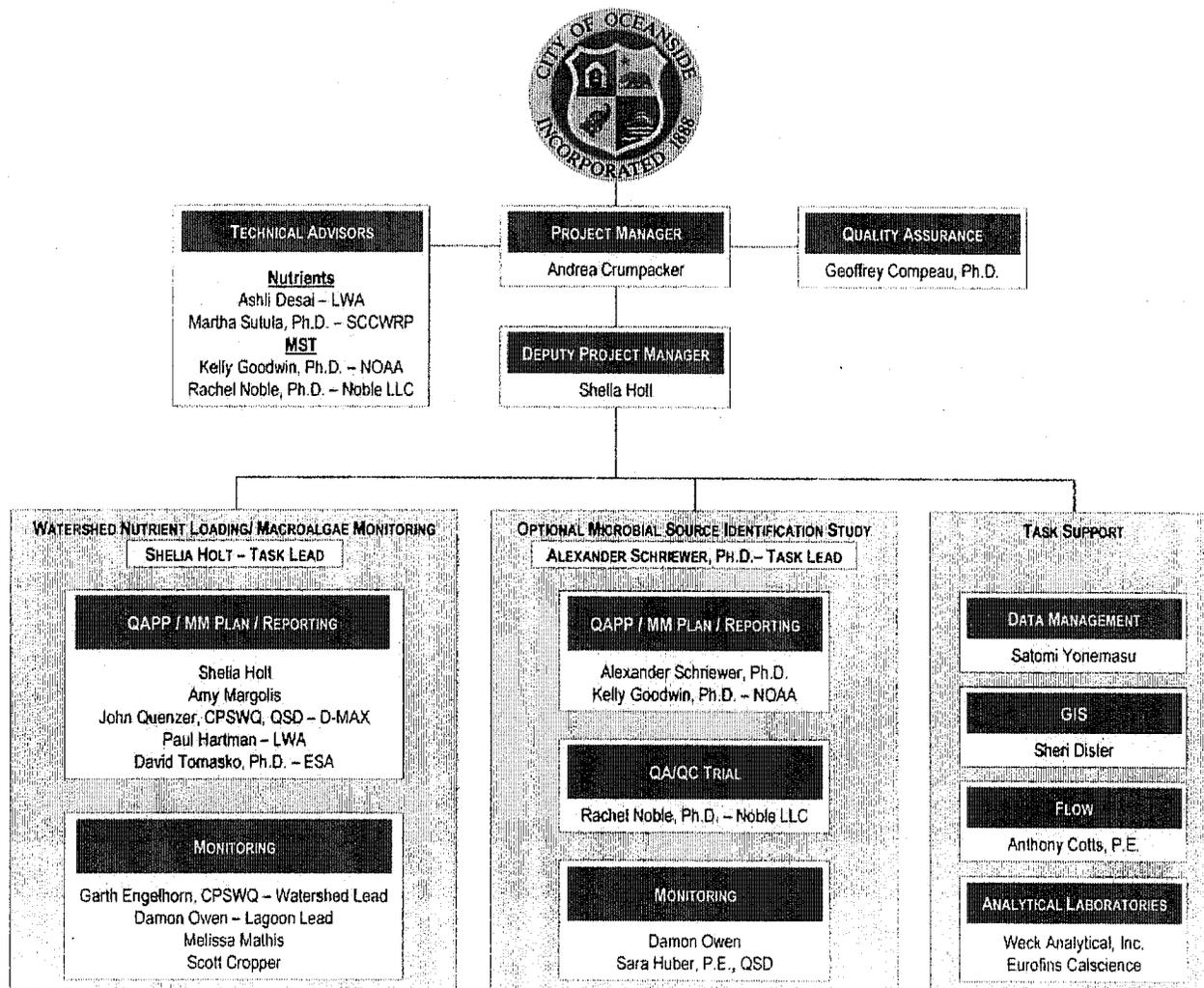


Figure 1. Organizational Chart

Project Management

Andrea Crumpacker, Project Manager • WESTON—With over 15 years of experience of jurisdictional stormwater program support, TMDL development, monitoring study design, environmental analysis, and biological assessments, Ms. Crumpacker will serve as the Project Manager. Ms. Crumpacker is currently serving as the Project Manager for the City of Vista’s Stormwater Support contract, and has also served as Task Manager for the City and County of San Diego’s TMDL support and Permit implementation services. In addition, she is currently serving as the Project Manager for the development of the Marina del Rey Enhanced Watershed Management Plan and Coordinated Integrated Monitoring plan, as well as the Port of Los Angeles (POLA) Inner Cabrillo Beach Bacteria TMDL Natural Source Exclusion study.

Sheila Holt, Deputy Project Manager / Nutrients Task Lead • WESTON—More than 20 years of experience as an aquatic biologist working in marine, estuarine, and freshwater habitats throughout California, Ms. Holt will serve as the Deputy Project Manager. Her expertise in the development and implementation of monitoring programs in coastal lagoons and the marine environment will serve to increase cost efficiency and assure quality results. Ms. Holt recently led the Ambient Bay and Lagoon Monitoring Program for the San Diego County Copermittees, and she is also well versed in the development and implementation of Surface Water Ambient Monitoring Program (SWAMP) compatible Quality Assurance Project Plans (QAPPs).

Watershed Nutrient Loading/Macroalgae Monitoring Task

Ashli Desai, Technical Advisor • LWA—Ms. Desai has 19 years of experience in regulatory assistance, watershed management, and TMDL development and implementation. She recently assisted the City with the alternative to the nutrient TMDL for Loma Alta Slough, and will serve as a technical advisor during the development of the nutrient monitoring plan for this project.

Ms. Desai is primarily responsible for overseeing LWA's TMDL and regulatory work in Southern California, including NPDES permit assistance; regulation and policy review and comment; TMDL review, development and implementation; agricultural conditional waiver assistance; and special study development and implementation. Ms. Desai supports wastewater, stormwater and agricultural clients in all aspects of TMDL development and implementation and has reviewed or supported development of almost every TMDL adopted in the Los Angeles Region as well as multiple TMDLs developed in Orange and San Diego County, including the alternative to the nutrient TMDL for Loma Alta Slough. Ms. Desai is also managing the development of an Enhanced Watershed Management Plan (EWMP) and Coordinated Integrated Monitoring Plan (CIMP) for the Upper Santa Clara River Watershed and the development of a Salt and Nutrient Management Plan (SNMP) for the Lower Santa Clara River Watershed.

Martha Sutula, Ph.D., Technical Advisor • SCCWRP—Dr. Sutula is head of the Biogeochemistry Department at the Southern California Coastal Water Research Project Authority, a research institute formed by the leading water quality agencies in California to ensure a solid scientific foundation for their management activities. Her role on the project will be to serve as a technical advisor during development of the nutrient monitoring work plan.

Dr. Sutula oversees research related to eutrophication and harmful algal blooms in streams, estuaries and nearshore waters, tracking sources and fate of contaminants including stormwater and atmospheric deposition, and water quality modeling. Beyond her research activities, she focuses on linking science to management which includes her work as lead scientist to the California State Water Resources Control Board providing technical support to develop nutrient objectives for streams, lakes, and estuaries.

Amy Margolis, QAPP/MM Plan/Reporting • WESTON—With 14 years of experience as an environmental biologist, Ms. Margolis has extensive experience with toxicity testing of water and sediments, including toxicity identification evaluations. She will assist with the development of the SWAMP compatible QAPP and nutrient monitoring plan. Ms. Margolis has prepared annual storm water reports for the San Diego County Copermitees, Los Angeles Department of Public Works, and Riverside County Flood Control District. She has also assisted in the development of numerous QAPPs, including for the County of Los Angeles, City of San Diego, and County of San Diego.

John Quenzer, CPSWQ, QSD, QAPP/MM Plan/Reporting • D-MAX—Mr. Quenzer has managed JRMP update and MS4 monitoring tasks for the City of Oceanside. He has also supported the City in meetings with the Regional Board, including serving as project manager for the Loma Alta resolution development task. Mr. Quenzer will assist during the development of the nutrient monitoring plan, specifically to assist with cost effective measures related to the City's record keeping and reporting of NPDES required monitoring related to Loma Alta.

Mr. Quenzer has prepared reports for numerous monitoring programs, including a nutrient investigation study for the City of San Marcos. He has also prepared JRMPs for 11 jurisdictions and more than 20 storm water annual reports for municipalities, and he is currently serving as co-lead for the development of the San Diego Bay WQIP.

Paul Hartman, QAPP/MM Plan/Reporting • LWA—Mr. Hartman has 16 years of experience in water quality focused in the development and implementation of municipal stormwater programs in Southern California. His experience spans multiple watersheds with varied pollutant waterbody combinations and regulatory challenges, including TMDLs for bacteria, sediment, and nutrients targeting estuaries within North San Diego County. Mr. Hartman was recently the project manager for negotiation and development of the alternative to the nutrient TMDL for Loma Alta Slough.

David Tomasko, Ph.D., QAPP/MM Plan/Reporting • ESA—Dr. Tomasko has over 25 years of experience related to water quality assessments and the development of science-based resource management plans. He will provide input during the development of the nutrient monitoring plan, bringing a national perspective and knowledge to the project. Dr. Tomasko's projects have resulted in the

development of water quality and natural resource restoration projects in a variety of locations, and his documentation of the source(s) of ecological problems has led to successful restoration efforts in numerous lakes and estuaries.

Garth Engelhorn, CPSWQ, Monitoring - Watershed Lead • WESTON—Mr. Engelhorn has over 12 years of experience with monitoring equipment and environmental assessment experience with a focus on water and sediment quality. He will lead the watershed monitoring task, utilizing his expertise in flow and sample collection.

Mr. Engelhorn is currently serving as the Project Manager for the San Diego County Regional Copermittee Urban Runoff Monitoring Program. He specializes in scientific field surveys, flow monitoring and sample collection for water quality, benthic, and sediment samples. For the County of San Diego Watershed Protection Program, he successfully coordinates with multiple stakeholders, jurisdictions and technical work groups. Provided field leadership in numerous projects, including monitoring for the County of San Diego NPDES storm water program, monitoring the County of San Diego Hydromodification Management Plan, dry weather monitoring of the City of San Diego's storm water conveyance system, lagoon TMDL monitoring within the City of San Diego, and bacterial source tracking within the City of San Diego and the Port of Los Angeles.

Damon Owen, Monitoring – Lagoon Lead • WESTON—Mr. Owen has over 14 years of professional experience as a biologist and will serve as the task lead for lagoon monitoring. He is a field scientist specializing in biological and water quality assessments for municipal clients including the Los Angeles Department of Public Works, County of San Diego, County Sanitation Districts of Los Angeles County, and Orange County Sanitation District. His expertise includes field surveys and analysis for benthic, sediment, and water quality samples including stream bioassessment surveys/sample collection and stormwater monitoring in San Diego County.

Melissa Mathis, Monitoring • WESTON—Ms. Mathis will support monitoring activities, and her field sampling experience includes water quality monitoring, water sampling, stream macroinvertebrate collection for bioassessment, and sediment sampling. She conducted bioassay testing for the San Diego Copermittees Regional Monitoring Program, Bight '08, and San Diego Regional Harbor Monitoring Program (RHMP).

Scott Cropper Monitoring • WESTON—Mr. Cropper will support monitoring activities and has more than 8 years of experience in water, soil, and sediment sampling. His recent projects include the County of San Diego Copermittee Monitoring and Reporting Program, Lake Elsinore and Canyon Lake TMDL Monitoring, and San Diego River Microbial Source Tracking Study.

Optional Microbial Source Identification Study Task

Alexander Schriewer, Ph.D., Optional Microbial Source Tracking Lead and QAPP/MM Plan/Reporting • WESTON—Dr. Schriewer will serve as the task lead for the optional Microbial Source Tracking study, and has 12 years professional experience in the development and implementation of assays for the detection of chemical and biological markers, as well as microbial source tracking experience with a wide variety of environmental samples. He has also authored several technical reports and peer reviewed scientific publications regarding chemical and biological water quality and the application of MST.

Kelly Goodwin, Ph.D., Technical Advisor • NOAA (CRADA with WESTON)—Dr. Goodwin is an environmental microbiologist and molecular biologist with more than 20 years of experience developing and implementing assays to microbiological quality in environmental samples, including seawater and sand matrices. She will serve as a technical advisor for the development and implementation of the monitoring program. Her experience includes detection of a variety of fecal indicators, pathogens, and source identification markers using polymerase chain reaction (PCR), quantitative PCR (qPCR), and traditional assays (microscopy, plate counts, IDEXX). Dr. Goodwin's experience includes adaptation of biotechnologies used in clinical settings for use in coastal field investigations. Work supports investigation of the sources of nutrient and microbial contamination to coastal waters, beaches and watersheds, with recommendation of remediation strategies. She is currently serving as the technical advisor on the City of San Clemente Poche Beach bacteria source identification and POLA Cabrillo Beach TMDL microbial source identification studies. Dr. Goodwin also participates on the Bight 2013 microbiology committee.

Rachel Noble, Ph.D., Technical Advisor and QA/QC Trial Lead • Noble LLC—Dr. Noble has 25 years of experience in the water quality arena, with experience in microbial contaminant loading and assessment, application of molecular methods including microbial source tracking methods, and design and implementation of successful, compliant water quality management programs in coastal and estuarine regions. Dr. Noble will serve as the technical advisor for the development and implementation of the quality assurance program for the molecular assays. She has been a national leader in microbial source tracking research, with projects previously conducted or currently ongoing in the Counties of Santa Barbara, Los Angeles, Orange and San Diego.

David Pohl, P.E., Ph.D., Technical Advisor • ESA—Dr. Pohl has over 30 years of geo-environmental engineering experience, and 17 years of experience in project management and senior technical oversight of water quality and quantity monitoring and assessment, watershed management, Bacteria Source Tracking and TMDL special studies and implementation plan development. Dr. Pohl will serve as a technical advisor for the optional microbial source tracking program, for items related to development of best management practices. He has developed the strategic plan for six watersheds in San Diego County that integrated MS4 and TMDL compliance and bacteria TMDL compliance framework using results of special studies for City of San Diego. He also recently prepared successful grant applications for the City of Oceanside and Newport Beach for water quality and habitat enhancement projects.

Sara Huber, P.E., QSD, Monitoring • WESTON—Ms. Huber will assist with microbial source tracking monitoring, and has diverse experience designing, implementing, and assessing the progress of NPDES and TMDL programs. She is an expert at calculating runoff volumes and loads for bacteria, nutrients, metals, and other pollutants, and has led molecular source tracking studies to screen for and quantify host-specific genetic markers (human, gull, canine). Ms. Huber is also currently serving as the Assistant Project Manager for the Inner Cabrillo Beach Bacteria TMDL Natural Source Exclusion study.

Task Support

Satomi Yonemasu, Data Management Lead • WESTON—Ms. Yonemasu will serve as the data manager for all tasks, and has extensive experience including managing all data collected for the San Diego Copermittees NPDES Regional Monitoring Program for the past 3 years. She is responsible for QA/QC, analysis, and tabulation of data.

Sheri Dister, GIS Lead • WESTON—Ms. Dister will lead geographic information system (GIS)-related tasks and has over 20 years of experience using GIS and related technologies in diverse natural resource, water resource, and human health applications. She regularly performs GIS data processing, integration, analysis, and map production for a variety of water resource projects in southern California with water quality, sediment quality, and bioassessment data.

Anthony Cotts, P.E., Flow Lead • WESTON—Mr. Cotts will serve as the lead for all flow analysis, and is a registered Professional Engineer in California with over 13 years of experience. He has a comprehensive understanding of waterbody impairments and designs both traditional and innovative BMPs for cost-effective, practical water quality solutions. He also conducts watershed modeling to assess stormwater runoff quantity and quality so that BMPs can be appropriately sized. Recent design projects include BMPs for the protection of the Newport Beach Areas (ASBS) and rip rap and channel improvements for Hoyt Park in the Scripps Ranch Area of San Diego. He prepared the Marina del Rey Harbor TMDL Implementation Plan and supported the City of Oceanside in developing the Loma Alta Creek TMDL.

3.0 Resumes

Qualifications Summary

- More than 15 years of experience as a Project Manager, environmental statistician, and biologist.
- Focused on TMDL development and policy.
- Working on MS4 Permit and TMDL development and compliance in San Diego Region for 10 years.
- Leads monitoring program negotiations with Regional Boards.
- Manages multi-disciplinary teams of experts to achieve compliance and client goals.
- Presents scientific findings at technical conferences.
- Routinely performs statistical analyses and water quality modeling for TMDLs.
- Author and technical editor of scientific reports and papers.
- Conducted biological research projects across the U.S. and Canada.

ANDREA CRUMPACKER

Project Manager



Schedule

Current booked work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program.

Education

M.S., Environmental Analysis & Decision Making - Rice University (2005)
B.S., Biology - Truman State University (1999)

Key Projects

City of San Clemente, Poche Beach Watershed and Beach Microbial Source Tracking Investigation, City of San Clemente, CA, Technical Advisor. Provided technical oversight related to project design, data analysis, and interpretation of findings. The recommendations provided as an outcome of this watershed bacteria source identification study have resulted in a change of the rating of Poche Beach from an "F" to an "A+" Heal the Bay report card score.

Municipal Copermittee Urban Runoff Monitoring Program, Ambient Bay and Lagoon Monitoring Program, County of San Diego, San Diego, CA, Data Management and Statistical Task Leader. Study design and statistical analysis for trend and spatial patterns among 12 lagoons (including Agua Hedionda), along with multivariate data analysis for overall sediment and water quality in these water bodies. Multivariate analysis included Principal Components Analysis, cluster, and discriminant analysis.

City of San Diego As-Needed Stormwater Monitoring Services Contract 2005-2011, TMDL and §303(d) Support, City of San Diego, San Diego, CA, Project Manager. Provided support, review, and comment of the Bacteria Project I TMDL, and including Regional Board meeting support. Reviewed and commented on the 2008 §303(d) List, and re-analyzed the data used for the 2008 §303(d) list. Proposed recommendations for future data gathering in response to the Draft 2008 §303(d) list, and including additional data collection to address the multiple selenium listings. Compiled and formatted data in preparation for the 2012 State Board request for data.

City of Vista, TMDL as Needed Support, Vista, CA Project Manager. Provides ongoing strategic and technical support to the City of Vista on TMDL

issues, source identification studies, monitoring program development, and 303(d) delisting strategies.

Inner Cabrillo Beach Bacteria TMDL and Natural Source Exclusion, San Pedro, CA, Port of Los Angeles, Project Manager. Ms. Crumpacker serves as the primary client liaison and advisor for study design and data evaluation of this first-ever Natural Source Exclusion program in Southern California, representing the POLA during negotiations with the Los Angeles Regional Board. The program includes ongoing studies to quantify the sources of bacteria loading to the beach, and to allocate sources appropriately. The next step in the project is to identify human health risk based on pathogen evaluations linked to the predominant bacteria sources at the beach. Ultimately, the work will help the POLA come into compliance with the Bacteria TMDL.

Marina del Rey EWMP, Los Angeles, CA, Los Angeles County Department of Public Works, Project Manager. WESTON is leading the development of an EWMP for the County of Los Angeles, City of Los Angeles, and City of Culver City (watershed management group [WMG]). The process involves leading stakeholder meetings with the WMG to develop an EWMP Work Plan, Coordinated Integrated Monitoring Plan, and EWMP Plan. The process is expected to require two years, and also includes public stakeholder involvement. The EWMP will include a section that details the reasonable assurance analysis (RAA) a methodology for quantifying the expected load reduction to meet the TMDL or other receiving water requirements, within a certain level of confidence.

County of San Diego Copermittee Water Quality Monitoring and Reporting Program, County of San Diego, Task Manager. Led the WESTON team responsible for development of Report of Waste Discharge data analyses, including statistical modeling of monitoring scenarios. The water quality long-term effectiveness assessment assessed the five most recent years of monitoring data collected by the Copermittees for use during the ROWD development.

Water Quality and Sediment Characterization Services, Main Ship Channel and Inner Cabrillo Beach Bacterial TMDL Implementation and Recommendations, POLA, San Pedro, CA, Statistician. Advised the Bacteria TMDL work group on project design and implementation to determine areas within the Main Ship Channel for future study. Merged bacteria study results from TMDL monitoring and several focused studies to answer questions of correlation and causal relationships. These results have been used to plan for future TMDL implementation.

San Diego Municipal Stormwater Copermittees Regional Monitoring Program, County of San Diego Department of Public Works (DPW) Watershed Protection, San Diego, CA, Data Analysis and Management Task Leader. Responsible for regional multivariate statistical analysis, spatial and categorical analysis of dry weather data, trend analysis, and bioassessment method development, including o/e analysis. Provides management of wet weather and dry weather water quality monitoring data to assist the County and City of San Diego, San Diego Unified Port District, and other Copermittees comply with their National Pollutant Discharge Elimination System (NPDES) permit.

2008 State §303d Listings and Comment Preparation, County of San Diego, San Diego, CA, Task Manager. Summarized the issues and provided comment on the §303d listings within the County jurisdiction. The comments provided for the County resulted in several listings being removed. It also identified potential future delisting strategies.

2012 State Board Request for Data Submittal, County of San Diego, San Diego, CA, Task Manager. Compiled and summarized Copermittee regional data, dry weather monitoring data, and County special project data in preparation for submittal to the State Board.

As-Needed (Urban Runoff) Support Contract, County of San Diego, San Diego, CA, Data Analysis and Statistician Task Leader. Responsible for statistical analysis of water quality monitoring data, relationships of those data to land use, land cover, and natural features. Additional responsibility for load calculations and quality assurance of all data collected for San Diego River and Agua Hedionda task orders. Supported the County during the comment period for the 2008 §303(d)/305(b) Integrated Report and Bacteria Project I TMDL (TO No. 8).

County of Los Angeles Department of Public Works Annual Monitoring Report, Alhambra, CA Project Manager. Annual monitoring reporting for the County of Los Angeles is handled by the Public Works Department. The report includes one year of monitoring data, including mass emission, toxicity, and bioassessment results. The report is submitted to the Los Angeles Regional Board as a Permit Required document. WESTON has been developing the Annual Monitoring Report for the LADPW since 2010.

Qualifications Summary

- 20 years of experience as an aquatic biologist working in marine, estuarine, and freshwater habitats in California.
- Responsible for project management, sample collection, data analyses, report writing (SAPs, QAPPs, final reports), and quality assurance/quality control for benthic infauna and sediment related projects.
- Extensive experience using the SQOs analytical tool.
- Responsible for leading field surveys and sampling marine communities for collection and analysis of benthic infauna, fish, sediment, and water utilizing a wide variety of sampling techniques.
- Responsible for QA/QC of benthic data and chemistry data.
- Experience in taxonomic identification of freshwater mollusks.
- Familiar with dredge material evaluations.

SHEILA HOLT

Deputy Project Manager / Nutrients Task Lead

**Schedule**

Current booked work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Ms. Holt will be available during each summer to oversee implementation of the nutrient monitoring program.

Education

B.S., Aquatic Biology - University of California, Santa Barbara (1994)

Key Projects

County of San Diego Municipal Copermittee Urban Runoff Monitoring and Reporting Program, San Diego, CA, County of San Diego, Senior Scientist. As Task Leader and biologist, managed the Ambient Bay and Lagoon Monitoring Program in San Diego County (2008-2014), a task within the Copermittee program. Responsible for coordinating and leading the field surveys in various coastal lagoons and estuaries in San Diego County. Responsible for analyzing benthic and sediment data using the SQO analysis and writing annual reports. Developed the Sediment Monitoring Plan and SWAMP-compatible QAPP (2014), two documents incorporated into the WQIPs which provide guidance for sediment monitoring under the 2013 NPDES permit. Also, performed freshwater mollusc taxonomy for samples collected for the San Diego County bioassessment monitoring.

