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**COACHELLA VALLEY WATER DISTRICT
RFP 2022-8**

**Proposal to Implement Workplan
to Develop the Coachella Valley
Salt and Nutrient Management Plan**





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February 25, 2022

Coachella Valley Water District

75-515 Hovley Lane East
Palm Desert, CA 92211

RE: Proposal to Implement the Workplan to Develop the Coachella Valley Salt and Nutrient Management Plan (CV-SNMP), PSA 2022-8

Dear Coachella Valley Water District:

The State Water Board's Recycled Water Policy requires the Coachella Valley SNMP Agencies (CV-SNMP Agencies) to develop an Salt and Nutrient Management Plan (SNMP) that sustainably manages salt and nutrient loading in the Coachella Valley Groundwater Basin to protect its beneficial uses. The CV-SNMP Agencies prepared an SNMP in 2015 that was rejected by the Regional Board, in part, because of insufficient consideration of salt loading from the recharge of Colorado River water, which is an invaluable water supply to the Coachella Valley and its economy. This effort to develop the CV-SNMP must not fail. The CV-SNMP must comply with the Recycled Water Policy and, at the same time, allow the use of Colorado River water (and recycled water) without spending hundreds of millions of dollars to attain water-quality objectives that do not have a nexus to the protection of the beneficial uses of groundwater.

In 2020/21, the CV-SNMP Agencies hired West Yost to lead a multi-stakeholder effort, including Regional Board staff, in the development of a workplan to update the 2015 CV-SNMP (CV-SNMP Workplan). The CV-SNMP Workplan, which we prepared in collaboration with the CV-SNMP Agencies and Regional Board, included an updated groundwater monitoring program and a technical scope-of-work to set numeric TDS objectives across the groundwater basin, which are necessary to develop a CV-SNMP that complies with the Recycled Water Policy and resolves the concerns of the Regional Board with the CV-SNMP Workplan. The Regional Board approved the CV-SNMP Workplan in 2021.

We are proud of this accomplishment and the working relationships we developed with the CV-SNMP Agencies and Regional Board staff that made the accomplishment possible. We also understand that the job is not complete. We plan to faithfully execute the Workplan and build upon the trust and confidence that we have developed with the stakeholders and Regional Board. The trust and confidence were earned through our technical abilities, our extensive experience in developing SNMPS, our creative thinking, our communication skills, and our ability to lead and facilitate stakeholder efforts.

We are assigning the same senior staff that developed the CV-SNMP Workplan to lead the implementation of the CV-SNMP Workplan. **Andy Malone** will serve as the Project Manager and Technical Supervisor for the project. Andy was the lead author of the CV-SNMP Workplan. In addition, we have augmented our team with the foremost professionals in California in SNMP law and policy and stakeholder engagement and outreach. **Tess Dunham** of Kahn, Soares & Conway, LLP (KSC), will serve as the lead regulatory and policy advisor. Tess was a key contributor to the development of the Central Valley SNMP as part of the CV-SALTS program. **Meagan Wylie** of Zephyr Collaboration (Zephyr) will lead stakeholder engagement and outreach. Meagan has served as an outreach and engagement facilitator in the development of several Groundwater Sustainability Plans (GSPs), including the critically overdrafted Borrego Springs Subbasin.

We were hired to prepare the CV-SNMP Workplan based on our long history of leading the development and implementation of innovative technical and policy solutions that balance the water-supply challenges of water/wastewater agencies and State mandates to protect water quality. Some of these past efforts included:

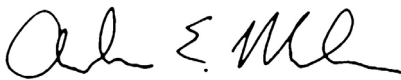
- The development of the Regional Board approved SNMP for the Santa Ana Region. This work was codified in Basin Plan and lauded by the State Board as a prototype for SNMPS across California.
- The development of the Regional Board approved SNMP for the Central Valley.
- The development and implementation of the Chino Basin Optimum Basin Management Program, which was estimated to have provided a net present value benefit of \$1 billion to the region.
- The development of scientifically based TDS objectives that conform to California Water Code requirements.
- The development of creative SNMPS that result in cost-effective salinity management and the protection of beneficial uses of groundwater and surface water.
- Leading large stakeholder groups through complex decision-making processes under strict regulatory deadlines. These efforts included the development of the Tulare Basin GSP and the ongoing implementation of the Borrego Springs GSP.

We are confident that we are proposing the most experienced team and a tested, successful approach to CV-SNMP development with the highest certainty for Regional Board approval. The stakes are high for the ratepayers in the Coachella Valley. Without this team and without our approach, the CV-SNMP development process may fail again, or the ultimate cost of SNMP compliance may be so great that it results in an unnecessary shock to the Coachella Valley economy.

We look forward to discussing the proposal with you. Please call or email Andy Malone or Charles Duncan with any questions or needs for additional information.