Bight 2013 Regional Monitoring Program, Southern California, SCCWRP, Project Manager and Biologist. Participated in the Field and Benthic Committee work groups. Led field surveys for sediment and infaunal sample collection for various clients including the San Diego Copermittees and SCCWRP. Responsible for evaluating data using the SQO analysis and writing report for San Diego Copermittees.

Sediment Quality Objective (SQO) Phase II Evaluation in the Port of Los Angeles and Port of Long Beach, Biologist. Responsible for coordinating and leading field surveys to develop baseline fish tissue concentrations and evaluate the Indirect Effect's SQO Tier II Decision Support Tool's ability to accurately relate sediment concentrations to fish tissue concentrations within the POLA and Long Beach Harbor Complex. Project included the collection of fish, sediment, water, and benthic infaunal samples. Responsible for data analysis and writing Sampling and Analysis Plan (SAP) and final report.

Freshwater Lake Monitoring (Confidential Client), Project Manager. Managed/coordinated sediment, fish tissue, and water characterization study at two recreational fishing lakes in the LA region to define contaminant levels and human health risk. Coordinated field sampling, evaluated data, and wrote reports (SAP, SWAMP-compatible QAPP, and final report).

Water Quality Services in San Diego South Bay, CA Dynegy South Bay, LLC, Project Manager. Responsible for managing monthly water quality sampling for the South Bay Power Plant (included use of CTD and collecting grab samples) and writing monthly reports for client.

Dredged Material Evaluation for Ocean Disposal at the HARS: Maintenance Dredging for Confidential Client, Hudson River, Yonkers, NY, Project Manager. Managed field sampling and sediment testing program to characterize sediment proposed for maintenance dredging in an area located in the Hudson River for its environmental suitability for ocean disposal at the U.S. EPA's designated Historic Area Remediation Site. Responsible for interaction with regulatory agencies, evaluating data, and writing report.

Tracer Dye Study at Inner Cabrillo Beach, San Pedro, CA, Port of Los Angeles, Project Manager. Managed and coordinated a tracer dye study at Inner Cabrillo Beach. Responsible for coordinating and implementing an investigation into whether or not sewage pipes were leaking and contributing to the bacterial contamination of the receiving waters at Inner Cabrillo Beach. Analyzed data and wrote final report.

U.S. Navy Dredged Material Evaluation for Potential Ocean Disposal: Maintenance Dredging at Bravo Docks B4-21 and B22-26, Mike Docks M1-4, and Sierra Wharves S1-8, Hawaii, Project Manager. Managed and coordinated the field sampling and sediment testing program to characterize sediment proposed for maintenance dredging in areas surrounding several docks and wharves in Pearl Harbor, HI for its environmental suitability for ocean disposal at the U.S. EPA's designated South Oahu Ocean Dredged Material Disposal Site. Responsible for interaction with regulatory agencies, evaluating data, and writing report.

Ocean Monitoring Services for Receiving Water Monitoring Program, Encina Wastewater Authority, Project Manager. Managed and coordinated a Receiving Water Monitoring Program for Encina Wastewater Authority which measured the effects of discharge effluent upon ocean receiving water characteristics and resident biota. Project included field surveys for fish, benthic infauna, sediment and water quality monitoring. Managed laboratory analyses, data processing, and report writing.

Regional Harbor Monitoring Program, Assistant Project Manager. Coordinated and led field surveys in support of a comprehensive effort to survey the general water quality and condition of aquatic life in Region 9 harbors, and to determine whether beneficial uses are being met in San Diego Bay, Mission Bay, Oceanside Harbor, and Dana Point Harbor. Project included the collection of benthic infauna, sediment chemistry, and water quality data. Responsible for data processing, analyzing data, conducting SQO analysis, and writing reports (SAPs, SWAMP-compatible QAPP, final reports).

Bight 2008 Regional Monitoring Program, Southern California, SCCWRP, Biologist. Participated in the field and benthic committee work groups. Led field surveys for sediment and infaunal sample collection at over 115 sites for various clients including the San Diego Copermitees, Port of San Diego (for the Regional Harbor Monitoring Program), and SCCWRP. Managed data and laboratory analyses of benthic infauna for various clients. Responsible for writing reports for various clients including the San Diego Copermitees.

Triad Studies of Intertidal Mudflats and Salt Marshes of South San Diego Bay, Biologist. Coordinated/led field survey in intertidal regions of Sweetwater Marsh and South San Diego Bay. Samples collected for analysis of sediment, benthic infauna, and toxicity. Managed laboratory analyses and data processing of the benthic infauna community.

Characterization of Sediment Contaminant Flux for the Inner Harbor and Outer Harbor Waterbodies to Support Sediment TMDL Implementation, Port of Los Angeles and Port of Long Beach, CA, Biologist/Laboratory Manager. Assisted in field sampling program which provided additional data to characterize contaminant concentrations in sediment, pore water, and overlying waters in the Port of Los Angeles and Port of Long Beach to assess the contribution of sediments to contaminant loadings to the Port's Harbor Complex. Collected samples for benthic infauna, sediment, and pore water. Managed benthic infaunal analysis in the laboratory, and assisted in data processing and benthic infaunal community analysis. Analyzed benthic and sediment sample data using the SQO analysis which was the first application of the draft version of the Phase I SQO process.

Qualifications Summary

- Provides regulatory assistance, watershed management, and TMDL development and implementation support to clients throughout California.
- Primarily responsible for overseeing LWA’s TMDL and regulatory assistance work in Southern California, including NPDES permit assistance; regulation and policy review and comment; TMDL review, development and implementation; agricultural conditional waiver assistance; and special study development and implementation.
- Specializes in facilitating coordination between municipal agencies, stakeholder groups, and regulatory agencies to provide regulatory solutions that allow implementation of stakeholder developed strategies for solving water quality problems.

ASHLI COOPER DESAI
 Technical Advisor – Nutrients Task



Schedule

Ms. Desai is currently overseeing many watershed planning projects for LWA, many of which are due mid-2015, coinciding with the start of the Loma Alta Slough monitoring project for the City. She will be available in an advisory capacity to address technical and regulatory matters related to nutrients, nutrient policy, and TMDLs throughout the duration of the project.

Education

M.S., Civil Engineering-Environmental Engineering and Science - Stanford University, Stanford (1996)
 B.S., Earth Systems-Environmental Technology - Stanford University, Stanford (1995)

Key Projects

Loma Alta Slough Nutrient and Bacteria TMDL, Technical Support, City of Oceanside. Senior advisor supporting the City of Oceanside with development of alternatives to a nutrient TMDL in Loma Alta Slough. Worked with the stakeholders and Regional Board staff to explore alternatives to the traditional TMDL process to address the 303(d) listings in the Slough that allow implementation to occur within the existing structure of the jurisdictional and watershed based stormwater programs.

San Diego County Bacteria TMDL Implementation Assistance. Project manager responsible for supporting the City and County of San Diego with strategic planning for implementation of the Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Bacteria TMDL). Work includes the development of a process plan to that outlines the process for working with the San Diego Regional Water Quality Control Board to successfully incorporate the results of special studies into revised TMDL provisions. The process plan will also include the key aspects of the TMDL to be addressed through the reopener, a process for working with the Regional Board staff to review and consider the technical work, a process for using the technical work to develop a Basin Plan Amendment for the Bacteria TMDL, and approaches to coordinate other related TMDL, permit and other applicable regulatory requirements.

Calleguas Creek Watershed TMDL Implementation. Project manager responsible for implementing all aspects of the effective TMDLs for toxicity, organochlorine pesticides and PCBs, sediment, metals and selenium, and salts in the Calleguas Creek watershed. Responsibilities include development and conduct of special studies, identification of implementation actions, coordination with stakeholders and Regional Board, incorporation of TMDL requirements into NPDES permits, and management of monitoring and reporting requirements.

Santa Margarita River Watershed Biostimulatory Substances Support. Project manager responsible for assisting the Santa Margarita River Nutrient Initiative Group with the development of a process for interacting with regulatory agencies to address impairments due to biostimulatory substances in the Santa Margarita River and Estuary. As a member of the technical advisory committee, prepared a draft process plan for the development of technical information necessary to identify and address any identified impairments. The process plan defines the tasks to be completed by the workgroup, key decisions and paths forward based on the decisions, and a discussion of how the technical work will be used by the San Diego Regional Water Quality Control Board to develop the Basin Plan Amendments, if needed.

Lower Santa Clara River Salt and Nutrient Management Plan. Project manager responsible for the development of a Salt and Nutrient Management Plan (SNMP) for the Lower Santa Clara River. Responsible for facilitating the stakeholder process, outlining the SNMP approach, developing the monitoring plan, preparing the antidegradation analysis, compiling technical work from multiple subcontractors into the final SNMP, and coordinating with the Los Angeles Regional Water Quality Control Board to ensure approval of the SNMP.

Agua Hedionda Lagoon Bacteria and Sediment TMDL Development Support. Project manager responsible for assisting the Agua Hedionda Lagoon dischargers with development of TMDLs for bacteria and sediment in the Lagoon. Responsibilities included attending meetings with RWQCB staff and providing feedback and information at the meetings and providing strategies for developing the TMDLs in coordination with RWQCB staff. Supervised the preparation of information that led to the delisting of bacteria and sediment for the lagoon.

Calleguas Creek Watershed Salt and Nutrient Management Plan. Project Manager responsible for the development of a Salt and Nutrient Management Plan (SNMP) Framework for the Calleguas Creek Watershed. Assisted the stakeholders with evaluating the regulatory requirements of the SNMP, identifying existing management plans that can be used to meet the SNMP requirements, and reviewing and compiling recycled water projects and goals.

Ventura River Nutrient TMDL. Managed the development of technical studies and regulatory support during RWQCB development of the Ventura River Nutrient TMDL for the Ojai Valley Sanitation District. Tasks include review of existing and ongoing technical studies, assistance with developing numeric targets, source analysis and implementation planning. Prepared comments on the draft TMDL and successfully negotiated revised TMDL conditions for stormwater, wastewater and agricultural dischargers.



Qualifications Summary

- Head of the Biogeochemistry Department at the Southern California Coastal Water Research Project Authority, a research institute formed by the leading water quality agencies in California to ensure a solid scientific foundation for their management activities.
- Oversees research related to eutrophication and harmful algal blooms in streams, estuaries and nearshore waters, tracking sources and fate of contaminants including stormwater and atmospheric deposition, and water quality modeling.
- Focuses on linking science to management, including her work as lead scientist to the California State Water Resources Control Board providing technical support to develop nutrient objectives for streams, lakes, and estuaries.

MARTHA SUTULA, PH.D.

Technical Advisor – Nutrients Task

Schedule

Dr. Sutula will be available as needed to serve in an advisory capacity during the development of the Slough Monitoring Plan, beginning summer of 2015.

Affiliation

Department Head, Biogeochemistry Department, Southern California Coastal Water Research Project. Costa Mesa, California, 2001 - present

Education

Ph.D., Estuarine Ecology - Louisiana State University (1999)
 M.S., Public Health - Tulane Univ. School of Public Health & Tropical Medicine (1994)
 B.S. Chemistry - Purdue University (1987)

Selected Professional Appointments

President, California Estuarine Research Society, Affiliate of Coastal & Estuarine Research Federation

California Ocean Science Trust Blue Ribbon Panel on Coastal Hypoxia and Acidification

Science Advisory Panel for Review of the Louisiana Master Plan for Sediment Diversions from the Mississippi River

US EPA National Estuarine Experts Workgroup for Development of Nutrient Criteria

US EPA Workgroup for Bioassessment of Estuaries

Selected Publications

M.D.A. Howard, **M. Sutula**, D.A. Caron, Y. Chao, J.D. Farrara, H. Frenzel, B. Jones, G. Robertson, K. McLaughlin, and A. Sengupta. 2014. Anthropogenic nutrient sources rival natural sources on small scales in the coastal waters of the Southern California Bight. *Limnology and Oceanography* doi:10.4319/lo.2014.59.01.0000

K McLaughlin, **M Sutula**, L Busse, S Anderson, J Crooks, R Dagit, D Gibson, K Johnston, L Stratton. 2013. A regional survey of the extent and magnitude of

eutrophication in Mediterranean estuaries of Southern California, USA. *Estuaries and Coasts* DOI 10.1007/s12237-013-9670-8.

L Green, **M Sutula**, P Fong, 2013. Identification of the benchmark of adverse effects by bloom forming macroalgae on macrobenthic faunal abundance, diversity, and community composition. *Ecological Applications* DOI 10.1890/13-0524.1.

J Day, F Sklar, J Cable, D Childers, C Coronado-Molina, S Davis, S Kelly, C Madden, B Perez, E Reyez, D Rudnick and **M Sutula**. The salinity transition zone between the Southern Everglades and Florida Bay. 2013. In: *Gulf of Mexico Origin, Waters, and Biota*. J Day and A Yanez-Arancibia (eds). Texas A&M University Press.

Sutula M., L. Green, G. Cicchetti, N. Detenbeck, P. Fong. In Press. Thresholds of Adverse Effects of Macroalgal Abundance and Sediment Organic Matter on Benthic Habitat Quality in Estuarine Intertidal Flats. *Estuaries and Coasts*

Sengupta A., **M. Sutula**, K. McLaughlin, M. Howard, L. Tiefenthaler, T. Von Bitner, A. Anselm. Riverine Nutrient Loads and Fluxes to the Southern California Bight (USA). Submitted to *Biogeochemistry*.

Nezlin, N.P, **M. Sutula**, R.P. Stumpf and A. Sengupta. 2012. Phytoplankton blooms detected by Sea-WIFS along the central and southern California coast. *Journal of Geophysical Research*. 117,

- Solek, C., **M. Sutula**, E. Stein, C. Roberts, R. Clark, K. O'Connor and K. Ritter. 2012. Determining the health of California's coastal salt marshes using rapid assessment. *Wetlands Science and Practice* 29:8-28.
- Solek, C.W., E.D. Stein and **M.A. Sutula**. 2011. Demonstration of an integrated watershed assessment using a three-tiered assessment framework. *Wetlands Ecology and Management* 19:459-474.
- Fetscher, A.E., **M. Sutula**, J. Callaway, V.T. Parker, M. Casey, J. Collins, and W. Nelson. 2010. Patterns in estuarine vegetation communities in two regions of California: Insights from a probabilistic survey. *Wetlands* 30:833-846.
- Brown, J., **M. Sutula**, E. Long, and C. Stransky. 2010. Sediment contaminant chemistry and toxicity of freshwater urban wetlands in southern California. *Journal of American Water Resources Association* 6:367-384.
- Stein, E., A.E. Fetscher, R.P. Clark, A. Wiskind, J.L. Grenier, **M. Sutula**, J.N. Collins, and C. Grosso 2009. Validation of a wetland rapid assessment method: Use of EPA's Level 1-2-3 Framework for method testing and refinement. *Wetlands* 29:648-665.
- Collins, J.N., E.D. Stein, **M. Sutula**, R. Clark, A.E. Fetscher, L. Grenier, C. Grosso, and A. Wiskind. 2008. California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas. www.cramwetlands.org
- Sutula, M.**, E.D. Stein, J.N. Collins, A.E. Fetscher, and R. Clark. 2006 A practical guide for the development of a wetland assessment method: The California experience. *Journal of the American Water Resources Association* 42:157-175.
- Collis, H., J. Cable, and **M. Sutula**. 2006. Evaluating sediment depositional patterns using ⁷Be in Upper Newport Estuary, California. p. 369-382 in: V.P. Singh and Y.J. Xu (eds.), *Coastal Hydrology and Processes*. Water Resources Publications, LLC. Highlands Ranch, CO.
- Sanders, B., F. Arega, and **M. Sutula**. 2005. Modeling the dry-weather tidal cycling of fecal indicator bacteria in surface waters of an intertidal wetland. *Water Research* Volume 39:3394-3408.
- Sutula, M.**, T. Bianchi, and B. McKee. 2004. Effect of seasonal sediment storage and diagenesis in the lower Mississippi River on bio-availability of particulate phosphorus flux to Gulf of Mexico. *Limnology and Oceanography* 49:2223-2235.
- Schiff, K. and **M. Sutula**. 2004. Organophosphorus pesticides in stormwater runoff from Southern California watersheds. *Water Resources Management* 23:1815-1821
- Sutula, M.**, B. Perez, E. Reyes, J.W. Day Jr., and D. Childers. 2003. Spatio-temporal variability in material exchange between the Southeastern Everglades Wetlands and Florida Bay. *Estuarine, Coastal, and Shelf Science* 57:757-781.
- Mitra, S., T. Bianchi, B. McKee, and **M. Sutula**. 2002. Black Carbon in the Mississippi River: Quantities and Sources. *Environmental Science and Technology* 11:2296-2302.
- Sutula, M.**, J. Day, and J. Cable. 2001. Hydrological and nutrient budgets of freshwater and estuarine wetlands of Taylor Slough in Southern Everglades, Florida (USA). *Biogeochemistry* 56:287-310.

Qualifications Summary

- 14 years of professional experience as an environmental biologist.
- Comprehensive experience with toxicity testing of water and sediments, including toxicity identification evaluations.
- Preparation of annual storm water reports for the San Diego County Copermittees, Los Angeles Department of Public Works, and Riverside County Flood Control District.
- Experience with toxicity laboratory oversight/management, data analysis, and reporting.
- Preparation of Sampling and Analysis Plans and final reports.
- USEPA Standards Compliance, NPDES permit compliance.

AMY MARGOLIS**QAPP/MM Plan/Reporting – Nutrients Task****Schedule**

Current booked work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Ms. Margolis will be available during each summer/fall to participate in the development of the annual report.

Education

B.S., Marine Biology - Boston University (1998)

Key Projects

County of San Diego Copermittee Water Quality Monitoring and Reporting Program, County of San Diego, Project Scientist. Supervised and conducted toxicity testing of urban runoff collected during ambient and stormwater events. Responsible for collection and reporting of bioassay data. Assisted in final report preparation to the County Copermittees.

City of San Diego As-Needed Stormwater Monitoring Services Contract 2005-2011, City of San Diego, San Diego, CA, Toxicology Laboratory Manager. Supervised and conducted toxicity testing of urban runoff collected during dry and stormwater events. Responsible for collection and reporting of bioassay data.

Los Angeles County Department of Public Works (LACDPW) Annual Monitoring Report 2010 to present, County of Los Angeles, Project Scientist. Responsible for quality assurance of toxicity data associated with Los Angeles County NPDES Permit monitoring data and assisted in report writing effort.

Bight 2008, Toxicology Committee and Testing Program, Southern California, Southern California Coastal Water Research Project. Laboratory Manager and Technical Team Member. Assisted in the development of the toxicity testing component of Southern California Bight 2008 Regional Monitoring Project (Bight 2008) program. Assisted in the development of the standard operating procedures for the amphipod toxicity test and ammonia reduction procedures. Managed WESTON's Bioassay Laboratory, which performed more than 200 bioassay tests in the summer of 2008.

Riverside County Flood Control and Water Conservation District Support Services (NPDES), Riverside County, Santa Ana, CA, Project Scientist.

Assisted with reporting effort for Santa Ana and Whitewater Region annual monitoring reports. Assisted with bioassessment monitoring and sediment special studies monitoring and reporting.

Ambient Bay and Lagoon Monitoring Program, County of San Diego, Toxicology Laboratory Manager. Managed and conducted toxicity testing of sediment samples collected in coastal embayments within San Diego County as part of the San Diego County Municipal Stormwater Permit monitoring program.

Poche Beach Bacterial Source Identification Study, City of San Clemente, CA, Project Scientist. Assisted in data analysis and report preparation for the City of San Clemente.

Tijuana River Bacterial Source Identification Study, City of Imperial Beach, CA, Project Scientist. Assisted in data analysis and report preparation for the City of Imperial Beach.



**JOHN QUENZER, CPSWQ,
QSD**



Qualifications Summary

- Senior Scientist who has been involved in a variety of water quality projects in San Diego County.
- Extensive experience in storm water inspections, monitoring, and data management, including database development and GIS.
- Prepared complete storm water program annual reports and Jurisdictional Runoff Management Plans (JRMPs) for several San Diego Copermittees.

QAPP/MM Plan/Reporting – Nutrients Task

Schedule

Current workload will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside’s program. Mr. Quenzer will available to assist with annual report preparation each year.

Registration

Certified Professional in Storm Water Quality (CPSWQ) #693
Qualified SWPPP Developer (QSD)/Qualified SWPPP Practitioner (QSP)
#24039

Education

M.S., Johns Hopkins University, Environmental Engineering and Science, 2014
B.S., University of California, San Diego, Environmental Chemistry, 2002

Key Projects

City of National City Storm Water Program, Project Manager. Represents the City in MS4 Permit negotiations, Total Maximum Daily Load scoping negotiations, and storm water program audits with the Regional Board. Responsible for effectiveness assessment, modeling, monitoring, and conceptual LID design for the City’s grant-funded A Avenue green street project. Represents the City in its role as co-lead in the process to develop the San Diego Bay Watershed Water Quality Improvement Plan. Manages the City’s water quality monitoring programs, including wet weather monitoring for grant effectiveness assessment, and is also currently updating the City’s JRMP. Also has overseen a City-wide trash assessment pilot project, special studies to support 303(d) delisting, residential inspection pilot projects, and jurisdictional and watershed annual reporting. Has given presentations to the RWQCB and represented the City in audits.

City of Oceanside Storm Water Services, Project Manager. JRMP updates in 2008 and 2015 to comply with new Permit requirements and integrate strategies from watershed plans. Prepare and document jurisdictional monitoring procedures; revise BMP requirements to address key sources of pollutants; and develop source inventories and prioritization procedures. Attended meetings with Regional Board staff for program audits and during Loma Alta resolution development process. Has also managed MS4 outfall monitoring for the City.

City of Poway Storm Water Services, Project Manager. Managed annual effective monitoring for 5 regional detention basins consisting of wet weather composite samples, outflow samples, and statistical analysis of collected data. Oversee annual MS4 outfall monitoring and source investigations and wet weather sampling, including additional sampling to identify sources of key pollutants, at the City’s public works maintenance yard. Has represented the City in audits with Regional Board staff and prepared technical reports on behalf of the City. Has prepared jurisdictional annual reports since 2004 and the 2002, 2008, and 2014-2015 JRMPs.

Upper San Marcos Creek Nutrient Investigation Study, Project Manager. Prepared QAPP and monitoring plan and oversaw field sampling and reporting. Study was targeted at identifying spatial and temporal patterns in nutrient loadings among the City’s major drainage basins and at identifying contributions from Phase II jurisdictions. The study included both wet and dry weather sampling.



PAUL HARTMAN

QAPP/MM Plan/Reporting – Nutrients Task

Schedule

Mr. Hartman is currently busy completing several watershed planning projects in the region, however, many of these will be completed mid-2015. He will be available to provide assistance in development and review of the monitoring plans, analyses, and annual compliance reports for the duration of the Loma Alta Slough monitoring project for the City.

Education

B.S., Biology - James Madison University (1995)

Key Projects

Loma Alta Slough Nutrient TMDL, Technical Support, City of Oceanside. Project Manager in the development of the TMDL in Loma Alta Slough for nutrients. Worked with the stakeholders and Regional Board staff in developing an alternative to the traditional TMDL process whereby implementation will occur within the existing structure of the jurisdictional and watershed based stormwater programs.

Transitional Monitoring Annual Report, County of San Diego. Senior advisor and secondary author for the Transitional Monitoring Annual Report (TMAR) under Order R9-2013-0001. The report provides watershed based data analysis and summaries of all monitoring performed under the order during the period prior to acceptance of the Water Quality Improvement Plans (WQIP). Lead author on the WQIP section and primary reviewer of multiple watershed sections of the report.

Low Impact Development Effectiveness Assessment, City of Vista. Project Manager working with the City of Vista's Engineering and Stormwater Divisions to implement a Proposition 84 Stormwater grant awarded to construct a green street project as part of a larger redevelopment effort by the City. Developed the Monitoring and Reporting Plan including the Project Assessment and Evaluation Plan, the Monitoring Plan, and the Quality Assurance Project Plan. Implemented Phase I of the monitoring plan, consisting of pre-construction, baseline monitoring for the project.

Watershed Protection Program Support, County of San Diego. Project Manager providing support focused on development of the Water Quality

Qualifications Summary

- Senior Scientist serving as a Project Manager for LWA's work in stormwater, watershed management, and TMDLs and as the Regional Office Manager for LWA's Carlsbad Office.
- Experience in water quality has focused in the development and implementation of municipal stormwater programs and TMDLs across California.
- Expertise spans jurisdictional, watershed, and regional scales with a focus on the development of reasonable policies and cost effective programs.
- Laboratory Analyst, Grade II, California Water Environment Association

Improvement Plans (WQIP) for the San Luis Rey and San Diego River Watersheds. Regulatory support is focused on the assessment of impacts and preparation of comments for State Water Resources Control Board, Regional Water Quality Control Board, and USEPA policies affecting the Watershed Protection Program. Developed key sections of the Jurisdictional Runoff Management Plan to comply with the MS4 Permit, including the municipal, residential, and illicit discharge detection and elimination components.

Transportation and Stormwater Program Support, City of San Diego. Project Manager for LWA supporting development of the WQIPs in the City led watersheds. Developed the Adaptive Management Sections for three City led watersheds in the Region including Mission Bay, San Dieguito, and Los Peñasquitos. Led the development of a special study plan for the San Dieguito WQIP. Assisted in the development of jurisdictional strategies to address the highest priority water quality conditions. Providing regulatory and programmatic support focused on the assessment of impacts and preparation of comments for regulatory policies affecting the program.

Loma Alta Slough TMDL Development, Carlsbad Watershed. Represented the City of Vista on a Stakeholder Advisory Group in the development of the TMDL for nutrients for Loma Alta Slough. Assisted in development of the

problem statement, participated in modeling exercises and in the development of wasteload allocations and numeric targets, conducted additional field monitoring, and evaluated the results of the nutrient numeric endpoint process against the current Basin Plan Objectives.

Comprehensive Load Reduction Plan (CLRP) Development, San Luis Rey Watershed. Represented the City of Vista on a team of Copermittees that developed the CLRP to comply with the Bacteria TMDL. The CLRP was designed to address multiple pollutants including bacteria, nitrogen, and phosphorus. Participated in modeling exercises, developed non-structural BMP programs, and evaluated structural BMP options to meet required load reductions; assisted in the development of cost estimates and implementation schedules; and developed monitoring plan.

Bacteria Source Investigation, Exfiltration from Sanitary Sewers, City of Vista. Designed and implemented a study to investigate the potential for exfiltration from sanitary sewers to contribute fecal indicator bacteria within Vista's portion of the San Luis Rey and Loma Alta Watersheds.

Agua Hedionda Lagoon TMDL, Technical Lead for Carlsbad Watershed. Represented six stakeholders as the technical lead in the development of TMDLs for bacteria and sediment in Agua Hedionda Lagoon. The stakeholders developed technical documentation demonstrating that there were no impairments in the Lagoon for bacteria or sediment, resulting in delistings for both constituents and avoiding the need for TMDLs.

Monitoring Program Development and Implementation, San Diego Region. Designed and implemented programs assessing receiving waters, runoff characteristics, and source investigations including a Regional Reference Study, Lagoon Investigative Order, Ambient Bay and Lagoon, Bight 03 and 08 Studies, MS4 Outfall, Dry Weather Monitoring, Long Term and Temporary Receiving Waters Monitoring, and a Microbial Source Tracking Study for the San Luis Rey Watershed.

Microbial Source Tracking Study, San Luis Rey Watershed. Member of the Stakeholder Advisory Group (SAG) convened to design and implement a grant funded Microbial Source Tracking Study in the San Luis Rey Watershed. The SAG included a team of experts from academia, the regulated community, regulators, County Health Department, and environmental groups.

Southern California Bight Study 2008, San Diego Region. Regional representative and technical lead in the development of the estuary component of Bight Program in San Diego County. The goal of the study was to determine whether urban runoff from major tributaries was influencing water and sediment quality in estuaries. The design included sediment sampling consistent with protocols developed for the Sediment Quality Objectives, which were yet to be adopted.

Order R9-2006-0076, Lagoon Investigative Order (IO), Carlsbad Watershed. Member of Stakeholder Advisory Group that developed the design and implementation of a monitoring program to collect the necessary data to evaluate water quality conditions within the lagoons under various hydrologic conditions. Monitoring included water and sediment sampling at the mouths of tributaries, within the lagoons, and at the ocean inlets. Upon completion of the monitoring project, participated in development of extensive water quality analysis and data reports for submittal to the RWQCB.



Qualifications Summary

- More than 25 years of experience related to water quality assessments and the development of science-based resource management plans.
- Projects have resulted in the development of water quality and natural resource restoration projects in a variety of locations, and documentation of the source(s) of ecological problems has led to successful restoration efforts in numerous lakes and estuaries.
- Involved with a variety of ecological assessments, including predictions of likely responses of water quality and natural resources to upgrades in treatment processes for a regional wastewater treatment plant, the determination of water quality responses of downstream estuaries in coastal Louisiana to large-scale diversions of freshwater inflows from the Mississippi River, development of water quality management plans for more than 50 lakes in Florida, assessment of the water quality and natural resources responses of San José Lagoon (Puerto Rico) to the restoration of historical circulation patterns, and the development of pollutant load reduction goals for a variety of estuaries and coastal water bodies in the U.S., the Caribbean basin, and the Middle East.

DAVID TOMASKO, PH.D.

QAPP/MM Plan/Reporting – Nutrients Task

Schedule

Dr. Tomasko will be available as needed to provide nutrient monitoring results interpretation for the annual reports.

Education

Post-doctoral Fellowship - University of Texas Marine Science Institute (1990)
 Ph.D., Biology - University of South Florida (1989)
 M.S., Marine Biology - Florida Institute of Technology (1985)
 B.S., Biology - Old Dominion University (1982)

Key Projects

Development of Numeric Nutrient Concentration Criteria for Clam Bay, the Cocohatchee River, and Wiggins Pass, Collier County, Florida. Project Manager. Responsible for field work, data collection, compilation, analysis and interpretation and report writing for the development of salinity-normalized nutrient concentration criteria for the Upper, Outer and Inner Clam Bay. Results were transmitted to FDEP and the US EPA for review, and were accepted and adopted into state criteria in Florida Administrative Code, Chapter 62-302 "Surface Water Quality Standards."

Development of a Pollutant Load Reduction and Water Quality Goals for Sarasota Bay, Sarasota, Florida. Project Manager. Responsible for overseeing a multi-year, multi-million dollar effort to develop a pollutant load reduction goal (PLRG) for Sarasota Bay, a highly urbanized estuary on the west coast of Florida. The effort involved field work, sampling of water and sediment quality, surveys of distribution of seagrass meadows throughout the bay, the development of a watershed-level pollutant loading model, review of potential nutrient load reduction projects, and presentation of findings to various stakeholder groups.

Assessment of Potential Water Quality Impacts of a Proposed Freshwater Diversion near Violet, Louisiana. Task Manager. Oversaw all aspects of an investigation of the likely responses of water and natural resources of Lake Borgne (Louisiana, USA), a brackish lagoon, in response to a proposed large-scale introduction of freshwater inflows from the Mississippi River. This project for the U.S. Army Corps of Engineers (USACE) New Orleans District involved the development of empirically derived water quality models for the Mississippi River, Lake Borgne, and the Biloxi Marsh complex. The project involved field work, data collection and compilation, the development of nutrient loading and water quality models, data analysis and interpretation, and the development of an interpretive report. Using local data, the project determined the expected changes in suspended solids, nitrogen, phosphorus, chlorophyll-a, and dissolved oxygen in various waterbodies in coastal Louisiana with a proposed diversion of 1,000 to 7,000 cubic feet per second of freshwater inflow from the Mississippi River, after being processed through a 20,000-acre cypress swamp. Served as task manager responsible for technical assessments, budget tracking, data analysis and interpretation, field surveys and pollutant load and ecosystem response modelling, as well as integration of results into a report to stakeholders.

Development of the TMDL for the Fecal Coliform Bacteria for Wagner Creek, Florida. Project Manager. Supported the City of Miami and FDEP for the development of the TMDL for Wagner Creek, a tributary to the Miami River.

The project included developing load reduction estimates, tracking the location, quantities and timing of wastewater delivery system overflows, and the use of microbial source tracking efforts to identify sources of bacteria throughout the watershed. The final product was reviewed and approved by the Florida Department of Environmental Protection and then reviewed and approved by the U.S. Environmental Protection Agency. Duties included coordinating logistics, field work, data compilation and analysis, public presentations, report writing, and project and contract management.

Sunshine Lake/Sunrise Waterway Study, Charlotte County, Florida. Project Manager. Oversaw all aspects of a multi-year project to determine the potential cause(s) of a massive algal bloom in Sunshine Lake and the Sunrise Waterway, two semi-isolated waterways connected to Charlotte Harbor, an "estuary of national significance" as determined by the US EPA. Coordinated field work and laboratory analyses and quantified the amount of nitrogen and phosphorus loads required to account for the algal biomass within the lake. Developed loading model for nutrients, and proposed a series of actions to prevent the reoccurrence of the algal bloom in the lake (the initial algal bloom was removed via a \$3 million dollar dredging project.).

Investigation of Algal Bloom Dynamics in the Florida Keys. Project Manager. Project manager for the State of Florida to assess the factors potentially involved with the development of a large (more than 30-square-miles) algal bloom in northeast Florida Bay. The project determined the relative impact of various factors (e.g., road construction, freshwater inflow, hurricane impacts) that could have contributed to the massive algal bloom in eastern Florida Bay. Served as project manager responsible for contract and project management, coordinating and conducting field work and data analysis efforts, pollutant load model development, invoicing, and report preparation.

Feasibility Report and Environmental Impact Statement for the Caño Martín Peña Ecosystem Restoration Project in San Juan, Puerto Rico. Task Manager. Oversaw technical tasks for ENLACE, a public corporation formed to implement the restoration of the Martín Peña Canal. This highly polluted waterway connects San Juan Bay and the San José Lagoon, within the city of San Juan. The project involved developing an environmental assessment of the ecological benefits that could occur via restoration of the historical tidal connection between San Juan Bay and the San José Lagoon, Puerto Rico. The assessments involved quantification of the positive and potentially negative consequences of activities associated with canal restoration and reestablishment of historical circulation patterns. Served as task manager responsible for water quality modeling efforts and the assessment of potential impacts and benefits related to fisheries habitats.

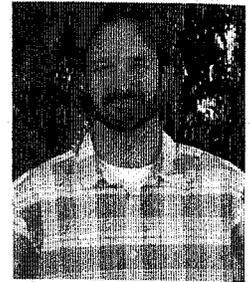
Benthic Index Development for San Juan Bay, Puerto Rico. Project Manager. Technical lead for the San Juan Bay Estuary Program to develop a benthic index for the San Juan Bay estuary complex. The project involved the compilation and analysis of water quality and benthic community data, and the development of an index of biological health for this tropical estuary with a highly urbanized watershed. Using guidance from the U.S. Environmental Protection Agency, the project developed an integrative technique for assessing the health of San Juan Bay's biological health, using benthic (i.e., bottom-dwelling) communities as bio-indicators. Served as technical project manager responsible for technical assessments, budget tracking, data analysis and interpretation, and report writing.

Qualifications Summary

- More than 12 years of experience with monitoring equipment and 7 years of environmental assessment experience with a focus on water and sediment quality.
- Areas of expertise include NPDES and TMDL compliance monitoring; sampling plan design; mobilization/demobilization of equipment; management of remote sensing data loggers and autosamplers; and equipment calibration and maintenance.
- Scientific specialization in field surveys, flow monitoring and sample collection for water quality, benthic, and sediment samples.
- Responsible for full compliance with project-specific Quality Assurance Project Plans and SWAMP compatible sampling.
- Evaluation of analytical data and compilation of data for graphics and final reports.
- Design and development of watershed assessments, methodologies, and source identification studies.

GARTH ENGELHORN, CPSWQ

Watershed Lead – Nutrients Task



Schedule

Current monitoring work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside’s program. Mr. Engelhorn will be available during each summer to oversee implementation of the watershed monitoring portion of the nutrient monitoring plan.

Certifications

Certified Professional in Storm Water Quality (CPSWQ) No. 0953)

Education

B.S., Earth Sciences (emphasis in oceanography/geophysics) - University of California, San Diego

Key Projects

San Diego County Regional Copermittee Urban Runoff Monitoring Program, County of San Diego, Project Manager. Manages all aspects of the NPDES permit program including water quality sampling at over 30 stations annually; stormwater monitoring; continuous flow monitoring and remote access telemetry system development; stream bioassessment; toxicity, microbiology, and analytical chemistry testing; ambient bay and lagoon sediment monitoring and assessment using Sediment Quality Objectives; data management and analysis; report preparation; work plan development; and budget preparation. Implemented the monitoring requirements of the new 2013 NPDES permit.

Lake Elsinore and Canyon Lake Nutrient TMDL Watershed Monitoring and Annual Reporting, Santa Ana Watershed Project Authority (SAWPA), Project Manager. Manages an annual watershed-wide monitoring and reporting program for the Lake Elsinore and Canyon Lake Nutrient TMDL Task Force. Coordinates storm sampling events and prepares annual reports summarizing the data to evaluate compliance with the Canyon Lake and Lake Elsinore nutrient TMDLs.

Riverside County Flood Control District (RCFCD) As-Needed Stormwater NPDES Professional Services, Task Leader. Designed and implemented a special study designed to assess the water quality of stormwater flows entering the District’s MS4 target source areas. Responsibilities include field reconnaissance, wet weather sampling, data management and report preparation.

City of Vista, TMDL as Needed Support, Task Leader. Provides ongoing strategic and technical support to the City of Vista on TMDL issues, source

identification studies, monitoring program development, 303(d) delisting strategies. MS4 dry weather inspection program including the IC/ID program.

Hydromodification Monitoring Program, County of San Diego, Project Manager. Manages the first hydromodification monitoring program of its kind in the Southern California Region. Tasks involve developing a SWAMP compatible QAPP, site permitting, conducting monitoring, data analysis, and processing. Monitoring includes geomorphic assessments, channel surveys, bedload transport surveys, and flow surveys and sediment sampling. Project work includes coordination with multiple stakeholders and jurisdictions and technical work groups.

Buena Vista Lagoon and Stream Sewer Spill Support, City of Oceanside Public Works, CA, Task Leader. Under contract to City of Oceanside Public Works, conducted monitoring to assess the short and long-term impacts of the sewage spill in Buena Vista Creek to public health, animal, and plant communities, and on the overall ecosystem downstream of the discharge. The impacts were assessed through sampling, analysis, and comparison of recently collected historical data. Monitoring was conducted to assess the area upstream of spill site and downstream of spill site in the Creek, and the eastern portion of the Lagoon. Responsible for mobilization/demobilization of equipment, sample collection, equipment calibration and maintenance, evaluation of analytical and hydrologic data, and reporting.

Famosa Slough TMDL Monitoring, City of San Diego, CA, Field Team Lead. Conducted monitoring required to assess water quality impairments in the slough to parameterize, calibrate and verify watershed and lagoon models. Coordinated four dry weather monitoring events as well as continuous water quality parameter monitoring at locations throughout the lagoon. Responsible for mobilization/demobilization of equipment, sample collection, equipment calibration and maintenance, evaluation of analytical and hydrologic data, and reporting.

San Diego River Source Tracking Investigation-Phase I, City of San Diego, CA, Field Team Lead. Successful completion of a microbial source tracking study in the San Diego River watershed to determine land use activity contributions to bacterial loading in the river. Project responsibilities included field reconnaissance, water sampling, mapping and field surveys. Developed field surveys and completed a comparison of the activities and unique characteristics of different land uses. Study successfully identified key land use sources and activities and recommended remedial actions for bacterial load reduction.

Qualifications Summary

- Over 14 years of professional experience as a biologist and field scientist specializing in biological and water quality assessments.
- Benthic sampling/sorting projects for municipal clients including the Los Angeles Department of Public Works, County of San Diego, County Sanitation Districts of Los Angeles County NPDES Permit Monitoring Program and Orange County Sanitation District 301(h) Monitoring Program.
- Expertise includes field surveys and analysis for benthic, sediment, and water quality samples.
- Stream bioassessment surveys/sample collection and stormwater monitoring in San Diego County.

DAMON OWEN**Lagoon Lead – Nutrients Task / Monitoring – Microbial Task****Schedule**

Current monitoring work will lighten during the late summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Mr. Owen will be available during each summer to implement the Slough monitoring portion of the nutrient monitoring program.

Education

B.A., Biology/Plant Sciences - University of California (1996)

Key Projects

San Diego County Regional Copermittee Urban Runoff Monitoring Program, San Diego, CA, County of San Diego, Field Supervisor/Senior Scientist. Coordinate and conducts all aspects of this NPDES permit program including stream bioassessment; water quality sampling at over 30 stations annually; stormwater monitoring; continuous flow monitoring and remote access telemetry system development; toxicity, microbiology, and analytical chemistry testing; ambient bay and lagoon sediment monitoring and assessment using Sediment Quality Objectives; data management and analysis; and. Sampling responsibilities include performing field reconnaissance, maintaining storm water sampling stations, performing stream ratings, and conducting both dry and wet weather sampling events. Field reconnaissance includes locating strategic site locations for MLS and mobilization and construction of all the MLS stations. Duties include mobilization of equipment prior to storm event; managing operation of autosamplers during storm events, collection of discrete water quality samples for laboratory analysis; measuring temperature, pH, and conductivity of water at the site; completing and recording field observations, delivering water quality samples for laboratory analysis within the required holding time; and demobilization of field equipment.

Poche Beach Bacterial Source Tracking, County of Orange, California, Sr. Project Scientist/Field Lead. Responsible for conducting a source tracking study in the Prima Deshecha Canada channel that discharges at Poche Beach in San Clemente, CA, for bacteria, trash, phosphorus, turbidity, nickel, and cadmium. Tasks included site reconnaissance, existing data summary, data analysis, field monitoring for constituents of concern (COCs), bacterial source tracking/regrowth studies, client meetings, and report preparation.

Dry Weather Analytical and Field Screening Monitoring Program – City of San Diego, California. Field Lead. Responsible for conducting inspections of

the City's municipal separate storm sewer system (MS4) for illicit connections and illegal discharges. Responsible for mobilizing field equipment; locating sites using global positioning system (GPS) equipment, aerial photography, and city maps; conducting field observations of site conditions; collection of water quality samples using EPA-approved clean sampling techniques; conducted field water quality testing for ammonia, nitrates, phosphates, temperature, and pH; performing quality assurance checks of field and laboratory data; accurately transcribing data into the City's Excel database.

Stormwater Monitoring and Reporting, Orange County, CA, Caltrans, Field Leader. Performed installation, calibration, operation, and maintenance of remote telemetry sampling systems at eight mass loading stations near structural best management practices (BMPs). Collects sample bottles from stations and transports them to analytical laboratory. Also provides emergency equipment maintenance during sampling event as necessary. Project will determine effectiveness of various BMPs in removing pollutants from stormwater runoff.

Los Angeles County Flood Control District NPDES Permit Program, Los Angeles, CA, Task Lead/Field Supervisor. NPDES permit stormwater program. Performed calibration, operation, and maintenance of sampling systems at eight mass emission/tributary stations in the Santa Monica Bay and Santa Clara River watersheds. Program and conduct stormwater sample collection. Also provides emergency equipment maintenance during sampling event as necessary.

Regional Municipal Stormwater NPDES Permit Program, San Diego, CA, County of San Diego, Senior Scientist. NPDES permit program reporting including stream bioassessment analysis; SWAMP physical habitat assessment and the California Rapid Assessment Method (CRAM) water quality monitoring analysis; toxicity, microbiology, and analytical chemistry testing of runoff; data management and analysis; and report preparation.

Los Angeles County Department of Public Works As-Needed Runoff & Stormwater Quality & Engineering Services (Annual Reporting and Marina del Rey EWMP & CIMP), Senior Scientist. Under contract to the Los Angeles Department of Public Works (LADPW) since 2003. Conducts field sampling and analysis for 20 monitoring sites in the Los Angeles basin for NPDES permit compliance. Responsible for data interpretation and reporting. Project contributed to the Los Angeles and San Gabriel Rivers Regional Monitoring Programs and the Stormwater Monitoring Coalition's Regional Monitoring Program.

Stream Bioassessment Studies for the Trout Unlimited San Mateo Creek Steelhead Recovery Project, Senior Scientist/Field Operations Supervisor. Coordinates conducts biological baseline surveys to define macroinvertebrate resources in the San Mateo Creek watershed in support of a steelhead recovery project funded through the California Coastal Commission.

Riverside County Flood Control and Water Conservation District Support Services (NPDES) Special Studies and Bioassessment, Riverside County, Riverside, CA, Senior Scientist. NPDES permit program stream bioassessment sample collection; SWAMP physical habitat assessment and the California Rapid Assessment Method (CRAM) water quality sampling

Bight 2008 Regional Monitoring Program, Southern California, Southern California, SCCWRP, Biologist. Conducted field surveys for sediment, and infaunal sample collection at over 115 sites for various clients including the San Diego Copermittees, Port of San Diego (for the Regional Harbor Monitoring Program), and SCCWRP.

San Gabriel Watershed Stream Bioassessment, Los Angeles County, CA, County Sanitation Districts of Los Angeles County (CSDLAC). Field/Laboratory Scientist. Assisted in collection and analysis of samples to comply with provisions of the Long Beach, Los Coyotes, and Whittier Narrows Reclamation Plants NPDES permit.

Best Management Practices (BMP) Effectiveness Assessment, Carlsbad and Lakeside, CA, County of San Diego Flood Control District, Field Technician. Installed, maintained, and operated automated water quality samplers for this Proposition 13 grant-funded study. Also conducted stream bioassessment sample collection to determine pollutant removal efficiencies of an underground treatment train (hydrodynamic separator and retention basin) at Palomar Airport and retention basin at Woodside Avenue.

Qualifications Summary

- Conducted bioassay testing for the San Diego Copermittees Regional Monitoring Program, Bight '08, and San Diego RHMP.
- Field sampling, including water quality monitoring, water sampling, stream macroinvertebrate collection for bioassessment, and sediment sampling.
- Performed algal assessments for NPDES permit compliance for municipal clients and for SMC Regional Bioassessment Program using the SWAMP and EPA algae collection protocols.
- Conducted water and sediment toxicity tests on several different aquatic vertebrates and invertebrates.
- Conducted equipment installation, maintenance, and mobilization for dry weather and wet weather monitoring.

MELISSA MATHIS**Monitoring – Nutrients Task****Schedule**

Current biological monitoring work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Ms. Mathis will be available during each summer/fall to participate in the implementation of the slough monitoring program.

Registration

PADI Open Water SCUBA Certification (2006)

Education

B.S., Biology - San Diego State University (2007)

Key Projects

County of San Diego Copermittee Water Quality Monitoring Program, County of San Diego, San Diego, CA, Field Technician. Assists in NPDES permit program including stream bioassessment sample collection; SWAMP physical habitat assessment and the CRAM water quality sampling during storm events; toxicity, microbiology, and analytical chemistry testing of runoff; data management and analysis; and report preparation.