Sincerely,

WEST YOST



Andy Malone, PG
Project Manager and Technical Supervisor

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amalone@westyost.com



Charles T. Duncan, PE
CEO, Principal-in-Charge

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01 // EXECUTIVE SUMMARY



Personnel. This section identifies each person that will be assigned to the project and describes their experience, qualifications, and applicable professional licenses held. We are dedicating our most experienced, senior staff to perform the scope of services—the same staff responsible for preparing the CV-SNMP Development Workplan. Andy Malone, PG was the lead author of the CV-SNMP Workplan. Andy will serve as the project manager, primary point of contact, and the lead technical supervisor for the project. Andy will be supported by several West Yost scientists and engineers with extensive experience in SNMP development and implementation. In addition, we have augmented our team with the foremost professionals in California in SNMP law and policy and stakeholder engagement and outreach. Tess Dunham will serve as the Regulatory & Policy Advisor. Tess will verify that the CV-SNMP satisfies the requirements of the Recycled Water Policy and is consistent with State law and policy, particularly with regard to the establishment of numeric Basin Plan objectives for TDS. Meagan Wylie will lead the stakeholder outreach and engagement efforts which include the public and across the various project committees.

Understanding of Project. This section describes our understanding of the project and our approach to project implementation. This is not a detailed description of the scope of services since that is described in the Workplan itself (the scope of services is listed in the Cost Proposal section of this proposal). Instead, this section describes: (1) the basis for our unparalleled understanding of the project; (2) the key principles and methods that we will employ to secure a successful outcome; and (3) the three distinct but related efforts/disciplines that are needed to develop a successful SNMP for the Coachella Valley—technical, policy/

regulatory, and stakeholder engagement/outreach. The primary objectives of the project are to:

- Provide the scientific justification for numeric TDS objectives for groundwater that will result in the long-term protection of the beneficial uses of the groundwater basin.
- Support the development of an SNMP that will maintain water quality in the basin pursuant to the numeric groundwater objectives, but at the same time, result in maximum beneficial use of the basin at the lowest possible cost.

References. This section provides several client references with project descriptions that demonstrate our excellent work in the development of robust SNMPs and leading multi-stakeholder groups through collaborative decision-making processes. We are confident that no other consultant can claim the same level of successful experience and client satisfaction as our team. The following information is included: project name, organization contact name, phone number, e-mail address, relevance to the CV-SNMP, and description of services. We encourage you to explore our project descriptions and contact our client references to confirm our claims of success and client satisfaction.

List of Representative Projects. This section includes a matrix that lists various representative projects that our team has successfully completed over the last five years versus the experience and skill sets required to implement the CV-SNMP Workplan. This chart demonstrates our exceptional qualifications to implement the CV-SNMP Workplan.

Disclosure of Claims/ Lawsuits. This section answers the disclosure questions included in the Request for Proposals (RFP).

Cost Proposal. This section includes a detailed, line-item cost proposal to execute the required Scope of Services described in Attachment 1 of the RFP. The cost table is broken down by task and subtask, and hence, outlines the specific steps that will be taken to execute the Scope of Services. For each task and subtask, the table describes the team members (and their staff classifications) that are expected to work on each task/subtask. The total cost estimate over the 5-year project period is approximately \$2,811,927.

Appendix A – Resumes. This section includes the full resumes for each team member that is listed in the Personnel section.

02 // PERSONNEL



West Yost

West Yost is a consulting engineering firm that was founded in 1990. Our focus is exclusively water, groundwater, wastewater, recycled water, and stormwater. We have broad experience in providing planning, design, construction management, and program management services in these areas.

West Yost is headquartered in Davis, California, and has over 200 staff members in 11 offices. The team we propose is primarily located and managed from our Lake Forest, CA office. Our staff includes certified or registered professionals in chemical, civil, control systems, electrical, environmental, and mechanical engineering; wastewater treatment and regulatory compliance; geology, engineering geology, and hydrogeology; architecture; GIS; control systems, cybersecurity, and risk management; asset management and condition assessment; project management; and construction management and inspection services.

Dedication to Client Service and Quality

West Yost is dedicated to providing exceptional client service and high-quality work products. Our success at meeting ongoing client needs is exemplified by our long-term relationships and repeat work. Our experience will allow us to serve as a valuable extension of your staff. West Yost will manage projects proactively and provide responsive service and timely work products.



OFFICE LOCATIONS

OREGON

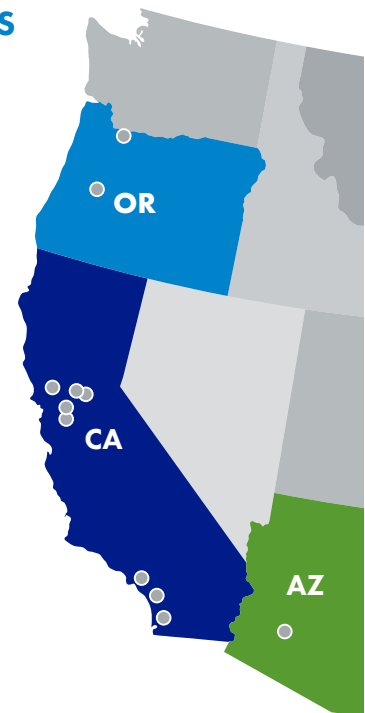
Eugene
Lake Oswego

CALIFORNIA

Concord
Davis (Corporate HQ)
Lake Forest
Oceanside
Pleasanton
Sacramento
San Diego
Santa Rosa

ARIZONA

Phoenix