Stream Bioassessment Monitoring for Los Angeles County Department of Public Works, Field Technician. Conducts field sampling, habitat analysis, and laboratory processing of samples for 22 monitoring sites in the Los Angeles basin for NPDES permit compliance.

City of San Diego As-Needed Stormwater Monitoring Services Contract 2005-2011, City of San Diego, San Diego, CA, Technician. Responsibilities include field reconnaissance and site installations; wet and dry weather sampling that consist of mobilizing equipment for all sampling teams; site maintenance. Also assist in conducting bioassessment of several stream sites in San Diego County following the SWAMP Bioassessment Protocol and the

CRAM.

Riverside County Flood Control and Water Conservation District Support Services (NPDES) Special Studies and Bioassessment, Riverside County, Riverside, CA, Scientist. Conducts field sampling, habitat analysis, and laboratory processing following the SWAMP Bioassessment Protocol and the California Rapid Assessment Method (CRAM).

Port of Los Angeles Inner Cabrillo Beach Bacteria TMDL and Natural Source Exclusion, Los Angeles, CA, Associate Scientist. Participated in multiple surveys along Inner Cabrillo Beach collecting water and biological samples. Performed weekly sampling for the ICB Pathogen study.

Bight 2008, Toxicology Committee and Testing Program, Southern California, Southern California Coastal Water Research Project. Lab Technician. Assisted in conducting toxicity testing components of Southern California Bight 2008 Regional Monitoring Project program. Assisted in the performance of more than 200 bioassay tests in the summer of 2008 (*Eohaustorius estuarius*, 10 day solid phase test and *Mytilus edulis* sediment water interface test).

Stream Bioassessment Studies for the Trout Unlimited San Mateo Creek Steelhead Recovery Project. Conducted biological baseline surveys to define macroinvertebrate resources in the San Mateo Creek watershed in support of a steelhead recovery project funded through the California Coastal Commission.

Padre Dam Impact Analysis. Responsible for conducting stream bioassessment, periphyton, water, and sediment chemistry sample collection for NPDES permit issued by the San Diego Regional Water Quality Control Board.

Jean Lafitte National Historic Park and Preserve Submerged Aquatic Vegetation Natural Resource Damage Assessment, Field Scientist. Assisted in aquatic vegetation surveys, water quality sampling and analysis, and habitat assessments.

Harper Lake Macroinvertebrate Sampling and Selenium Analysis, Field Scientist. Was responsible for the collection of benthic macroinvertebrates from three saline ponds associated with NextEra Energy Operating Systems, LLC, for Selenium analysis.

Qualifications Summary

- More than 8 years of experience in water, soil, and sediment sampling.
- Experience with monitoring and sampling equipment in the field.

SCOTT CROPPER

Monitoring – Nutrients Task



Schedule

Current monitoring work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Mr. Cropper will be available during each summer to participate in the watershed monitoring portion of the nutrient monitoring plan.

Education

B.S., Environmental Geosciences - Texas A&M (2006)

Key Projects

County of San Diego Copermittee Monitoring and Reporting Program, San Diego County, CA, Task leader. Sample station set up and flow weighted sampling set up. Coordinated with subcontractors, labs, and field staff during wet and dry weather sampling events.

County of San Diego-As Needed-2012-RBF, HMP-Phase II, CA, Task Leader. Conducted continuous flow monitoring at nine sites and site-specific rain gauges. Monitored site and samples collected during wet weather events.

Lake Elsinore and Canyon Lake TMDL Monitoring, Santa Ana Watershed Authority, Santa Ana, CA, Senior Technician. Worked on equipment removals and ordering sample supplies.

Chollas Creek TMDL Monitoring, City of San Diego, CA, Field Scientist. Installed flowmeters and sampling equipment to collect automated flow weighted composite samples at north/south forks of the creek during storm events.

Chollas Creek Jurisdictional Boundary Water Quality Monitoring, City of San Diego, San Diego, CA, Field Scientist. Installed and collected data from flow meters and sampling equipment. Assisted in the field sampling efforts during wet weather and dry weather sampling events.

San Diego River Microbial Source Tracking Study, City of San Diego, San Diego, CA, Field Scientist. Worked with a team that conducted a microbial

source tracking study in the San Diego River watershed to determine land use activity contributions to bacterial loading in the creek and investigated loading inputs from jurisdictional boundaries during dry and wet weather with a focus on indicator bacteria as well as molecular indicators of human sewage. Assisted in the field sampling efforts during wet weather and dry weather sampling events.

San Dieguito River Watershed Characterization, City of San Diego, San Diego, CA Field Scientist. Worked with team to assess indicator bacterial loads/concentrations from watershed locations with varying degrees of urbanization, including a reference location with minimal anthropogenic influence. Assisted sampling efforts during wet/dry weather sampling events. Installed, maintained, and collected data from Hach-Sigma flow meters and YSI data logger sondes.

Tecolote Creek Microbial Source Tracking Study, City of San Diego, CA, Field Scientist. Worked with team that conducted microbial source tracking study in the creek watershed to determine specific land use activity contributions to bacterial loading in the creek. Assisted field sampling efforts during wet and dry weather sampling events.

Dewatering Discharges and Groundwater seepage Impacts and Management Study, City of San Diego, San Diego, CA, Field Scientist. Field lead in collecting samples and assessing flow.

Preliminary Assessment of Sediment Reduction Opportunities for Los Peñasquitos Lagoon – Carroll Canyon Watershed, City of San Diego, San Diego, CA, Field Scientist. Partnered with ESA PWA with field reconnaissance for a geomorphic assessment of the Watershed to identify the primary sources of sediment to the Lagoon.

Dry Weather Analytical and Field Screening Monitoring Program, San Diego, CA, City of San Diego, Field Technician. Conducted follow-up inspections and upstream investigations of the City's municipal separate storm sewer system (MS4) for sources of illicit connections and illegal discharge (IC/ID). Reported violations to City authorities. This program is required to meet stormwater NPDES permit requirements.

Inner Cabrillo Beach Facilitated Circulation and Bacterial Indicators Study, San Pedro, CA, Port of Los Angeles, CA, Field Scientist. Worked with a team that utilized a trash pump with the outfall set at waist/shallow water pushed water under limited conditions. Collected turbidity and FIB samples.

Inner Cabrillo Beach 2012 Microcirculation Pilot Studies, San Pedro, CA, Port of Los Angeles, CA, Field Scientist. (1) Worked with field team that helped support and monitor a 700GPM pump system for a four day operation that circulated seawater from a distance offshore closer to an area of concern, which was just offshore. Collected FIB samples, water velocity data, weather data, and observations. (2) Part of a team that conducted daily operation of a 700-1200 GPM circulation system for 10 consecutive weeks. Collected FIB samples, weather data, and observations.

Inner Cabrillo Beach Natural Source Exclusion Mini-Studies, San Pedro, CA, Port of Los Angeles, CA, Field Scientist. Involved with team that collected pushcore sediment, seawater and eelgrass qPCR samples off a small dingy.

Tijuana River Bacterial Source Identification Study, City of Imperial Beach, CA, Field Scientist. Conducted surface water and groundwater sampling. Installed and monitored flow monitoring equipment in storm drains.

Poche Beach Bacterial Source Identification Study, City of San Clemente, CA, Field Scientist. Conducted surface water and groundwater sampling. Installed and monitored flow monitoring equipment in storm drains.

Qualifications Summary

- Environmental Scientist with 12 years professional experience in the development and implementation of assays for the detection of chemical and biological markers.
- Over eight years microbial source tracking experience with a wide variety of environmental samples (stormwater, sea water, fresh water, sediment, sludge, shellfish, etc.).
- Authored several technical reports and peer reviewed scientific publications regarding chemical and biological water quality and the application of MST.
- Experience includes detection of a range of bio-targets pathogens, fecal indicators, and source identification markers via qPCR, PCR, traditional culture methods and IDEXX.
- Developed methods to overcome inhibitory matrix effects for the analysis of pathogens and MST markers in road runoff samples via qPCR, participated in multi-laboratory qPCR performance and assay validation studies, and designed several studies for the assessment of transport and prevalence of human pathogens and other biomarkers in the environment.

ALEXANDER SCHRIEWER, PH.D.

Optional Microbial Source Identification Study Task Lead



Schedule

Current MST work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program, if the MST grant is awarded. Dr. Schriewer will be available to oversee implementation of the MST program through its duration.

Education

Ph.D., Chemistry and Urban Water Management - Technical University Munich (2007)
 M.S., Chemistry - Technical University Munich (2003)

Key Projects

Stockton Pathogen TMDL Characterization Study, Larry Walker and Associates, Laboratory Manager. Data analysis and QA/QC of molecular analysis of dry and wet weather samples collected within the Stockton urban watershed for microbial source tracking markers and human pathogens.

Completion of environmental toolkit for fecal source tracking and pathogen analysis in stormwater, California Department of Transportation, Molecular Biology Lead. Scientific Lead for the development of methods to perform microbial analyses on stormwater samples. Focus points included the assessment and reduction of qPCR inhibition, DNA recovery and optimization of filtration techniques for challenging sample matrices.

Santa Monica Bay Microbial Source Tracking Study, California Department of Transportation, Laboratory Manager. Data analysis and QA/QC of molecular analysis of pacific coast highway stormwater runoff samples for microbial source tracking markers and human pathogens.

Los Angeles River Bacteria Source Identification Study, AMEC, Laboratory Manager. Data analysis and QA/QC of molecular analysis of dry weather flow samples of the Los Angeles River watershed for microbial source tracking markers and human pathogens.

Microbial Source Tracking as Component of the Middle Santa Ana River (MSAR) Watershed TMDL Implementation Plan, CDM, Laboratory Manager. Technical Lead on data analysis and QA/QC of molecular analysis of pathogen and MST markers in surface water samples from the MSAR watershed and connected waste water treatment plants.

Central Valley Bacteria Source Identification Study, Central Valley Regional Water Quality Control Board, Laboratory Manager. Technical Lead on use and quality control of microbial source tracking assays.

Monitoring and Mitigation to Address Fecal Pathogen Pollution along California Coast. UC Davis, Molecular Biology Lead. Technical lead on use and quality control of microbial source tracking assays in estuarine, fresh and sea water samples.

Research in Support of Microbial Water Quality Improvements from Highway Facilities, Pacific Coast Highway, California Department of Transportation, Project Manager. Managed all aspects of a multi-year research effort to

investigate the sources and extent of fecal contamination in stormwater runoff of the Pacific Coast Highway sites located within Santa Monica Bay TMDL jurisdictions.

Assessing the effectiveness of improved sanitation on diarrhoea and helminth infection: a cluster randomized controlled trial in rural India – MST sub-study. Bill & Melinda Gates Foundation. Molecular Biology Lead. Designed monitoring plan and coordinated two-year sampling effort. Technical lead on use and quality control of pathogen and MST assays in surface water, stormwater runoff, hand rinses, and ground water samples.

Potential for Pathogen Growth, Fecal Indicator Growth and Phosphorus Release under Clam Removal Barriers in the Lake Tahoe Basin, US Forest Service, Molecular Biology Lead. Contributed to study design and quality control of microbiological analyses.

Quantification of Pathogens and Sources of Microbial Indicators for QMRA in Recreational Waters (PATH1R08), Water Environment Research Foundation (WERF), Laboratory Manager. Responsibilities included contributions to development of filtration and extraction methods, quality control of molecular analyses for human pathogens and MST markers in source water samples and data analysis of obtained results.

Qualifications Summary

- Environmental microbiologist and molecular biologist with interdisciplinary training to support projects investigating sources of microbial and nutrient contamination to coastal waters and watersheds with recommendation of remediation strategies.
- In addition to traditional assays (microscopy, plate counts, IDEXX), experience includes a variety of rapid and fecal source identification technologies (PCR, qPCR, Luminex, microplate assays, in-situ sensing), including experience with nucleic acid extraction from environmental matrices.
- Worked on detection of a variety of fecal indicators, pathogens, & MST markers using PCR, qPCR, and traditional assays (microscopy, plate counts, IDEXX).
- Developing/implementing assays for microbiological quality in environmental samples for real-time platforms.

KELLY D. GOODWIN, PH.D.
NOAA (working with WESTON through a CRADA)
 Technical Advisor / QAPP/MM
 Plan/Reporting – Microbial Task



Schedule

Current MST work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside’s program, if the CBI grant is awarded. Dr. Goodwin will be available as needed to support the development and implementation of the MST program.

EDUCATION

PhD, Environmental Engineering Science—California Institute of Technology (1996)
 Subject Minor, Oceanography—California Institute of Technology, obtained at residence at Scripps Institute of Oceanography (1993)
 MS, Environmental Engineering Science—California Institute of Technology (1991)
 BS, high honors, Neurobiological Sciences—University of Florida (1988)

Credentials and Training

Quantitative Microbial Risk Assessment, Water Quality and Technology Conference (2011)
 Real-Time Quantitative PCR, Quality and Technology Conference, (2011)
 Marine Mammal Stranding and Necropsy, Southwest Fisheries Science Center (2010)
 Quantitative PCR, Florida International University (2005)
 Bloodborne Pathogens and Laboratory Chemical Safety, OSHA 29 CFR 1910.1030, University of Miami (2004)
 Prokaryotic Annotation and Analysis, The Institute for Genomic Research (TIGR) (2003)

Awards

Takeda Techno-Entrepreneurship Finalist Commendation, 2001; National Research Council Postdoctoral Fellow, 1995-1997; Soroptimist Society Fellowship, 1990; Golden Key National Honor Society, 1987; Phi Beta Kappa, early admission 1986

Key Projects

Port of Los Angeles Inner Cabrillo Beach Bacteria TMDL and Natural Source Exclusion, City of Los Angeles, California, Molecular Biology Lead. Technical lead for MST assays (human, dog, and bird), rapid detection.

Contributions include project design, field work, work plan, lab, & project reports, scientific presentations (including to the Regional Board), and proposal writing.

Analysis of Staphylococcus for Southern California Epidemiology Studies, La Jolla, CA, (Southern California Coastal Water Research Project, SCCWRP), PI. Lead project to enumerate *Staphylococcus aureus* and MRSA in beach seawater and sand as part of a large epidemiology study (Pacific Coast Water Study).

Poche Beach Bacterial Source Identification Investigation, City of San Clemente, San Clemente, California, Molecular Biology Lead. Technical lead for MST assays (human, dog, bird) in samples collected from the watershed, scour pond, and beach (sand and seawater). Contributions include project design, lab & project reports, scientific presentations, and proposal writing.

Tijuana River Bacterial Source Identification Study, City of Imperial Beach, CA, Molecular Biology Lead. Technical lead on use and quality control of microbial source tracking (MST) assays.

Ventura County Microbial Source Tracking, County of Ventura, Ventura, California, molecular Biology Lead. Technical lead on MST assays (human, bird). Development of new bird assay to serve client needs

Facilitate Implementation of Biological Sensors for Microbial Contaminants, La Jolla, CA, (NOAA Oceans and Human Health Initiative), PI. Leads project to develop improved methods of nucleic acid extraction to help improve automated and in-situ biosensing in marine waters. Collaborators include the MBARI, SCCWRP, Stanford, U. South Florida, UC San Diego & NOAA Northwest Fisheries Science Center.

Bacterial Pathogens of Marine Mammals, La Jolla, CA, (NOAA), PI. Lead pilot study investigating the ability to detect bacterial pathogens from remote biopsy samples taken from free-ranging coastal dolphins. The targets are a variety Gram positive bacteria (enterococci, staphylococcus), species of *Vibrio*, and antibiotic resistant bacteria. The laboratory approach uses a combination of bacterial enrichment, selective and differential media, colony isolation and archiving, and molecular identification.

Oceanography of the Florida Area Coastal Environment (FACE), Miami, FL (NOAA), CoPI. Microbiological analyses of coastal waters receiving treated wastewater. Methods include culture and molecular methods for: Fecal indicators: enterococci, *Escherichia coli*, *Bacteroides* spp.; Source tracking markers: *Bacteroides* human markers, enterococci human markers; Pathogens: *Staphylococcus aureus*, MRSA, *E. coli* O157:H7, *Campylobacter jejuni*, *Salmonella* spp., adenovirus, *Cryptosporidium*/*Giardia*, *Vibrio*; Harmful algae: *Karenia brevis*, *K. mikimotoi*.

Development of Genetic Sensors to Monitor Waters for Threats to Human Health, Miami, FL, (Northern Gulf Institute), PI. Lead project to develop rapid assays for molecular water quality analysis, including development of a quantitative assay for dog fecal source identification.

Biodegradation of carbon tetrachloride, La Jolla, CA and Miami, FL, (NOAA, NSF), CoPI. Study demonstrated the ubiquitous nature of CCl₄ uptake by soils with demonstration of biological uptake (versus abiotic). A variety of bacterial inhibitors and substrates were used to gain insight into the microbial mechanism responsible for uptake.

Electrochemical Biosensors to Monitor Coastal Waters for Biological Threats to Human Health, Miami, FL (CICEET, NOPP & NOAA), PI. In collaboration with industrial and academic partners, lead project to develop electrochemical methods for use in portable and in situ biosensors to detect the genetic signatures of fecal indicators, harmful algae, human pathogens, and source tracking markers in coastal waters.

Adapting Luminex to Microbial Source Tracking, Miami, FL, (CICEET & NOAA), PI. Lead project working to incorporate source tracking markers into the Luminex™ technology platform (bead array detection).

Qualifications Summary

- 25 years of experience in the water quality arena, with specific experience in microbial contaminant loading and assessment, application of molecular methods including microbial source tracking methods, and design and implementation of successful, compliant water quality management programs in coastal and estuarine regions.
- International Reviewer, Range of Water Quality Assessments and Microbial Source Tracking Projects, including Aquaculture, Beaches, Estuaries, and Pathogen Quantification.
- Expert in Sanitary Survey and Watershed Sampling Design and Strategies across both Dry and Wet Weather.
- Water Quality Assessment and Study Design in Industrial Discharges.
- Design and Review of EPA and Federal Agency Guidance Documents, Including Assessment on the Importance of Aquaculture Effluents, Impacts of Antibiotic Resistance, Beach Assessments, and Water Quality QA/QC and QAPP Generation.

RACHEL NOBLE, PH.D.

Noble Environmental LLC

Technical Advisor / QA/QC Trial – Microbial Task



Schedule

Current scheduled MST work will allow for Dr. Noble to participate in the development of the optional MST program for the City during the summer of 2015.

Education

Ph.D., Biological Sciences - University of Southern California (1998)
 B.S., Biological Sciences - Carnegie Mellon University (1991)

Key Projects

MACTEC/City of Oceanside: Bacterial Source Tracking in the Lower San Luis Rey River, Oceanside, CA. Water quality project conducted to assess the dynamics of microbial contamination fate and transport from upstream locations of the San Luis Rey River through the discharge into the Pacific Ocean. Included interaction with MACTEC project team, management of large scale microbial contaminant data and molecular data analyses, interaction with stakeholders and guidance on potential infrastructure and monitoring modifications for successful remediation of contamination. Project conducted with UNC Chapel Hill.

City of San Diego/AMEC: Water Quality Assessment Quantitative Microbial Risk Assessment Study in Tecolote Creek, CA: Member of the project working group assembled to conduct extensive water quality assessment of Tecolote Creek, CA toward successful TMDL development and implementation including microbial contaminant data analyses and interpretation, guidance on QA/QC issues, guidance on sampling frequency and site allocation, and molecular analyses to support microbial source tracking. Project conducted with UNC Chapel Hill.

Relationships between rainfall and microbial contaminants, Hampton Roads Sanitation District: Water quality projects to assess the historical relationships between rainfall and microbial contaminant markers, as well as to assess the impact of sediment resuspension for an estuarine location that is proximal to high levels of residential development within Virginia Beach. The assessment has included a range of microbial and chemical contaminant analyses, along with basic conceptual modeling of the fate and transport of stormwater related contamination during wet weather periods.

Chair, Peer Review Team, EPA Recreational Water Quality Criteria Document, ERG Consulting: Was the chair for the entire peer review team

that provided feedback and recommendations to the USEPA on the development of draft criteria for recreational waters, released 2013. As chair, performed extensive assessments of epidemiological, quantitative microbial risk assessment, and molecular and culture based methods data and interpretation toward development of the final criteria document. Led the peer review team through integral meetings and interactions with the USEPA.

Town of Wrightsville Beach, NC: Quantitative analysis of fecal bacteria in Wrightsville Beach stormwater outfalls. In collaboration with the Town of Wrightsville Beach, Lead PI on water quality project to determine the relative importance of bird, dog, and human fecal contamination on the coastal and recreational waters of Wrightsville Beach, NC, a prominent tourist destination in NC. Includes large scale data analyses for microbial contaminants, hydrological assessments during wet and dry weather, and incorporation of microbial source tracking data generated through laboratory analyses. Project conducted at UNC Chapel Hill.



DAVID POHL, PH.D., P.E.

Technical Advisor – Microbial Task

Schedule

Current scheduled work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Dr. Pohl to assist with development of BMP recommendations based on the outcome of the optional MST project.

Registration

Professional Engineer, Civil, CA, 69522

Education

Ph.D., Geo-Environmental Engineering - Drexel University

M.S., Geotechnical Engineering - Drexel University

B.S., Civil Engineer - Lehigh University

B.A., Applied Science - Lehigh University

Key Projects

Loma Alta Slough Bacteria and Nutrient TMDL Development and Restoration Alternatives, City of Oceanside (Oceanside, CA): Dr. Pohl provided senior water quality and treatment expertise to support the City of Oceanside in the development of the Total Maximum Daily Load (TMDL) for the Loma Alta Slough. He provided technical support in meetings and correspondence with the Regional Water Quality Board that developed the waste load allocation for bacteria and nutrients entering this tidally influenced estuary that discharges to a popular beach within the City of Oceanside. The support included advising the City on using the TMDL development to evaluate implementation scenarios that include optimizing the existing UV treatment facility and discharge options to reduce bacteria concentrations and maintain recreational uses, restoring the slough to allow for greater nutrient removal and improve habitat, source controls within the watershed and slough outlet configurations.

Poche Beach Watershed and Coastal Lagoon Bacteria Source Study and Multi-Benefit Alternative Development and Assessment, City of San Clemente (San Clemente, CA): Dr. Pohl provided senior water quality and treatment expertise on this project that included source tracking studies and development of recommendations for steps forward for consideration by the City. Dr. Pohl led the development of multi-benefit alternatives to address not only the issue of bacteria exceedances in the scour pond/remnant lagoon and ocean surf zone, but also cost effective use of the UV treatment system, flood control, habitat restoration and maintaining recreational benefits of the beach area. He used his expertise to explore using an integrated approach that includes both engineered structures to address flooding and erosion with natural systems to enhance this dynamic dunal ecosystem that has challenging existing infrastructure constraints. The alternatives developed include an emphasis on source control, maximum efficiency of the existing treatment system and use of natural systems to address eutrophication, restoration and flooding goals in the scour pond/remnant lagoon.

Carlsbad Watershed Management Area Water Quality Improvement Plan (WQIP), City of Carlsbad: Dr. Pohl's role is technical advisor to the team lead by Mikhail Ogawa Engineering (MOE) for the development of the Carlsbad Watershed WQIP. Dr. Pohl is providing technical input on the development of the water quality priorities, numeric effluent goals, interim goals and

Qualifications Summary

- 17 years of experience in project management and senior technical oversight of water quality and quantity monitoring and assessment, watershed management, Bacteria Source Tracking and TMDL special studies and implementation plan development, NPDES MS4 permit compliance strategies and plan preparation, State 303d listing and Basin Plan amendment evaluation.
- 30 years of geo-environmental engineering including BMP design and effectiveness monitoring, and engineering cost estimates and economic analysis of TMDL implementation and MS4 Permit compliance.
- Developed Strategic Plan for Six Watersheds in San Diego County that integrated MS4 and TMDL Compliance and Bacteria TMDL Compliance Framework using results of Special Studies for City of San Diego
- Technical Advisory Committee for the Development of Water Quality Credits for the re-issued San Diego Region MS4 Permit,
- Key author of the new CASQA guidance document for Stormwater Program Effectiveness Assessment.
- Recently prepared successful grant applications totaling \$2M for the City of Oceanside and Newport Beach for water quality and habitat enhancement projects.

implementation strategies and schedules.

Storm Water Monitoring Contract, City of San Diego Storm Water Department, San Diego, CA, \$6M - Technical QA Director/Program Manager/Task Manager. Dr. Pohl provided senior technical oversight and contract management of this 5-year contract. His role included identifying synergies between the various projects throughout the Department. He led numerous special studies for bacteria, sediment, selenium, metals, pesticides and nutrients throughout the City's jurisdiction in support of TMDLs and MS4 Permit compliance. These included the bacteria source studies in Tecolote Creek Watershed and sediment source studies in Los Peñasquitos Watershed. He also authored the Department's Strategic Plan that integrated NPDES and TMDL requirements for all six watersheds within the City's jurisdiction, and therefore brings an understanding of the environmental and water quality conditions in all the hydrologic units where the City has storm water facilities.

Los Angeles Department of Public Works, Engineering/Watershed Services Contract, Los Angeles, CA, \$5M - Program/Technical Director. Dr. Pohl served over six years as Contract/Technical Director leading the technical oversight and QA review of multiple water quality monitoring and reporting task orders including the New Development Impact Study and Effectiveness of Standard Urban Stormwater Mitigation Plan Modeling at the Santa Clarita Watershed, the Integrated Receiving Water Impacts (IRWI) Report for Los Angeles County. He is also lead the development of the TMDL Implementation Plan for Marina del Rey.

San Diego Co-Permittees Regional Monitoring and Reporting Program (2008-2012), San Diego, CA, \$5 Million over 5 years - Technical QA Manager /Project Manager. Dr. Pohl provided technical review and oversight of the Annual Monitoring Reports, Work Plans for the MS4 Monitoring Program, Source Identification Monitoring and the updated Water Quality Rating System Assessment for the ROWD.

City of Newport Beach Public Works Department, Newport Coast Watershed Management Plan and Area of Special Biological Significance (ASBS) Assessment, Restoration and BMP Design and Construction Oversight, Newport Beach, CA – Project Manager. Dr. Pohl managed flow, water quality and biological studies to assess impacts to the ASBS and the effectiveness of BMPs and restoration projects designed and implemented by the project team. Prepared grant applications that brought over \$3M in funds to design, implement and assess BMPs to reduce impacts to ASBS and for watershed management plan. The most recent work included completing the ASBS Compliance Plan and developing a Clean Beach Imitative grant for the City in 2014.

SARA HUBER, P.E., QSD

Monitoring – Microbial Task



Qualifications Summary

- Diverse experience designing, implementing, and assessing the progress of NPDES and TMDL programs.
- Led molecular source tracking studies to screen for and quantify host-specific genetic markers (human, gull, canine).
- Eight years of ambient and wet weather water quality monitoring experience.
- Expert at calculating runoff volumes and loads for bacteria, nutrients, metals, and other pollutants.
- Wrote and implemented SWAMP compatible SAPs and QAPPs for TMDL compliance.

Schedule

Current booked work will lighten in summer of 2015, which will coincide with the beginning of project work if the City is awarded the CBI grant. Moving forward, Ms. Huber will be available to support the monitoring program for the MST program for the duration of the project.

Registration

Professional Engineer (P.E.) (No. 77332), CA (2011)
 Qualified SWPPP Developer and Practitioner (QSD/QSP) (No. 20635) (2011)

Education

L.L.M., International and Comparative Water Law and Policy - University of Dundee, Scotland (2008)
 B.S., Civil Engineering, Water Resources and Environmental Hydrology - University of California, Irvine (2006)

Key Projects

Inner Cabrillo Beach Bacteria TMDL and Natural Source Exclusion Program, San Pedro, CA, Port of Los Angeles, Project Engineer, Field Lead. Ms. Huber helped develop and leads the monitoring effort for the Bacteria TMDL and Natural Source Exclusion program at Cabrillo Beach. She uses anti-septic techniques to collect paired FIB and qPCR samples (water, sand, eelgrass, feces) and has conducted mass balance analyses in open-tidal systems to quantify bacterial load. Ms. Huber writes monitoring plans, management summaries, and technical and annual compliance reports for TMDL and Time Schedule Order (TSO) compliance and special studies.

County of San Diego Copermittee Water Quality Monitoring and Reporting Program, San Diego, CA, County of San Diego, Project Engineer, Technical Writer, Field Scientist. Ms. Huber conducts water quality monitoring at MS4 and receiving water stations across San Diego County, including Loma Alta Creek. She manages flow data for dozens of monitoring stations, conducts data standardization and quality control, calculates discharge volumes and pollutant loads (per annum and event), and develops graphical presentations of the results. Ms. Huber writes chapters of Monitoring Annual Reports.

Riverside County Flood Control District As-Needed Stormwater NPDES Professional Services, Riverside, CA, Riverside Flood Control and Water Conservation District, Project Engineer. Ms. Huber writes the Monitoring Annual Report for the Santa Ana River and Whitewater River regions and provides technical support on special studies in the Santa Margarita River region. She evaluates bacterial, chemical and toxicity data using Basin Plan, CTR, USEPA and other water quality criteria and calculates annual and event discharge volumes and pollutants loads.

Marina del Rey (MdR) Watershed Enhanced Watershed Management Plan, County of Los Angeles, Marina del Rey, CA, Project Engineer. Ms. Huber helped develop the coordinated integrated monitoring plan (CIMP) for the MdR Watershed which integrates requirements of the Bacteria TMDL, Toxics TMDL, Marine Debris TMDL, and NPDES permit. She also provides technical support for the EWMP, including data analysis and reporting, and conceptual design and cost estimation for regional best management practices (BMPs) and low impact development (LID) projects.

Lake Elsinore and Canyon Lake TMDL Monitoring, Santa Ana Watershed Project Authority, Santa Ana, CA, Project Engineer. Ms. Huber manages the annual flow monitoring data for five receiving water stations and calculates runoff volume and nutrient load analyses (per annum and event).

Qualifications Summary

- Managed all data collected for the San Diego Copermittees NPDES Regional Monitoring Program for the past 3 years.
- Responsible for QA/QC, analysis, data tabulation and submission to SCCWRP.
- Managed data collected for SMC program.

SATOMI YONEMASU**Data Management Lead****Schedule**

Current scheduled work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Ms. Yonemasu will be available during each summer/fall to participate in the development of the annual report.

Education

B.S., Biochemistry and Cell Biology - University of California (1997)

Key Projects

San Diego County Regional Copermittee Stormwater Monitoring and Reporting Program, San Diego County, CA, Data Manager. Responsible for managing the water quality monitoring data, QA/QC, analysis, and tabulation of the data to assist the County of San Diego in complying with its NPDES permit. Also responsible for formatting all the data collected under the program into templates for CEDEN submittals.

Riverside County Flood Control and Water Conservation District Support (NPDES), Riverside County, CA, Data Manager. Responsible for managing the water quality monitoring data. Data was analyzed and tabulated to assist in complying with its NPDES permit. Provided support in writing the Annual Monitoring reports for the Santa Ana Region and Write Water Region.

City of San Diego As-Needed Stormwater Monitoring Services Contract 2005-2011, City of San Diego, San Diego, CA, Data Analyst. Provided

assistance with data analysis of the water quality monitoring data, QA/QC, and tabulation for projects including Chollas Creek, Los Peñasquitos, San Diego River and Tecolote Creek TMDLs.

Los Angeles County Department of Public Works, Annual Monitoring Report, County of Los Angeles, CA, Data Analyst. Responsible for managing QA/QC, analysis, and tabulation of the annual monitoring data collected to comply with NPDES permit. Annual report is submitted to the Los Angeles Regional Board.

Southern California SMC, Southern CA, Data Manager. Responsible for QA review of chemistry, toxicity, physical and biologic data collection. Responsible for the processing and analysis of stream water bioassessment monitoring data that includes calculations of various metric and indices. Program data submitted to SCCWRP.

Riverside County Flood Control and Water Conservation District Support Services (NPDES) Special Studies and Bioassessment, Riverside County, Santa Ana, CA, Data Manager. Responsible for data management, QA/QC and analysis of the bioassessment and physical habitat data for the Santa Ana Region. Analysis includes calculations of metrics, Index of Biotic Integrity (IBI), and California's Rapid Assessment Methodology (CRAM).

Lake Elsinore and Canyon Lake TMDL Monitoring, Santa Ana Watershed Authority, Santa Ana, CA, Data Manager. Responsible for data management, QA/QC and tabulation and analysis of water quality monitoring data. Responsible for submitting the data into CEDEN.

Southern California Bight Regional Monitoring Program SCCWRP (2013), Southern CA, Data Manager. Provided assistance with QA review of various data from samples collected for the program and assisted with the processing of benthic and sediment chemistry data; data analysis; and database management.

Inner Cabrillo Beach Bacteria TMDL and Natural Source Exclusion, Port of Los Angeles, CA, Data Manager. Responsible for QA and analysis of indicator bacteria and molecular data collected for Natural Source Exclusion.

San Diego Unified Port District, City of San Diego, City of Oceanside, County of Orange, RHMP, Southern CA, Data Analyst. Assisted with the collecting of benthic, sediment chemistry, and trawl samples; responsible for the QA review of data and assisted with data processing and analysis, including trend analysis and cluster analysis.



County of Orange Regional Stream Bioassessment and Harbor Monitoring, Orange County, CA, Data Analyst. Responsible for laboratory and data processing of benthic macroinvertebrates for 20 freshwater stream sites in Orange County following the California Stream Bioassessment Protocol. Responsible for the benthic analysis and data processing of 17 harbor sites in Dana Point, Newport, and Huntington harbors.

Tijuana River Bacterial Source Identification Study, City of Imperial Beach, CA, Data Analyst. Responsible for QA/QC and tabulation of data collected to identify sources of bacterial contamination in the watershed.

Poche Beach Bacterial Source Identification Study, City of San Clemente, CA, Data Analyst. Responsible for the QA/QC of data from various studies within the program. Managed the analysis and tabulation of the data collected to identify sources of bacterial contamination in the Prima Deshecha Canada watershed.

Qualifications Summary

- 21 years of experience using GIS and related technologies in diverse natural resource, water resource and human health applications
- Directed and performed GIS data processing, conversion, integration, analysis, and map production for a variety of water resource projects in southern California with water quality, sediment quality, and bioassessment data.
- Experience managing storm water monitoring annual report preparation, performing water quality monitoring, and preparing CWA §404 Permit submittals.
- Managed GIS department budgets, staff training and review, workload, development of methods and standards, oversight of metadata creation, map templates and quality assessment/ control.

SHERI DISTER

GIS Lead

Schedule

Current scheduled work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Ms. Dister will be available during each summer/fall to participate in the development of the annual report.

Education

M.S., Biology - San Jose State University (1995)
 B.S., Biology - Duke University (Graduation with Distinction) (1988)

Key Projects

City of San Diego As-Needed Storm Water Monitoring Services Contract, San Diego, California, GIS Technical Manager. Managed and conducted GIS mapping and spatial analysis services involving GIS data management and QA for over 30 task orders issued under the As-Needed contract that supported the City with implementation of their storm water program. Highlighted below are a few of the project contributions:

- **San Diego River Source Tracking Investigation, GIS Technical Manager.** Conducted GIS-based analysis to identify catchments and sampling locations for monitoring in the San Diego River WMA to characterize runoff associated with different land uses that might contribute significant bacterial loads to the receiving environment.
- **Tecolote Creek Microbial Source Tracking Study, GIS Technical Manager.** Developed map templates and prepared more than 20 maps to illustrate project location and context, sampling design, and study results including wet weather loads and dry weather concentrations. Involved database organization, quality control, and consistency of formats and styles among map products.
- **City of San Diego, Aerial Deposition Project – Phase III, GIS Technical Manager.** Directed GIS-based evaluation of metal

sources of storm water pollution based on interpretation of aerial imagery, land use and integration of inspection and compliance data. Developed priority ranking and mapping of analysis results.

- **TMDL Monitoring for Sedimentation/Siltation in Los Peñasquitos Lagoon, GIS Technical Manager.** Responsible for GIS analysis and mapping, and watershed description section of study report. Delineated creek drainage areas, quantified and analyzed land use by drainage area, employed USDA SSURGO data to map soil erodibility, and generated slope map for watershed from 10-m USGS DEM data.
- **La Jolla ASBS Storm Water Management Plan Project Inventories and Geodatabase, GIS Technical Manager.** Developed an inventory of watershed activities, including existing and proposed BMPs, monitoring, outreach, and enforcement, a schema for relating watershed activity monitoring, and a geodatabase deliverable and metadata for the La Jolla Area of Special Biological Significance (ASBS).
- **Sustainable Canyons Project, City of San Diego, Assistant Project Manager/Regulatory Specialist.** Responsible for project management including coordination of baseline storm water monitoring and biological resources assessment, GIS tasks, and the development of a permitting needs framework involving pre-application meetings with resource agencies.



County of San Diego, Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed, Santa Margarita Watershed, CA, GIS Technical Manager. Developed a GIS-based threat-to-water quality (TTWQ) inventory for nutrients for parcels within the Rainbow Creek watershed, which has an approved TMDL for total nitrogen and total phosphorus. Responsible for compiling, creating, and analyzing data sets, as well as designing and applying approach

used to characterize parcels and drainage areas in terms of nutrients sources and transport. Involved image interpretation to develop a land cover/land use map and report preparation.

County of San Diego, Desktop-Based Inventory and Urban Runoff Pollutant Assessment of Residential Areas in the Unincorporated Areas of San Diego County, CA, Project Manager. Developed a GIS- based inventory of existing residential development to fulfill new JRMP requirements of the 2013 MS4 Permit. Worked collaboratively with the County of San Diego to develop an approach that based residential management areas (RMAs) on hydrologic subareas (HSAs) and defined "survey zones" for performing visual observations of the residential areas to identify persistent dry weather flows and pollutant generating activities. GIS deliverable included information by RMA and survey zone designations useful in characterizing and prioritizing areas, such as residential land use classes, major MS4 outfalls and drainage areas, identification of major MS4 outfalls with persistent flows, historical water quality monitoring locations and data, CWA section 303(d) listed waterbodies and impairments, and Environmentally Sensitive Areas. Assessor's Parcel based attributes and HOA information, where available, were also included in the inventory, and associated with RMAs and survey zones.

City of Imperial Beach, Tijuana River Bacterial Source Identification Study, Imperial Beach, CA, GIS Technical Manager. Responsible for GIS-based mapping and spatial analysis for several sanitary and dry weather surveys conducted in this source identification study. Involved development of GIS database, integrating multiple GIS themes, including study results and potential sources. Worked with field investigators to delineate urban drainage areas to the Tijuana Estuary.

County of San Diego Water Quality Monitoring and Reporting Program, San Diego County, California, Project Manager and GIS Technical Manager. Currently, serving as Project Manager for the Reporting Contract, which covers development of the Transitional Monitoring and Assessment Reports for nine Watershed Management Areas and several other documents, including work plans, in accordance with 2013 Permit requirements. Responsible for coordinating and overseeing WESTON reporting team, permit review to determine reporting and assessment needs, client coordination, and participation in the San Diego Regional Monitoring Workgroup meetings. As GIS Technical Manager since 2008, responsible for GIS data organization, integration, QA, analysis, and mapping of watershed and monitoring results for Annual Monitoring Reports for the Copermittees to comply with MS4 permit. Tasks include development of GIS data processing methods, map templates, QA/QC procedures, drainage area delineations, data interpolation, map production, and design of interactive components of reports under 2007 Permit.

City of San Diego, Storm Water Monitoring & Reporting Management Services, San Diego, CA, Project Manager. Responsible for coordinating with City to maintain the existing functionality and enhance the City's Storm Water Monitoring Database Management System for environmental monitoring and reporting to meet new and additional regulatory requirements under the 2013 MS4 Permit. Managed preparation of a comprehensive regulatory requirements document based on permit and TMDL review for use in defining design requirements for the database enhancements. Currently coordinating preparation of a recommendations document with database programmers to outline the modifications necessary to the system to accommodate additional data and reporting requirements.

Qualifications Summary

- Over 13 years of engineering experience relating to the design of improved channels and restoration of natural channel; analysis of open channel and close conduit systems; and continuous flow monitoring setup and data quality control.
- Very experience with wet and dry weather water quality sample collection, instantaneous stream flow measurements, continuous flow monitoring data, preparing stream rating curves, flow calculations, and report preparation.
- Extensive experience preparing hydrologic and hydraulic studies for improved and natural channels, which includes modeling large and small watershed management areas and specific sites using various software (SWMM, HEC-HMS, HEC-RAS, HSPF, TR-55, etc.)
- Expert at selection & design of structural BMPs for new construction, redevelopment, onsite retrofit, and online sites using traditional & proprietary type BMPs.
- Expert with the design, preparation, and review of construction plans and specifications for storm drain, water, sewer, dry utility, and recycled water projects.
- Thorough knowledge and experience in preparing and implementing SWPPPs for construction activities.

ANTHONY COTTS, P.E.

Flow Lead



Schedule

Current scheduled work will lighten in summer of 2015, which will coincide with the beginning of project work for the City of Oceanside's program. Mr. Cotts will be available during each summer/fall to participate in the flow calculations and development of the annual report.

Registration

Professional Engineer in CA (69395)
Qualified SWPPP Developer and Practitioner (QSD/QSP#24614)

Education

B.S., Civil Engineering - University of Oklahoma (1998)

Key Projects

County of San Diego Copermittee Water Quality Monitoring and Reporting Program, San Diego, CA, County of San Diego, Project Engineer. For the Transitional Monitoring and Assessment Report task, responsible for the data quality control and flow and load calculations for 51 MS4 monitored outfalls, including performing an MS4 assessment in which the collected flow and chemistry data were extrapolated in order to determine various water quality parameters, including jurisdictional annual loads per WMA and HSA, as required by the NPDES Permit. Prepared the MS4 assessment sections of the report that included a detail explanation of the assessment methodology, limitations, and results.

Loma Alta Slough TMDL Development, City of Oceanside, CA, Project Engineer. Mr. Cotts provided modeling and TMDL implementation strategy technical guidance to support the City of Oceanside in the development of the Loma Alta Slough TMDL. He attended technical support TMDL development meetings and prepared correspondences with the Regional Water Quality Board related to the waste load allocation for bacteria and nutrients entering the slough. The support included advising the City on using the TMDL development to evaluate implementation scenarios that included optimizing the existing UV treatment facility and discharge options to reduce bacteria concentrations and maintain recreational uses, restoring the slough to allow for greater nutrient removal and improve habitat, source controls within the watershed and slough outlet configurations.

City of San Diego As-Needed Stormwater Monitoring Services Contract 2005-2011, City of San Diego, San Diego, CA, Project Manager/Project Engineer. Responsible for determining high priority locations where BMPs can significantly improve water quality for each of the seven watershed management areas throughout the City's jurisdiction. Also responsible for selecting the appropriate types of BMP and performing the engineering design to incorporate each BMP into existing developed areas and performing modeling to determine appropriate BMP capacities. Performed baseline stormwater quality monitoring and determination of BMP effectiveness for key pilot projects throughout the area.

Marina Del Rey Enhance Watershed Management Plan (EWMP) and Coordinated Integrated Monitoring Plan (CIMP), Los Angeles County Department of Public Works, California, Project Engineer. Responsible for

calibrating water quality model monitoring data collected over five years. Calibrated model then used to estimate the existing loading of toxics and bacteria, the required load reductions to meet TMDL waste load allocations, and the recipe of associated BMPs proposed to meet the compliance schedules. Responsible for preparing written report describing modeling methodology, limitations, and results.

Malibu ASBS Special Protections Compliance and Pollution Prevention Plans, Malibu, California, Project Manager/Project Engineer. Responsible for evaluation of monitoring data, watershed modeling, determining required pollution load reductions, BMP quantification, and the preparation of compliance documents as required by the Special Protections, (Attachment 1 to the Ocean Plan General Exception). Coordinated with staff to establish monitoring program in Malibu that was part of a region-wide ASBS program to assess pollutant loads carried in stormwater runoff to ASBS. Performed modeling, calibrate using monitoring data, of 31 drainage areas along the ASBS. Results of the monitoring and modeling were incorporated into a Compliance Plan and Pollution Prevention Plan for submission to the State Board for review.

Stormwater Master Plan, Riverbank Local Redevelopment Agency, Riverbank, CA, Project Manager/Project Engineer. Responsible for collecting data on existing stormwater conveyance system and performing hydrologic and hydraulic modeling for the aging 173-acre site formally used for the production of ammunition for the U.S. Army. This included modeling areas prone to flooding, recommending key infrastructure improvements on the developed areas of the site, and demonstrating effective flood control and pollution removal capabilities of low impact development (LID) on vacant lots. Report provides concepts on the integrated stormwater management with a public amenity, such as a sports park. City is using report to base management decisions and promote the development of a "green" corporate park.

Riverside County Flood Control and Water Conservation District Support Services (NPDES) Special Studies and Bioassessment, County of Riverside, Riverside, CA, Senior Engineer. Utilized data collect by field bioassessment to calculate instantaneous flow rates within assessed streams in support of project report.

Lake Elsinore and Canyon Lake TMDL Monitoring, Santa Ana Watershed Project Authority, Santa Ana, CA, Senior Engineer. Flow data quality control and flow calculations in support of compliance documents.

Port of Los Angeles Inner Cabrillo Beach Bacteria TMDL and Natural Source Exclusion, Los Angeles, CA, Senior Engineer. Flow calculations for various open channels discharging to Port. Also responsible for development of 1-D model used to estimate loading entering and existing study area, and the report discussion of modeling methodology, limitations, and results.

GEOFFREY COMPEAU, PH.D.

Quality Assurance



Schedule

Dr. Compeau will be available as needed from the inception of the contract to assist the City as needed throughout the duration of the contract.

Education

Ph.D., Chemistry and Biomedical Sciences - Rutgers University

B.S., Environmental Sciences and Chemistry - Rutgers University

Key Projects

Principal. Managed multiple concurrent HTRW program projects, including a 5-year, \$9M Base Alignment and Closure (BRAC) program for the U.S. Army Corps of Engineers (USACE) Seattle District. Served as the regional operation lead for Information Technology/GIS implementation. Routinely provided and coordinated support for commercial environmental projects. Led development of protocols and quality assurance for integrated database and mapping applications, resulting in the award of multiple USACE, Navy, and EPA task orders in information management services contracts supporting BRAC, HTRW, EPA RAC, and IRP programs.

Vice President. Responsible for Pacific Northwest Environmental Operations (Washington, Alaska, Oregon, and Idaho). Led growth and execution of all commercial and federal projects in the Northwest. Clients have included the Navy, DESC Manchester, USACE Seattle, Weyerhaeuser, Boeing, and the Ports of Seattle and Tacoma. Because of abilities in startup and federal operations, was selected to run Shaw's \$850M FEMA IA TAC during Hurricane Katrina. Managed this critical program to provide temporary housing and shelter to 30,000+ residents of LA, FL, and TX via assessment and construction in response to Hurricanes Katrina, Rita, and Wilma. Developed a responsive program management organization and small business outreach program for 25+ FEMA task orders. Drove quality and safety performance with more than 1 million labor hours worked without a lost-time incident.

Principal. Led West Coast federal pursuits for all offices, serving federal and commercial clients. Responsible for expansion of business with USACE, NAVFAC, SW, and NFESC contracts obtained over the course of this work; built the capture structure and was successful on seven of nine project and program pursuits in an 18-month period. Managed the implementation of several innovative groundwater remediation technologies for chlorinated solvents and positioned successfully for storm water contracts with multiple ports and municipalities.

Vice President. Responsible for West Coast Federal Environmental Operations. Encompassed oversight of major programs conducted for DoD and civilian agencies (EPA, FEMA, USFW) with operation revenue of up to \$90M annually with a combined contract capacity in excess of \$500M.

Qualifications Summary

- More than 28 years of increasingly responsible project, program, and operations management in federal and commercial sectors.
- Extensive working knowledge of applicable CERCLA, RCRA, and other federal, state, and local laws, regulations, and guidance primarily in the western U.S. Pacific territories and Puerto Rico.
- Extensive experience in Knowledge Management and Quality systems supporting federal contracts.
- Developed winning technology, engineering, construction, and remediation teams to improve the company's operating performance.
- More than 17 years running environmental technology, compliance, and remediation projects and programs valued at \$200M+ for DoD, EPA, and numerous commercial, state, and local clients.

4.0 Project Objective

WESTON understands the importance of the Loma Alta Slough alternative to a TMDL as a “first of its kind” in California, and stands committed to ensure that the City is able to report scientifically sound and defensible nutrient Loma Alta Creek watershed load estimates, along with accurate estimates of macroalgal percent cover, biomass, dissolved oxygen, and nutrient concentrations within the Slough during July and August of each monitoring year.

The tasks in this proposal highlight our proposed approach to develop the Slough Monitoring Plan, per the Regional Board’s Tentative Investigation Order (R9-2014-0020), develop a QAPP, and conduct watershed and slough monitoring in support of compliance reporting. We have also included our approach to develop annual reports, and presented our project team and identified individual contributions for each task. The Team is comprised of individuals and firms with the expert knowledge and experience to assist the City with development of management actions based on monitoring results during implementation of the project. In addition to our experienced core technical staff, we have included Ms. Ashli Desai and Dr. Martha Sutula who provide additional high-level expertise and knowledge to assist the City on this project. We are committed to the City’s success, and look forward to assisting the City during implementation of the project.

We would like to propose an augmentation to the percent cover monitoring required as part of the Tentative Order. If feasible, collection of aerial imagery, taken within a three-day window of slough macroalgal monitoring in July and/or August the first sampling year, would provide additional quantitative data to support and verify calculation of the percent cover. The interpretation of the imagery, which could include near infrared data sensitive to chlorophyll, would be calibrated based on the quadrat monitoring conducted in the field, and percent cover may then be accurately calculated for the entire slough, rather than depending only upon the two 75-meter transects. The cost and additional effectiveness of this approach would then determine its application in future monitoring years.

Our understanding of the Optional MST study is that that City would like to determine the areas of greatest fecal indicator bacteria (FIB) loading to the Loma Alta Creek, Loma Alta Slough, and Buccaneer Beach. Additionally, the sources of this FIB will be identified through the study. The monitoring program design will follow the California Microbial Source Identification Manual guidelines, and also meet the Clean Beach Initiative grant funding documentation requirements.

As part of our study, we would like to propose a special study in collaboration with our teaming partner, Dr. Rachel Noble. Prior to initiation of field sampling activities, our project group will take advantage of an important research opportunity to quantitatively assess inhibition, detection limit, sensitivity, and sensitivity. Archived, blinded unseeded and fecal source seeded water samples will be analyzed using both qPCR (WESTON Laboratories, relative quantification) and digital droplet PCR (Noble Laboratory, absolute quantification) approaches. Filtration volumes will be optimized for time, detection limit, and suspended solids content (a major contributor to inhibition). It will be vital to assess inhibition in ambient field samples to optimize this process, which will be collected during both wet and dry weather periods. For example, previous experience by the project team indicates that first flush conditions during wet weather, along with tail periods of the hydrograph, present different hurdles for alleviating inhibition in samples from the San Luis Rey River. As a partner in this study who is interested in the advancement of Droplet Digital PCR (ddPCR) methods, Dr. Noble will provide limited ddPCR analyses to this project at no cost.

Inhibition assessments will be balanced with extraction approaches to optimize reduction of inhibitory substances, an area in which Dr. Noble has extensive expertise. It is unlikely that dilution alone will successfully be used to alleviate qPCR inhibition with the current solids profile in the samples. Detection limit experiments will be conducted using both qPCR and ddPCR approaches to verify the accuracy of quantification assessments using both relative and absolute quantification approaches. Toward the end of the quality assurance/quality control (QA/QC) process, data will be analyzed to assess the utility of a multiple marker approach will be assessed for each type of fecal contamination, so as to encourage interpretation of data across a gradient of sensitivities and specificities (e.g., Noble, Virginia Blind Study, Hampton Roads, Virginia, in preparation).

5.0 Project Approach

Task 1 – Develop a Water Quality Monitoring Program (Slough Monitoring Plan)

The WESTON Team will work with the City to develop a monitoring plan that meets the requirements of the Regional Board Tentative Investigation Order (R9-2014-0020), focused on the two monitoring questions:

- a. Are watershed flows and the loading of phosphorous to the Slough reduced to levels required to meet the TMDL?
- b. Are the numeric targets for macroalgal cover and biomass in the Slough achieved?

The Team members are familiar with the development of the Loma Alta Slough alternative compliance history, including Ms. Ashli Desai and Mr. Paul Hartman from LWA, and Dr. Martha Sutula from SCCWRP. These individuals will help review the monitoring plan and ensure that the proposed approaches are scientifically defensible. If necessary, Ms. Desai and Dr. Sutula are available to assist the project team during negotiations or other meetings with the Regional Board prior to submittal of the monitoring plan. WESTON recommends an informal meeting be scheduled with the Regional Board prior to monitoring plan submittal to give them a preview before the final submittal. This will help to ensure that the Regional Board has agreed with all aspects of the monitoring plan and will reduce the chance of an unexpected comment from the Regional Board to the City.

The WESTON Team will organize a kickoff meeting within two weeks of receiving the notice to proceed with the City to discuss the schedule and outline of the Slough Monitoring Plan, QAPP and other project-specific details. Assuming the contract is awarded by June 30, 2015, the first draft of the work plan will be submitted to the City on September 1, 2015 and the final work plan and QAPP will be submitted on November 1, 2015. Our cost estimate assumes one round of revisions after the draft and one round of revisions after the final work plan submittal to the City.

Task 2 – Develop a QAPP for the Slough Monitoring Plan

The WESTON Team has successfully developed numerous SWAMP comparable QAPPs and understands the effort and quality assurance (QA) necessary to develop a QAPP which includes all relevant elements and will be accepted by the Regional Board. Our QAPPs have been accepted by the Regional and State Water Quality Control Boards for TMDL related studies, compliance monitoring programs, and in support of grant funding programs. Some project examples include: response to a sediment investigation order for the Lockheed Martin facility in the San Diego Bay, La Jolla Shores ASBS Protection Implementation Project (City of San Diego), and the Tijuana River Bacteria Source Identification Study (Prop 84, City of Imperial Beach).

The QAPP for this nutrient monitoring program will contain all relevant SWAMP-required elements, including data collection methods, data management, and data quality objectives for all components of the Loma Alta Slough monitoring. The QAPP will include consistent objective sample process design, sampling methods, sample handling, equipment calibration and maintenance, and quality control (QC). A key component will be ensuring analytical methods meet or exceed SWAMP reporting limits. WESTON incorporates the SWAMP guidelines for frequency of analysis and of field quality controls (e.g., field duplicate, field blank) and laboratory quality controls (e.g., matrix spike, matrix spike duplicate) to ensure measurement quality objectives (MQOs) are met. WESTON's long-standing relationship with the Team's analytical laboratories enables effective communication of expectations and ensures the MQOs are met. Following SWAMP guidelines ensures that data meets the requirements of reporting for such uses as State Board Section 303(d) listing assessments and TMDL development and compliance.

Task 3 – Perform Annual Water Quality Monitoring Activities

The WESTON Team understands the importance of high quality and scientifically defensible data, and has successfully implemented monitoring, sampling, analysis, QA/QC, and data management in accordance with the SWAMP Quality Management Plan (QMP) and QAPP for numerous projects in Southern California. WESTON's expertise in SWAMP comparable data collection includes the most recent updates for the MQOs incorporated in 2013. We have been performing consistent and objective SWAMP monitoring since 2003, providing our clients with high-quality SWAMP comparable data. The following are examples of projects which exemplify WESTON's expertise in development, collection, and data submittal in accordance with SWAMP requirements:

- County of San Diego Transitional and Long-Term Receiving Water Monitoring under the 2013 Permit (wet and dry weather receiving water monitoring, sediment pyrethroid monitoring, bioassessment monitoring);
- County of San Diego Transitional Wet Weather MS4 Outfall Discharge Monitoring;
- County of San Diego Bight '08 and Bight '13 Regional Monitoring;
- Stormwater Monitoring Coalition (SMC) Bioassessment Monitoring (County of San Diego, Los Angeles County Department of Public Works [LADPW]), Riverside County Flood Control and Water Conservation District (RCFCWCD);
- LADPW Reservoir Characterization Study;
- La Jolla Shores ASBS Protection Implementation Project (City of San Diego); and
- Tijuana River Bacteria Source Identification Study (Prop 84, City of Imperial Beach).

These projects highlight WESTON's extensive experience and expertise collecting and submitting data in accordance with SWAMP requirements for water quality, bioassessment, and sediment quality monitoring programs.

Task 3a. Watershed Nutrient Loading

In order to meet the requirements of the Regional Board order, monitoring will begin in 2016 with sampling conducted in July and August of each year until the end of the contract, or 2022 should the City exercise successive one-year contract extensions past 2019. Sampling shall be conducted immediately upstream of Loma Alta Slough in the area near the creek connection to the slough. The purpose of the sampling will be to quantify concentrations of nutrients entering the slough. These data will be useful to estimate annual dry weather loads entering the slough during the critical period when the ocean inlet is filled in with sand.

Receiving water sites will be installed and maintained to perform flow monitoring and sampling during the annual monitoring period. All sampling and analyses will be in accordance with applicable United States Environmental Protection Agency (USEPA) regulation and guidance. The receiving water stations will be set up to be completely automated for continuous data collection and sample collection. Automated flow-weighted sample collection includes some of the following; flowmeter, level sensor, peristaltic pump (automated sampler), flexible pump tubing, Teflon-lined sample tubing, sample container, control electronics, power supply (12V DC or AC), telemetry, rain gauge, and in-situ sensors (dissolved oxygen (DO), conductivity, pH, temperature etc.).

Flow rates will be monitored using Hach (or comparable) flowmeters with a bubbler or submerged pressure transducer as the primary measuring device (level sensor). Flow rates will be measured or estimated in accordance with the NPDES Storm Water Sampling Guidance Document (EPA-833-B-92-001). The primary sensor will continuously measure stage (i.e., stream height) and relay that information to the flowmeter. The flowmeter will continually calculate flow rates by inserting the stage information into the preprogrammed discharge equation. Using this system, the flowmeter will be able to actuate the automated sampler to achieve a flow-weighted sample. To quantify flow rates based on stream stage, a relationship between flow and stage will be derived using standardized stream rating protocols developed by the United States Geological Survey (USGS) (Rantz, 1982; Oberg et al., 2005). Continual flow data will be downloaded from each site once every 2 weeks to verify equipment functionality and thus to reduce data gaps, ensure accuracy, and identify maintenance and calibration needs. Flow data will be entered into the data management system. Equipment will be maintained throughout this period to ensure it is in proper working order. Water quality data (dissolved oxygen, conductivity, pH, temperature, and turbidity) will be collected continuously during using a YSI 6600 Multi-parameter Water Quality Sonde. Calibration of field instrumentation will be conducted according to manufacturer's specifications. Each individual sensor will be calibrated, with calibration standards per manufacturer specifications, prior to deployment and upon removal of equipment to check for sensor drift.

A single flow-weighted composite sample will be collected during the weekly monitoring events. During the monitoring event, sample aliquots will be collected in proportion to the rate of flow (i.e., flow-weighted) using automated equipment and Teflon-lined tubing. Flow-weighted composite samples will be collected over a typical 24-hour period, with a minimum of three sample aliquots collected per hour.

Flow-weighted water samples will be collected in pre-cleaned 20-liter (L) borosilicate graduated glass bottles. Sample bottles will be properly labeled with sample ID, date, and time; sealed with a pre-cleaned rubber stopper; and preserved on

ice for transport to WESTON for sample compositing. Subsamples for chemical analyses will be poured into glass containers with Teflon lids. The flow-weighted composite samples will be analyzed for all the constituents not identified for grab sampling. Grab samples will be collected for those constituents that are not amenable to composite sampling.

Samples will be assessed analytes included in the table, below, and also assessed for DO, temperature, turbidity, and conductivity using a YSI or similar equipment.

Watershed Monitoring Chemistry	
Analysis	Specific Method
Ammonia	EPA 350.1
Dissolved Nitrogen	353.2 (CALC)
Nitrate as N	EPA 353.2
Nitrite as N	EPA 353.2
NO ₂ + NO ₃ as N	EPA 353.2
Total Nitrogen	353.2 (CALC)
TKN	EPA 351.2
TKN, Soluble	EPA 351.2
Dissolved Phosphorous	EPA 365.1
Ortho-phosphate	EPA 365.3
Total Phosphate	EPA 365.1

All instruments used for field and laboratory analyses will be calibrated in accordance with manufacturer's specifications. Calibration of the flow monitoring and sampling equipment will be conducted immediately prior to deployment or use and will be field verified during each data download or sample event. The calibrations will be conducted in accordance with the manufacturer's specifications.

Safety and quality are integral parts of the WESTON culture. Team safety meetings and quality reviews will be conducted to ensure that safe and reliable business practices are used during the performance of this program. All field personnel will have current and relevant experience in all aspects of standard field monitoring, including use of relevant field equipment such as field instruments and monitoring equipment. Field personnel will be trained and have experience in the collection, handling/storage, and chain-of-custody procedures. Proper field sampling and sample-handling techniques will be reviewed prior to sampling, and only those staff with proficiency will be permitted to conduct the field work. Training will be documented in the health and safety plan of each member of the field team. All personnel are responsible for complying with the QA/QC requirements that pertain to their organizational/technical function. Each technical staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular function and a general knowledge of laboratory operations, test methods, QA/QC procedures, and records management.

Task 3b. Macroalgae Monitoring

Macroalgae biomass and percent cover monitoring will be performed in July and August of each year, beginning in 2016, per the Regional Board Investigation Order and Draft TMDL Report. This work will be conducted within the slough by a team of trained scientists, familiar with the methods required to assess percent cover and sample for macroalgae biomass. WESTON routinely collects macroalgae biomass samples as part of the SMC bioassessment program for the San Diego County Copermittees, the Los Angeles County Department of Public Works, and the County of Riverside. Further, WESTON is familiar with monitoring necessary to accurately assess percent cover, and has recently performed surveys for submerged aquatic vegetation (SAV) in Louisiana; kelp and eelgrass in Southern California marine areas for the Encina Wastewater Authority and Ports of Los Angeles and Long Beach. The use of a small inflatable or kayak is likely, depending upon the water depths in the western portion of the slough.

As per the Investigation Order and the Draft TMDL report, two 75-meter transects will be sampled for percent cover and biomass; one on either side of the railroad track. Transects shall be assessed for macroalgal cover using a 0.5-m quadrat, with a minimum of 5 quadrat placements per transect. The number of quadrat placements may be revised during the development of the Monitoring Plan, with more quadrats assessed if necessary. Macroalgal biomass samples will be collected at each of the quadrat locations. Algal samples will be analyzed for chlorophyll-*a*, ash-free dry mass (AFDM), and biomass and. Lagoon Results for both algal biomass (reported in g/m³ dry weight) and percent cover will be averaged for each quadrat, and the two quadrats averaged to represent the slough. Finally, the July and August biomass and percent cover results will be averaged prior to comparison with the numeric targets.

Water samples will be collected at each transect, and will analyzed for the constituents in the following table. Water samples will be collected from the mid-water depth.

Macroalgae Monitoring Chemistry	
Analysis	Specific Method
Benthic Chlorophyll-a	SM 10200
Suspended Chlorophyll-a	SM 10200
Ash-free dry mass	SM 10300
Ammonia	EPA 350.1
Dissolved Nitrogen	353.2 (CALC)
Nitrate as N	EPA 353.2
Nitrite as N	EPA 353.2
NO ₂ + NO ₃ as N	EPA 353.2
Total Nitrogen	353.2 (CALC)
TKN	EPA 351.2
TKN, Soluble	EPA 351.2
Dissolved Phosphorous	EPA 365.1
Ortho-phosphate	EPA 365.3
Total Phosphate	EPA 365.1

Water samples will be collected using a Kemmerer bottle or peristaltic pump and placed into appropriate bottles.

Physical conditions within the slough will also be recorded during each field event, including water depth, canopy cover, substrate type, and water temperature, likely following the SWAMP protocols developed by Betty Fetscher, et. al in 2009, updated 2010.

Task 3c. Dissolved Oxygen Monitoring

Continuous in-situ DO monitoring will be performed within the Loma Alta Slough below the impairment boundary on an annual basis in conjunction with the macroalgae monitoring. Monitoring will be conducted at each of the macroalgal transect locations (i.e., one on the eastern and one on the western side of the North County Transit District railway) within the slough. Monitoring will occur once in July and once in August of each year beginning in 2016 with sampling conducted in July and August of each year until the end of the contract, or 2022 should the City exercise successive one-year contract extensions past 2019. At each macroalgal transect location, DO will be measured using three YSI 6600 Multi-parameter Water Quality Sondes. Additional data collected by each sonde includes temperature, specific conductivity, turbidity, and pH. In order for monitoring to occur simultaneously throughout the water column, one YSI sonde will be deployed at each of three locations within the water column including six inches above the sediment-water interface, mid-depth, and one meter below the surface (subject to overall water depth, this distance may be less). All three sondes will be attached to a vertical rod that will be anchored into the bottom substrate. The sondes located six inches above the sediment-water interface and mid-depth will be anchored to the vertical rod. The sonde located at the top of

the water column will attached to a floatation buoy and a PVC sleeve that was allowed to slide up and down the vertical rod. The floatation buoy will allow the sonde to rise and fall with the surface of the water keeping the sensors one meter below the surface. Continuous DO monitoring will occur for a minimum of one 24-hour cycle per monitoring event (i.e., July and August of each year). Calibration of field instrumentation will be conducted according to manufacturer’s specifications. Each individual sensor will be calibrated, with calibration standards per manufacturer specifications, prior to deployment and upon removal of equipment to check for sensor drift.

Task 4 – Prepare Annual Monitoring Reports

Clear and concise reporting, based on technically sound science and statistics, is a vital component of all project work. WESTON is committed to exceptional quality on all services and deliverables to the City of Oceanside.

Annual monitoring reports will be submitted to the City of Oceanside initially as draft reports for review. Reports will present the results of field sample collections, chemical tests, and analysis of the macroalgae and nutrient samples. Statistical analyses and data interpretation will be conducted as related to observed trends in watershed nutrient loading and Slough macroalgae levels across monitoring cycles after the appropriate number of sampling events and seasons have been monitored. The reports will include field sampling logs, station global positioning system (GPS) coordinates, and descriptions of field, laboratory, data management, and data analysis methodologies. Complete laboratory results, including QA/QC results, will be provided in appendices to the main report.

Most importantly, reports will discuss the results of the analyses in relation to two monitoring questions:

- 1) Are watershed flows and the loading of phosphorus to the Slough reduced to levels required to meet the macroalgal numeric targets?
- 2) Are the numeric targets for macroalgal cover and biomass in the Slough achieved?

Reports will also include descriptions and analyses of load estimates and percent cover and biomass calculations within the Slough.

Mr. Quenzer will lead the sections of the report which include a discussion of the actions taken during the reporting period to eliminate all non-storm water and illicit discharges into the MS4, as well as actions to be taken during the next reporting period to achieve the numeric targets regulatory questions and requirements.

The reporting team will be led by Ms. Holt, with support from Ms. Yonemasu who will lead data management and analyses, Ms. Dister who will direct GIS analyses, and Mr. Quenzer and Mr. Hartman who will provide writing support as related to relevant activities completed by the City of Oceanside to eliminate its illicit MS4 discharges. Prior to submittal, reports will be thoroughly checked for inconsistencies, analytical mistakes, or typographical errors by the Project Manager, Ms. Crumpacker, and QA Manager, Mr. Compeau. Only after going through our internal QA/QC checks will draft or final deliverables be supplied to the City of Oceanside.

A draft report will be submitted to the City in late October of each monitoring year, and after receiving comments from the City, WESTON will revise reports for resubmittal as final reports, provided in the form requested by the City. Final annual monitoring reports will be provided to the City of Oceanside no later than 45 days prior to the required Regional Water Quality Control Board (RWQCB) submission deadline of January 30 following each summer monitoring period. Ms. Crumpacker, as the WESTON Project Manager, will ensure that all documents will be delivered on time and to the highest quality standards.

Task 5 – Provide Technical Interpretation And In-Person Meeting Support

The WESTON Team will participate in one kickoff meeting with City staff prior to work initiation, and will also attend up to three meetings with City staff as needed. WESTON's Project Manager, Andrea Crumpacker, and other appropriate technical staff will attend meetings, as necessary and directed to do so by the client.

Task 6 – OPTIONAL – Microbial Source Identification Study

The WESTON Team has been conducting MST studies in southern California for over 10 years, and has diverse experience identifying sources of fecal contamination in both freshwater and marine environments. For example, WESTON's recent work for the City of San Clemente at Poche Beach included source identification of both microbial and nutrient sources within the watershed, as well as characterization of sources at the beach. Based on statistical analysis, birds were found to be the likely greatest contributor of bacteria at the beach, and as a result our recommendations included bird diversion best management practices to the City. The City implemented a falconer program during the summer months, and a coyote decoy program during the winter months. As a result of implementation of these BMPs, the Heal the Bay report card score at the beach has changed from an F, to an A+. We have included other examples of our MST experience in Section 7 (below).

WESTON has assembled a team of scientists who are well-known and respected for their experience in MST, including Dr. Kelly Goodwin (NOAA), Dr. Rachel Noble (Noble), and Dr. Alexander Schriewer (WESTON). Each individual brings a wealth of experience, not only in Southern California, but also nationally and internationally. They will each contribute to the development of the monitoring program, implementation of monitoring and lab analysis, discussions with the Technical Advisory Committee, and interpretation of results to ensure that the City is receiving the most scientifically defensible data and interpretation to develop achievable management decisions and strategies.

Our approach to conducting the project is laid forth, below, and is based upon the concept grant proposal submitted by the City on July 9, 2014 and our knowledge of the watershed and slough. We have developed a cost estimate based on the assumptions of the grant proposal, but would like to note that after analysis of existing data and incorporation of the sanitary sewer and MS4 information, the timing of monitoring, number of samples, analyses, and specific monitoring locations may change.

Task 6a. Identify Contributing Sources of Fecal Indicator Bacteria to Loma Alta Watershed

WESTON will design a fecal source identification study focused on identifying contributing sources of fecal indicator bacteria to the Loma Alta Creek, Loma Alta Slough and Buccaneer Beach. The study design will follow the general research objectives, hypotheses, and sampling design described in the City's conceptual grant proposal submitted to the State Division of Financial Assistance on July 9, 2014.

Following WESTON's commitment to delivering exceptional quality, optimized methods for sample processing and analysis will be utilized. This includes the examination of most recent literature to formally assess whether assays listed in the California Microbial Source Identification Manual (CSIM) are to be used. The assays proposed in the CSIM are a result of the Source Identification Protocol Project (SIPP) study. However, newer and improved versions of source specific methods are becoming available monthly, therefore our consideration of appropriate methods will be broad and not limited to those methods highlighted in the now 3-year-old SIPP study. In our evaluation strong attention will be paid to issues relating to specific application in this watershed. We propose to prioritize and identify at least one high quality source identification marker (high specificity and high sensitivity) for each source type of interest, (e.g., human, gull, dog).

Task 6b. Create a Workplan Consistent with California Microbial Source Identification Manual

Committed to delivering exceptional quality, WESTON applies the highest quality standards to each component of its projects. Therefore, a scientifically sound work plan will be developed that tests the hypotheses as formulated in the conceptual grant proposal submitted to the State Division of Financial Assistance on July 9, 2014 in a multi-tiered approach in accordance with the CSIM.

In the first phase of the source identification study, representing steps 1 through 3 of the CSIM, WESTON will evaluate available data regarding infrastructure, historical FIB results, and the effect of past mitigation efforts on FIB concentrations. The purpose is to obtain spatial and temporal patterns to identify areas with highest contributions of fecal bacteria ('hot-spots'). This analysis will also help to inform about the possibility of sewer leaks or other infrastructural damages.

In Phase 2 (CSIM steps 4-6), sites will be selected based on conclusions of Phase 1 and prioritized for further sampling. If needed, additional sampling locations besides the historical monitoring locations may be chosen. Sampling will occur for a maximum of 24 sampling events at 9 sites in accordance with Phase 1 conclusions.

A significant characteristic of the Loma Alta watershed is the formation of a berm between Loma Alta Slough, the terminus of Loma Alta Creek, and Buccaneer Beach during the summer months. Direct associations between bacteria levels and open versus closed berm status have been found for example at San Juan Creek at Doheny State Beach, Dana Point and Malibu Creek at Surfrider Beach, Malibu (Colford Jr et al., 2012; Schriewer et al., 2012). Similar findings support the benefits of berm formation at Buccaneer Beach, which protects the beach from contamination with heavily impaired fresh water from Loma Alta Slough.

While the berm is closed during the summer months, supported by the ultraviolet (UV) treatment system that keeps water levels constant, beach water quality may be negatively impacted when opening of the berm occurs caused by stormwater runoff in winter or dynamic changes in tidal flows in fall and spring. As a result, we suggest two main scenarios to test: a) the fecal source distribution of and to the Loma Alta slough during dry weather, and b) sources of fecal loads within the watershed that reach Buccaneer Beach when the berm is open. A reasonable sampling plan would therefore for example include sampling for 12 weeks during dry and 12 weeks during wet season. Samples will be analyzed for human genetic marker and two non-human markers via qPCR. Non-human targets will be determined in accordance with the CSIM (likely dog and avian associated makers). As mentioned above, times and locations for sampling will be selected based on Phase 1 conclusions.

Approaches to optimize study results will be considered for the sampling and analysis work plan. For example a load reduction sampling approach (e.g., Monte Carlo simulation) based on available data may be effective to maximize the likelihood of an exceedance at an outfall. Alternatively, the use of additional markers will be also considered when appropriate. For example, testing for a general MST marker may be beneficial as has been shown in other MST studies in California (e.g., Schriewer et al. 2010). A general marker is not selective for one individual source and has therefore the advantage to be the most sensitive assay that can be tested. Such a test may be advisable as a control in samples where despite expectations host markers can't be detected.

The sample analysis for MST markers will be performed by WESTON's molecular laboratory and fecal indicator analysis will be sub-contracted to Weck Laboratories, Inc. (Weck), an established ELAP-certified laboratory (# 72489).

Task 6c. Use ELAP Certified Laboratories

The analysis for microbial source tracking markers will be performed in WESTON's on-site lab. WESTON's lab is currently analyzing samples for both marine and freshwater environments for the Port of Los Angeles Inner Cabrillo Bacteria TMDL Natural Source Exclusion program, County of Ventura, Port of San Diego, and the State of Minnesota. With the goal of providing the best possible quality, our lab operates according to the newest developments in the microbial source tracking community. Absolute transparency and vigorous quality control are not only our goals but part of the method. For example, WESTON's laboratory has participated in and passed the inter-laboratory calibration study which was required to perform molecular analyses of the Southern California Bight 2013 Regional Monitoring Program.

Fecal indicator analysis will be sub-contracted to Weck Laboratories, Inc., an established ELAP-certified laboratory (# 72489). WESTON has a long history of partnering with Weck, and is confident in their ability to accurately test microbial fecal indicator bacteria levels.

Task 6d. Complete QA/QC Laboratory Trial

As mentioned above, the microbial source tracking sample analysis will be performed in WESTON's molecular lab. Prior to start of enumeration of samples for molecular markers a rigorous laboratory QA/QC trial according to current best practices will be performed. Dr. Noble will lead the design and implementation of this QA/QC trial as part of the WESTON Team. The objectives are to quantify sample specific matrix effects on qPCR performance and to ensure method accuracy for creek and beach water samples.

There are two main issues related to qPCR-based MST techniques that prevent their widespread application using a single standardized, one-size-fits-all approach. First, quantification of molecular targets using qPCR-based approaches can be highly variable in nature due to what is referred to as “qPCR inhibition”. qPCR inhibition plays a major role in the success of the qPCR due to chemical, biological, and physical agents that block the performance of the test (e.g., Cao et al. 2013). Without appropriate inhibition assessments, it is difficult to interpret MST data. Extensive inhibition has been previously documented in samples collected and analyzed from the San Luis Rey River for a range of human MST targets (Noble et al. unpublished data). Second, qPCR-based MST methods tend to have specificities and sensitivities that are different in different systems, watersheds, or regions. When not attended to appropriately these two issues can cause poor results from MST-based studies, and data that are difficult to interpret. Even methods that have been peer-reviewed and tested in southern California may not yield useful information if not applied and optimized correctly. For that reason, even though the CSIM provides a strong framework for this project, our project team is poised to benefit from expertise in the optimization of sample processing approaches as well as the ongoing development of new source specific assays.

There will be two main components to a rigorous QA/QC trial:

1) Method optimization and prioritization:

- This process will include a close coherence to all MIQE guidelines (Bustin et al. 2009, these guidelines are the minimum expected for publication and are the “gold standard” for generation of scientifically credible information generation for qPCR). Only assays with established acceptable Efficiencies (E) (e.g. 90-110%) and r2 will be included.
- Optimization of sample processing and extraction approaches on watershed-specific samples for existing assays (e.g., HF183, HumM2, Gull-2).
- Evaluation of any new, highly promising assays that have not been previously well-tested in southern California.
- Dry weather samples will be utilized to optimize sample filtration, concentration and extraction approaches, with careful attention paid to method performance at limits of detection.

3) Inhibition assessment on range of real-world sample types

- Using a focused, and fully assessed set of MST assays, a set of test samples will be subjected simultaneously to inhibition testing using both a specimen processing control (endogenous control) and a qPCR only control (exogenous control). This will permit discrimination between issues related to recovery, as well as inhibition of the qPCR.
- It may be possible to assess stormwater filters already collected as part of the Bight 13 program by the San Diego County Copermittees at Santa Margarita, Agua Hedionda, Escondido Creek, Los Penasquitos, and San Dieguito mass loading stations. It will be necessary to coordinate this work with the County of San Diego to obtain permission prior to analysis.
- Inhibition controls utilized will include both DNA-based controls (e.g., salmon sperm DNA) as well as spiking of target material at a range of concentrations.
- As a partner in this study who is interested in the advancement of Droplet Digital PCR (ddPCR) a novel qPCR technique, which is considered less sensitive to inhibition, Dr. Noble will provide limited ddPCR analyses to this project at no cost. This opportunity adds an optional added layer of validation and confidence to qPCR results. Some of those analyses may be conducted during the QAQC trial, for example to clarify the effect of qPCR inhibitory substances in Loma Alta watershed samples in case of unexpected qPCR performance problems in QA/QC trial samples.

Task 6e. Prepare a Sampling and Analysis Workplan, QAPP, PAEP, and Final Report

In conjunction with a sampling and analysis work plan as described above (6b), WESTON will prepare a QAPP to detail sample collection protocols, analytical methods, calibrations, quality assurance objectives for data acquisition, data maintenance and reporting consistent with State Water Resources Control Board (SWRCB) guidelines. WESTON has extensive experience and expertise collecting and submitting data in accordance with SWAMP requirements for water quality, bioassessment, and sediment quality monitoring programs. WESTON’s expertise in SWAMP comparable data collection includes the most recent updates for the MQOs incorporated in 2013. We have been performing consistent and

objective SWAMP monitoring since 2003, providing our clients with high-quality SWAMP comparable data. The WESTON Team has successfully implemented monitoring, sampling, analysis, QA/QC, and data management in accordance with the SWAMP QMP and QAPP for numerous projects in Southern California.

Further a refined Project Assessment and Evaluation Plan (PAEP) will be developed to establish measurable criteria and outcome indicators used to track the progress and effectiveness of the microbial source identification study. WESTON recently developed a PAEP for the City of San Diego's La Jolla ASBS Prop 84 grant project. WESTON's long-standing relationships with the WESTON Team's analytical laboratories enables effective communication of expectations and ensures the measureable criteria and outcome indicators are met.

A final source identification study report will be submitted to the City of Oceanside and SWRCB grant manager initially as draft reports for review. Statistical analyses and data interpretation will be conducted as related to observed trends in microbial source tracking and FIB measurements. Most importantly, the report will evaluate the findings with respect to expected dry and wet weather loadings from specific sources and suggest possible mitigation efforts. The final report will include field sampling logs, station GPS coordinates, and descriptions of field, laboratory, data management, and data analysis methodologies. Complete laboratory results, including QA/QC results, will be provided in appendices to the main report. After receiving comments from the City of Oceanside, WESTON will revise reports for resubmittal as final reports, provided in the form requested by the City of Oceanside. Ms. Crumpacker, as the WESTON Project Manager, will ensure that all documents will be delivered on time and to the highest quality standards.

Task 7 – Licenses and Permits

WESTON will work with the City to obtain necessary right of way or encroachment permits or other applicable permits as necessary to conduct the field work prior to beginning field operations. WESTON is well-versed in the process necessary to obtain proper sample permits, and has been conducting this work for the San Diego County Copermittees for the past 15 years, including for locations located in the City.

If necessary, WESTON's team partner ESA will prepare necessary paperwork to meet the Categorical Exemption from the California Environmental Quality Act as noted in Article 19, Section 15306.

6.0 Project Schedule

A proposed project schedule follows:

Activity	Due Date
Submit first draft of Slough Monitoring Workplan to City	September 1, 2015
Final Slough Monitoring Plan and QAPP due to City for review	November 1, 2015
Final Slough Monitoring Plan and QAPP submitted to RWQCB	December 31, 2015
Conduct Loma Alta Slough Monitoring	Twice yearly (July-August) for seven years beginning in 2016 and ending in 2022
Submit Annual Loma Alta Slough Monitoring Reports	Each January 30 from 2017 through 2023
Demonstrate Numeric targets are Met	October 30, 2022

7.0 List of Similar Services

Our Team has the full spectrum of experience and competence required to perform the SOW for this contract. In the following pages, we have highlighted various projects completed within the last three years within the San Diego Regional Board jurisdiction, Southern California, and nationally, demonstrating our ability to successfully complete projects of a similar size and scope, and we encourage you to contact our references regarding the quality of our work.

The project summaries below reflect the WESTON Team's experience developing scientifically defensible and regulatory-driven plans. Specifically, monitoring conducted for the City of San Clemente at Poche Beach, the Lake Elsinore and Canyon Lake Nutrient TMDL, and Inner Cabrillo Beach Bacteria TMDL Natural Source Exclusion studies provide recent examples of WESTON's experience developing programs to meeting stringent regulatory requirements. In the case of Inner Cabrillo Beach, the Natural Source Exclusion study that WESTON has developed in coordination with the Los Angeles Regional Board is the first of its kind in Southern California. WESTON's teaming partners, D-MAX and LWA also have recent experience assisting the City with development and negotiation of the Slough monitoring program in the alternative TMDL for Loma Alta Slough.

In addition to development of monitoring plans, the following project summaries showcase our ability to collect SWAMP compliant data for use in estimation of watershed loading estimates, comparison to TMDL numeric targets, and development of appropriate management actions to help our clients move forward toward water quality compliance.

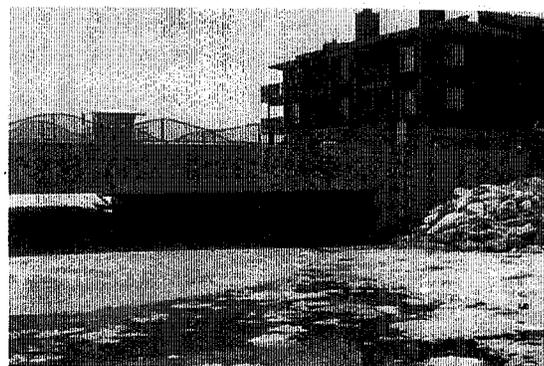
Loma Alta Slough Bacteria & Eutrophication TMDL Development Support

WESTON

Client City of Oceanside Water Utilities Department
Mo Lahsaie, PhD, REHS
760.435.5803

Vista & Oceanside, CA • 2011-2013

Description WESTON's TMDL support included participating in meetings with the Regional Board and USEPA, reviewing model assumptions and results for nutrient cycling and bacteria fate and transport, preparing technical memos to support City and stakeholder positions, developing technical documents and recommendations on bacteria and nutrient end point monitoring, and participating in stakeholder meetings. The Loma Alta Slough TMDL is using a nutrient endpoint approach to determine eutrophication compliance—the first to be developed for estuaries in California.



In order to provide technical support to the City of Oceanside, WESTON attended numerous meetings, typically held bi-monthly, in which the SCCWRP presented background data and applied modeling methodologies and results associated with determining watershed TMDL required load reductions. WESTON reviewed the general applicability of the model assumptions and provided guidance to the City of Oceanside regarding key decisions that SCCWRP/Region Board requested the stakeholders to make. During the TMDL development process, WESTON helped the City of Oceanside identify several gaps in the TMDL assumptions that included the lack of data relating to quantity and water quality of groundwater inputs, hydrodynamic conditions that affect dissolved oxygen in the water column, the general sources of phosphorous in the creek reaching the slough, and feasible strategies to achieve the required phosphorous load reductions.

Benefits

- Provided TMDL development support that has identified implication of modeling assumptions & results on implementation & monitoring responsibilities of the City of Oceanside & stakeholders (e.g., City of Vista).
- Developed technical memo to support stakeholders' position on the Bacteria TMDL reference storm event, approved by Regional Board.

Project Team and Role(s): Anthony Cotts, Project Manager; Sheri Dister, GIS; Satomi Yonemasu, Data Management; Andrea Crumpacker, TMDL Support

San Diego Municipal Copermittees Regional Monitoring & Reporting**WESTON**

Client County of San Diego, Dept. of Public Works
 Joanna Wisniewska
 858.694.2312

San Diego County, CA • 2001--ongoing

Description • The San Diego region municipal Copermittees required the assistance of a consulting firm to conduct stormwater monitoring in compliance with the Municipal NPDES Permit (R9-2007-0001). The San Diego RWQCB was due to issue a new permit, and based upon the activities in other regions, it was anticipated that the permit would include numerous monitoring changes and additional requirements. WESTON assisted the Copermittees with their Report of Waste Discharge to help guide the permit monitoring requirements to provide additional spatial information and ambient receiving water information.

WESTON was selected by the Copermittees to assist them with program implementation of the Permit. WESTON has conducted a variety of related activities including:

- A historical review of past Copermittees monitoring efforts and recommendations for the future monitoring program.
- Mass loading and temporary watershed assessment station monitoring throughout the County of San Diego (County) for chemical, microbiological, and biological parameters of concern. The mass loading stations provide long-term trend information about the region's stormwater mass emissions. Temporary stations are used to define constituent loading information to lead to management actions such as source identification.
- Dry weather monitoring data and information merger with mass loading station data by watershed for comprehensive water quality assessment by designing and implementing data management and statistical evaluations.
- Stream bioassessment monitoring in urban streams throughout the County to provide trend information of the health and condition of urban streams. This monitoring includes the taxonomy of fresh water insects to identify species diversity and abundance.
- TIE and special studies related to source identification.
- Ambient Bay and Lagoon Monitoring support and the evaluation of SQOs using a triad approach of chemistry, biology, and toxicity assessments in San Diego's lagoons and bays.
- Design and implementation of a monitoring program for ambient bays, lagoons, and coastal waters; design of a Regional Synthetic Pyrethroid Monitoring Plan; design of a Regional Trash Assessment Work Plan; design of a framework for conducting MS4 Monitoring and Source Identification; and design of Regional Source Identification Studies.
- Design support and monitoring support for the Copermittees Bight '13 Monitoring Program.
- Development of §303(d) listing assessments.

WESTON has provided program recommendations for the next five years to move the Copermittees into a watershed-based urban runoff monitoring approach and is currently implementing the program in an effective and efficient manner that meets the requirements of the NPDES.

Benefits • WESTON has provided sound scientific data results and reports over the past 15 years helping to ensure that the Copermittees are complying with their Permit requirements.

Project Team and Role(s): Garth Engelhorn, Monitoring Program Project Manager; Sheri Dister, Reporting Program Project Manager; Andrea Crumpacker, QA and Statistical Advisor; Satomi Yonemasu, Data Management; Amy Margolis, Scientist; Damon Owen, Field Operations; Scott Cropper, Field Operations; Melissa Mathis, Field Operations; Sheila Holt, Ambient Bay and Lagoon Monitoring Task lead; Sara Huber, Field Operations and Project Engineer; Anthony Cotts, Flow modeling; Paul Hartman (LWA), Reporting Assistance

City of San Clemente (Poche Beach), Bacteria Source Identification**WESTON**

Client City of San Clemente
Mary Vondrak
949.361.8204

San Clemente, CA • 2010-2014

Description • Poche Beach is located in the City of San Clemente in Orange County, California, and the beach has been among the worst in the region for exceedances of water quality standards for indicator bacteria, resulting in its inclusion in the adopted San Diego Beaches and Creeks Bacteria TMDL. WESTON was hired to conduct a bacterial source identification study to understand sources of bacteria from the watershed and transported to the beach. The study encompassed a multi-tiered adaptive approach with investigations of both anthropogenic and natural sources of bacteria. We used a suite of source tracking tools, including cutting edge molecular techniques, to assess a wide variety of potential bacterial sources and transport mechanisms including: assessments of groundwater recharge, over-irrigation, bacterial regrowth within the storm drain infrastructure and scour pond at the base of the watershed, and the contributions from the resident bird population at the beach. Based on recommendations from the study's findings, the City implemented a trial BMP focused initially on the gulls at the beach. The results have yielded dramatic improvements in water quality of the ocean receiving waters at Poche Beach. During the entire period that the BMP was implemented, Poche met the water quality objectives for bacteria. This is in sharp contrast to the historically high bacterial concentrations that have plagued Poche Beach for decades. The results demonstrate the importance of thorough site-specific watershed assessments in identifying sources of indicator bacteria with a focus on implementing the most practical BMPs to improve water quality. Project was completed on schedule and within budget.

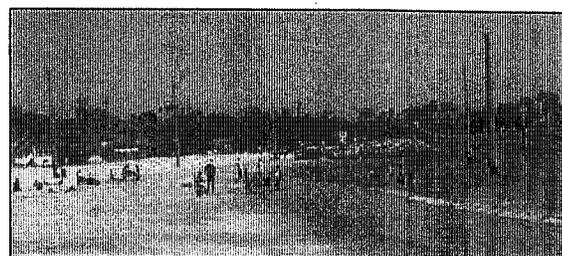
Project Team and Role(s): Andrea Crumpacker, Technical Advisor; Kelly Goodwin, Technical Advisor; Damon Owen, Field Lead; Anthony Cotts, Flow modeling; Sheri Dister, GIS; Satomi Yonemasu, Data Management

Inner Cabrillo Beach Bacteria TMDL Support**WESTON**

Client Port of Los Angeles
Andrew Jirik
310.732.3914

Los Angeles, CA • 2004–ongoing

Description • Since 2000, the Port of Los Angeles (POLA) and City of Los Angeles (City) have implemented extensive corrective measures to reduce sources of fecal indicator bacteria (FIB) in accordance with the Los Angeles Harbor Bacteria TMDL. Beginning in 2004, WESTON was contracted to develop the TMDL Implementation Plan, which included both non-structural best management practices (BMPS) such as public education, signage, trash removal, and beach grooming; and structural BMPs including sanitary and storm drainage system replacements/repairs, diversion structures, beach sand removal and replacement, and a permanent bird exclusion structure. Despite these activities, concentrations of total coliform, *Escherichia coli*, and enterococci along the Inner Cabrillo Beach shoreline continue to exceed the TMDL criteria.



WESTON has been continuously supporting the POLA throughout the duration of the TMDL implementation period and when the Los Angeles Regional Water Quality Control Board (LARWQCB) requested POLA to develop a transparent, scientifically sound process to establish natural source exclusion (NSE) eligibility at ICB, WESTON developed the ICB NSE Work Plan. This Work Plan includes an adaptive strategy for the design, development and implementation sanitary surveys utilizing molecular source tracking (MST), pathogen detection, and studies to explore the impact of non-fecal bacteria on beach conditions. All PCR and microbiology assays have been conducted in WESTON's laboratories. Steps to implement the ICB NSE Work Plan began in Summer 2012, and WESTON currently supports the POLA during discussions with the LARWQCB and represents the POLA at stakeholder meetings and public presentations. The study is currently ongoing, constantly adapted to the latest state of the science and public policy.

Project Team and Role(s): Andrea Crumpacker, Project Manager; Sara Huber, Assistant Project Manager/Field Lead; Damon Owen, Field Support; Kelly Goodwin, Technical Advisor; Sheri Dister, GIS; Satomi Yonemasu, Data Management

Project Team and Role(s): Andrea Crumpacker, Project Manager; Sara Huber, Assistant Project Manager/Field Lead; Damon Owen, Field Support; Kelly Goodwin, Technical Advisor; Sheri Dister, GIS; Satomi Yonemasu, Data Management

Lake Elsinore and Canyon Lake Nutrient TMDL Watershed Monitoring and Annual Water Quality Reporting

WESTON

Client Santa Ana Watershed Project Authority
Rick Whetzel, Senior Watershed Planner
(951) 345-4222

Santa Ana, CA • 2011–ongoing

Description • Since 2011, WESTON has been conducting wet weather monitoring at four receiving water sites to determine the total nutrient loading into Lake Elsinore and Canyon Lake from their tributaries. The work includes pre-storm equipment mobilization, time-weighted sample station set up, sample collection during wet weather, analytical laboratory analysis, data management and quality assurance. The annual water quality data is used to calculate loads and evaluate nitrogen and phosphorus TMDL compliance with waste load allocations. WESTON manages all the monitoring data, formats and submits the data into CEDEN, and prepares annual reports summarizing the data to evaluate compliance with the Canyon Lake and Lake Elsinore nutrient TMDLs. The report satisfies the obligation of Task Force stakeholders to submit an annual report summarizing watershed-wide monitoring, Canyon Lake nutrient in-lake monitoring and Lake Elsinore nutrient in-lake monitoring. WESTON participates in the technical advisory committee and recently supported development of the Phase 2 Compliance Monitoring Program.

Project Team and Role(s): Garth Engelhorn, Project Manager; Amy Margolis, Reporting; Satomi Yonemasu, Data Management; Scott Cropper, Field Support

Loma Alta Slough Phosphorus Total Maximum Daily Load

LWA

Client City of Oceanside Water Utilities Department
Mo Lahsaie, PhD, REHS
760.435.5803

Oceanside, CA • 2013-2014

Description • The City of Oceanside selected LWA to assist with regulatory issues, the most pressing of which was the Loma Alta Slough Phosphorus TMDL. The City and the USEPA were both concerned with the San Diego Regional Board's initial proposal for this TMDL. The Regional Board had proposed a nontraditional approach for adopting the TMDL, one that would allow for the expeditious adoption of a TMDL through a single regulatory action without an extensive public review period and Basin Planning process,

LWA's role was to propose regulatory solutions that would address the needs of each stakeholder, including the City, the Regional Board, and USEPA. Through a series of meetings, LWA achieved an understanding of the drivers for each party and developed a suite of potential alternatives to a traditional TMDL that addressed the following key concerns of each agency:

- Provide a streamlined process for adoption and implementation (Regional Board)
- Include defined numeric endpoints and a timeline for implementation (USEPA)
- Eliminate duplicative regulation and decrease compliance risk (City of Oceanside)

Ultimately, the Regional Board adopted a resolution (as opposed to a TMDL) that requires the City to work toward the numeric targets through development and implementation of the Water Quality Improvement Plan (WQIP) for the watershed. The WQIP provides an alternative program to implement the TMDL (through the MS4 Permit), obviating the need for the arduous, traditional TMDL process. With the support of the City, USEPA, and the environmental community, the Regional Board passed the resolution unanimously.

Project Team and Role(s): Ashli, Project Manager; Paul Hartman, Project Scientist



Phase I MS4 Watershed Planning Water Quality Improvement Plan Development LWA

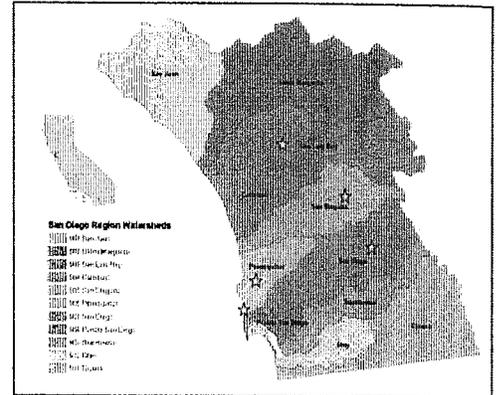
Client County of San Diego / City of San Diego
 Jo Ann Weber
 858.495.5317

San Diego, CA • 2013-Present

Description • The San Diego Phase I MS4 Permit requires each of the watershed management areas in the region to develop and implement WQIPs. LWA is a member of multiple consultant teams developing WQIPs for watersheds led by the County (2) and City of San Diego (3).

The WQIPs are long term planning documents designed to facilitate strategic, prioritized planning at the watershed scale leading to focused implementation at the jurisdictional scale. LWA has performed or is performing the following work:

- Leading the final production of the WQIPs for the San Luis Rey and San Diego River Watersheds for the County of San Diego.
- Providing regulatory, technical, and advisory support for WQIP development in five watersheds: San Luis Rey, San Diego River, San Dieguito, Los Peñasquitos, and Mission Bay.
- Assisted in development of priority water quality conditions and selection of the highest priority water quality conditions for each watershed.
- Assisted in the development of numeric goals for the San Luis Rey and San Diego River Watersheds for the County of San Diego, including an in depth review of TMDL compliance options and incorporation of these metrics into the watershed goals.
- Led the development of the jurisdictional strategies in the San Luis Rey and San Diego River Watersheds. These programmatic strategies were developed for each agency in the watersheds to help them tailor their programs to the watershed priorities. Agencies included the County of San Diego, the Cities of La Mesa, Oceanside, San Diego, Santee, and Vista, and Caltrans.
- Developed Adaptive Management Processes based on watershed and program assessments for all five watersheds.
- Developed a Special Study for the San Dieguito Watershed targeting Bacteria Source Identification.



Project Team and Role(s): Ashli, Project Manager; Paul Hartman, Project Scientist

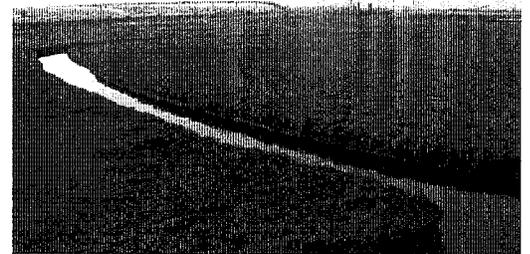
City of National City As-Needed Environmental Support

D-MAX

Client City of National City
 Stephen Manganiello
 619.336.4382

City of National City, CA • 2004-Present

Description • D-MAX developed monitoring plans and selected site locations for MS4 outfall monitoring, a trash monitoring special study, a special study in Paradise Creek designed to delist the creek for selenium, and BMP assessment monitoring in support of two Prop 84 grants. The BMP assessment work includes continuous flow measurement, wet weather composite sampling, and modeling to assess volume and pollutant reductions. BMP types include bioretention, infiltration, and water harvesting and reuse. D-MAX represented the City in multiple audits with the Regional Board and written required technical reports in response to Regional Board requests. They prepared comments on the MS4 Permit, proposed trash amendments, and Paleta Creek TMDL, and gave presentations to City Council on implications of the 2013 MS4 Permit and the WQIP process. They



prepared an analysis of actions the City would need to take to comply with the proposed trash amendments and their associated costs, and also designed and implemented a study to support delisting Paradise Creek for selenium.

As one of the co-leads in the San Diego Bay Watershed, D-MAX interfaces with the public and Regional Board on behalf of the City and the watershed group. This includes presenting and answering questions at public meetings and addressing comments from the public. They also developed goals and strategies and associated schedules for the City. They were able to obtain over \$4 million in LID retrofit and habitat restoration grants for the City, all focused along the water body most important to City management and local stakeholders. These grant projects are the City's key WQIP strategies. In addition to improving water quality, the retrofit and restoration projects are designed to maximize community benefits: aesthetics, recreation, economic development of a redeveloping area, and improved walkability and access to transit. D-MAX has written annual reports for the City since 2004, and we are currently updating the City's JRMP. The JRMP update includes developing strategies to reduce pollution, including inventory preparation, outreach, inspections, enforcement, for source types including residential areas, shopping centers, and industrial parks. The residential approach incorporates lessons learned from pilot projects completed in previous years.

Project Team and Role(s): John Quenzer, Project Manager

City of Oceanside Storm Water Services

D-MAX

Client City of Oceanside
Mo Lahsaie
760.435.5803

City of Oceanside, CA • 2007-Present

Description • D-MAX has prepared Jurisdictional Runoff Management Plans (JRMP) for the City of Oceanside in response to the last two San Diego MS4 permits. The first update was completed in 2007 through 2008, and the second update is currently in progress. These efforts have involved preparing and documenting jurisdictional monitoring procedures; revising BMP requirements; and developing source inventories and prioritization procedures.

As part of the current JRMP update contract, D-MAX also worked with our subcontractor, Larry Walker Associates, to assist the City in negotiating the terms of a TMDL alternative approach to eutrophication in the Loma Alta Slough. In addition to overall project management, D-MAX led the portion of the effort to catalog jurisdictional strategies that could help reduce nutrient loading to the slough and present them to the Regional Board in a way that emphasized how the City's proposed approach is different than what had been done under the 2007 Permit. We also analyzed historical outfall flow rates in the Loma Alta watershed and prepared maps sorting outfalls into different flow rate categories.

D-MAX has completed MS4 outfall monitoring for the City of Oceanside in 2010 and 2012, and we have been contracted by the City to complete additional outfall monitoring in the summer of 2015. These projects have included collecting visual observations, measuring flow rates, and, in some cases, performing water quality analyses on collected samples.

Project Team and Role(s): John Quenzer, Project Manager



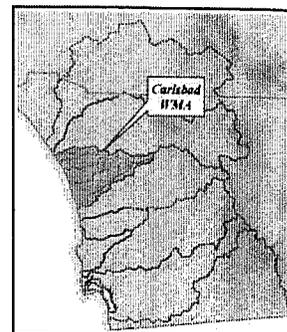
Carlsbad Water Quality Improvement Plan (WQIP)

ESA

Client Mikhail Ogawa Engineering
Mikhail Ogawa
760.795.6987

City of Carlsbad, CA • 2012-2015

Description • ESA is providing technical support to Mikhail Ogawa Engineering (MOE) for the development of the Carlsbad Watershed Water Quality Improvement Plan (WQIP). The WQIP is required under the re-issued MS4 Stormwater Permit. The Carlsbad Watershed Management Area is 135,345 acres and consists of six hydrologic areas: Loma Alta (904.1), Buena Vista Creek (904.2), Agua Hedionda (904.3), Encinas (904.4), San Marcos (904.5), and Escondido Creek (904.6). ESA is supporting MOE and the City of Carlsbad in developing the WQIP that includes:



- Collecting data and information about the waterbodies in the watershed;
- Developing priority water quality conditions, goals, potential strategies to address the conditions, and schedules associated with the strategies to achieve the goals;
- Evaluating and prioritizing the options;
- Determining the appropriate scale of strategies over a the implementation schedule; and
- Preparing the monitoring and assessment programs to best demonstrate the progress towards achieving the established goals.

The WQIP for the Carlsbad Watershed will be used to prioritize water quality impairments, determine BMPs necessary to achieve water quality, and show through defined target levels and monitoring that receiving water quality metrics will be achieved. The BMPs includes LID to meet the load reductions. The ESA Technical team is lead by David Pohl, Ph.D., P.E. Dr Pohl prepared and reviewed the Regional Annual Monitoring Report and Long Term effectiveness Assessment (LTEA) that will be used to define the water quality priorities.

Project Team and Role(s): David Pohl, as needed project support

Water Quality Management Plan for Sunshine Lake and the Sunrise Waterway

ESA

Client Charlotte County, Florida
Joanne Vernon, P.E.
941.575.3661

Charlotte County, FL • Ongoing

Description • ESA developed a Water Quality Management Plan for Sunshine Lake and the Sunrise Waterway, in Port Charlotte, in Southwest Florida. Sunshine Lake is seasonally connected to Charlotte Harbor (named by EPA as an estuary of national significance) via the Sunrise Waterway.

Residents in the neighborhoods surrounding Sunshine Lake had complained about what appeared to them to be a lowered lake level. ESA led the effort to determine what had happened in this lake. The initial report concluded that the lake had not been lowered, but the lake appeared to have been lowered due to a massive cyanobacteria bloom growing up from the bottom of the lake, and which had grown to the point that it occupied 50 percent of the lake volume.



Based on the findings of the extent of the algal bloom (which contained living photosynthetic biomass, living heterotrophic biomass, and dead organic material) the County hired a contractor to dredge the 8-acre lake, at a cost in excess of \$2 million.

ESA led the follow-up effort to develop a water quality management plan for the lake to reduce the probability of the algal bloom returning. The management plan was based on results from extensive sampling of stormwater inflows, groundwater seepage and water quality of both the lake itself and the surficial aquifer. The water quality management plan included a

number of actions to reduce the likelihood of the reappearance of the algal bloom, including increasing circulation, using floating treatment wetlands to filter nutrient inflows, and modifications of the lakes water levels.

Project Team and Role(s): David Tomasko, Principal Scientist

Development of NNC Criteria for Clam Bay

ESA

Client Collier County Coastal Zone Management Department
Gary McAlpin
239.252.2966

Clam Bay, FL • 2012

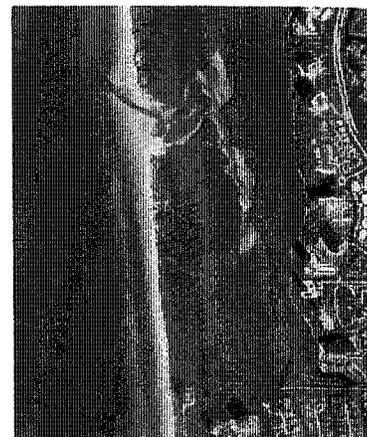
Description • ESA managed the development of NNC criteria for Clam Bay. Previously collected data support the contention of local stakeholders that the mangrove-lined shoreline and non-dredged benthic features of Clam Bay support a diverse assemblage of flora and fauna. However, water quality data from Clam Bay exceeded the previous dissolved oxygen (DO) criteria from FDEP, and portions of Clam Bay exceeded the default chlorophyll-a criteria of 11 μg / liter. Combined, ecological data suggested that Clam Bay was a health estuary supporting a diverse ecosystem, while the water quality data suggested that Clam Bay was “impaired” for nutrients.

ESA staff led the effort to develop salinity-normalized NNC criteria for both Total Nitrogen (TN) and Total Phosphorus (TP). The criteria for TN and TP were developed based on a multiple step process: 1) documentation of the health of the benthic communities in Clam Bay, 2) a comparison of Clam Bay’s water quality to that from a nearby estuary that FDEP had determined to be adequate for use as a “reference” system, 3) development of statistically unbiased criteria that allowed for the interpretation of TN and TP concentrations, when compared to levels of conductivity, and 4) review and approval by the appropriate regulatory agencies.

The proposed approach was presented to FDEP staff in Tallahassee for comment, and based upon suggested modifications; the salinity-normalized NNC criteria for TN and TP were developed for final review.

The proposed criteria were presented to local stakeholders, including the Collier County Board of County Commissioners. The NNC criteria were then reviewed and approved by FDEP and the US Environmental Protection Agency. The site specific and salinity normalized NNC criteria for Clam Bay were then formally included in the State of Florida’s Surface Water Quality Standards, as recorded in Florida Administrative Code, Chapter 62-302.352.

Project Team and Role(s): David Tomasko, Principal Scientist



8.0 Estimated Project Budget

Below is WESTON's estimated total project budget with fees and staff-hours for each task.

LOMA ALTA SLOUGH MONITORING COMPONENT			
TASK	ESTIMATED HOURS	1st YEAR COST¹	TOTAL COST (INCLUDING SUBCONTRACTS)²
1. Monitoring Plan Document			
a. Project Kickoff Meeting (One-time)	24	\$4,250	\$4,250
b. Document Preparation	230	\$42,270	\$42,270
2. QAPP			
a. Document Preparation	104	\$12,870	\$12,870
3. Annual Slough Monitoring Services (PER YEAR)			
a. Watershed Flow & Loading Sampling	118	\$21,251	\$92,631
b. Macroalgae Monitoring	50	\$6,986	\$34,390
c. Slough DO & Water Quality Monitoring	24	\$4,486	\$22,430
d. Data Management / QAQC	28	\$3,720	\$18,600
4. Data Analysis & Annual Reporting Services^{3,4}			
a. Data Compilation, Analysis, Summary	78	\$10,060	\$24,780
b. Document Preparation	96	\$14,520	\$49,880
5. Annual Meetings (2)⁵			
a. Pre-monitoring & Results Presentation	12	\$1,950	\$9,750
TOTAL	764	\$122,363	\$312,391

1. First-year cost is higher than subsequent years, includes subcontractors

2. Total cost is for the 5-year contract cycle

3. Per-Year estimate

4. Data analysis and document preparation hours are higher during the first year than subsequent years

5. Scope includes 3 annual meetings, so cost reflects three

MICROBIAL SOURCE IDENTIFICATION COMPONENT (CITY'S OPTION)			
TASK	ESTIMATED HOURS	1 st YEAR COST ¹	TOTAL COST (INCLUDING SUBCONTRACTS)
1. Direct Project Administration Costs			
a. Project Management Personnel Costs	32	\$3,000	\$4,640
b. Administer Technical Advisory Committee	60	\$10,400	\$10,400
c. Principal QAQC Final Review	56	\$10,800	\$10,800
2. Planning Costs			
a. Project Planning – Field & Lab Components	20	\$2,060	\$2,060
b. Environmental Permitting Documentation	4	\$1,620	\$1,620
c. Project Effectiveness Assessment Planning	40	\$4,960	\$4,960
d. Monitoring Plan Preparation	144	\$22,280	\$22,280
e. QAPP Preparation	84	\$10,620	\$10,620
f. Laboratory Sample Sensitivity Trial	44	\$16,680	\$16,680
3. Equipment			
a. Field Operations Materials & Supplies	0	\$5,230	\$5,230
b. Laboratory Reagents & Supplies	0	\$36,000	\$36,000
4. Monitoring / Data Processing & Analysis			
a. Field Operations Labor	848	\$67,740	\$67,740
b. Laboratory Operations Labor	600	\$82,800 ³	\$82,800 ³
c. Data Interpretation & Analysis ²	140		\$20,620
d. Reporting ²	320		\$55,620
TOTAL	2,392	\$274,190	\$347,070

1. 1st year cost includes subcontractors

2. Assume data interpretation and reporting will fall into second year of the program.

3. Includes fecal indicator data analysis conducted by Weck Analytical (240 samples)

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF FINANCIAL ASSISTANCE
PRELIMINARY FUNDING COMMITMENT (PFC)
CLEAN BEACHES INITIATIVE (CBI) GRANT PROGRAM
FAAST PIN: 27734

RECIPIENT: CITY OF OCEANSIDE (CITY)

PROJECT TITLE: MICROBIAL SOURCE IDENTIFICATION STUDY FOR BUCCANEER BEACH AND LOMA ALTA CREEK IN OCEANSIDE, CA (PROJECT)

TOTAL PROJECT COST: \$393,360

TOTAL CBI GRANT REQUEST: \$348,240

GRANT MANAGER: Andrew Tsiu, Environmental Scientist (916-319-9123 or Andrew.Tsiu@Waterboards.ca.gov)

AUTHORITY

The Clean Beaches Initiative (CBI) Grant Program provides funding for projects that restore and protect the water quality and the environment of coastal waters, estuaries, bays and near shore waters. The CBI Grant Program was initiated in response to the poor water quality and significant exceedances of bacterial indicators revealed by Assembly Bill (AB) 411 (Stats. 1197, ch 765) monitoring at California's beaches. Funding is available from the *Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act* (Proposition 84). In addition, there are unused or re-appropriated funds remaining from the *California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002* (Proposition 40) and the *Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002* (Proposition 50).

The State Water Board adopted Resolution No. 2012-0020 on June 5, 2012, which revised the CBI Guidelines used to solicit applications, evaluate proposals, and award grants for Proposition 84, Chapter 7 funds, and any unused or re-appropriated Proposition 40 and 50 CBI funds. The resolution authorized the Deputy Director of the Division of Financial Assistance (Division) to approve proposed projects, execute grant agreements and amendments to implement the proposed projects and utilize funds from projects which are withdrawn or completed under budget to fund additional projects recommended by the Clean Beaches Task Force (CBTF), or augment the scope and budget of projects previously awarded.

The Concept Proposal for this Project was submitted to FAAST on July 9, 2014. The CBTF met on September 24, 2014 and recommended this Project be invited to submit a detailed application. The applicant submitted a Detailed Application to FAAST on May 19, 2015. The application incorporated the recommendations suggested by the CBTF, and it has been determined to be complete. This PFC has been posted on the State Water Board's internet website, and circulated to the CBTF for review and comment prior to the Deputy Director executing a grant agreement.

PROJECT OBJECTIVE

The goal of this Project is to complete a microbial source identification study in the Loma Alta Creek watershed in Oceanside, CA. The main research objective is to use an informative water quality monitoring and infrastructure inspection program to identify specific sources of bacterial contamination in the Loma Alta Creek watershed. This includes identifying locations of significant bacterial

contribution and a determination of whether these contributions are of human in origin (e.g. storm drains, sanitary sewer systems).

PROJECT DESCRIPTION

The proposed Project will follow the methodology outlined in the California Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (http://www.swrcb.ca.gov/water_issues/programs/beaches/cbi_projects/docs/sipp_manual.pdf) to gather information on the extent and severity of sources of Fecal Indicator Bacteria (FIB) to Buccaneer Beach and the Loma Alta Slough.

An evaluation will be made after each tier of the California Source Identification Manual to determine whether the project will proceed to the next tier. The first task of the study is to develop hypotheses regarding FIB sources to the beach. Based on existing stakeholder knowledge and historical water quality monitoring data, a preliminary set of hypotheses have been generated by the City to guide the study. The City will gather additional water quality and water flow monitoring data, conduct field reconnaissance of the watershed, determine the integrity of storm water and sanitary sewer systems, and map Geographic Information Systems of physical infrastructure and environmental features to further formulate these hypotheses for the development of a sampling and analysis plan for microbial source testing. The sampling and analysis plan will be reviewed and approved by the Technical Advisory Committee (TAC) and Grant Manager. If sufficient information is gathered at this stage of the study to determine the source of FIB contamination, the testing of molecular indicators of human fecal pollution will not proceed and appropriate improvements to the storm and sewer infrastructure will be recommended.

If definitive information regarding FIB sources is not clear, testing for molecular indicators of human fecal pollution will follow and be consistent with the sampling and analysis plan that is approved by the TAC and Grant Manager. A validation trial will use Droplet Digital Polymerase Chain Reaction, and be completed before a full-scale molecular marker sampling described in the California Source Identification Manual to test sensitivity and specificity for the molecular markers used in the study. The human-specific markers will be tested using Quantitative Polymerase Chain Reaction. Analysis of results will be shared with the TAC and Grant Manager.

Testing for molecular indicators of non-human markers will follow the testing for human-specific markers if a significant amount of human-specific markers are not found. This tier will assess whether canine and fowl contribute to the FIB problem. Following this stage, if sources of FIB contamination are still not known, the project may continue with investigations of groundwater, berm water, and vegetative wrack suspension as likely pathways for FIB.

The total eligible cost of the Project is \$393,360. The City requested a CBI grant amount of \$348,240 for the Project. The City is providing \$45,120 of in-kind match for staff time throughout the project and additional FIB sampling as needed.

ENVIRONMENTAL IMPACT

For this Project, the City has filed a Notice of Exemption (NOE) for CEQA compliance at the County of San Diego Clearing House on March 20, 2015. The Project meets the following exemptions:

Section 15306: Class 6 Information Collection - Basic data collection and research with no disturbance to an environmental resource. No environmental impacts are expected as a result of this Project.

FISCAL IMPACT

As of July 1, 2014, the cumulative balance available for the CBI Grant Program funded by Proposition 40, 50, and 84 is:

July 1, 2014:	\$40,344,726
Approved Projects	\$15,403,442
Draft PFCs (proposed commitments):	
City of Oceanside – FAAST PIN 27734	<u>\$348,240</u>
Funds Remaining for Future Commitments:	\$24,583,064

REGIONAL WATER BOARD IMPACT

The Project does not directly impact a Regional Water Board.

ROUTINE, NON-CONTROVERSIAL PROJECT

The proposed Project is routine and non-controversial based on Division staff's consideration of the documents and information provided by the City, regulatory agencies, and written responses from the general public. There has been no indication of a protest or controversy regarding the proposed Project.

PUBLIC REVIEW

The PFC has been posted on the State Water Board's internet website for public review for 10 days.

APPROVAL

Using the authority delegated by the State Water Resources Control Board on June 05, 2012, in Resolution No. 2012-0020, I hereby:

Approve a Clean Beaches Initiative Grant Program Preliminary Funding Commitment of \$348,240 for the City of Oceanside's Microbial Source Identification Study for Buccaneer Beach and Loma Alta Creek in Oceanside, CA.

Darrin Polhemus, Deputy Director
State Water Resources Control Board
Division of Financial Assistance

Date

Reviewed by:
Office of Chief Counsel
Date: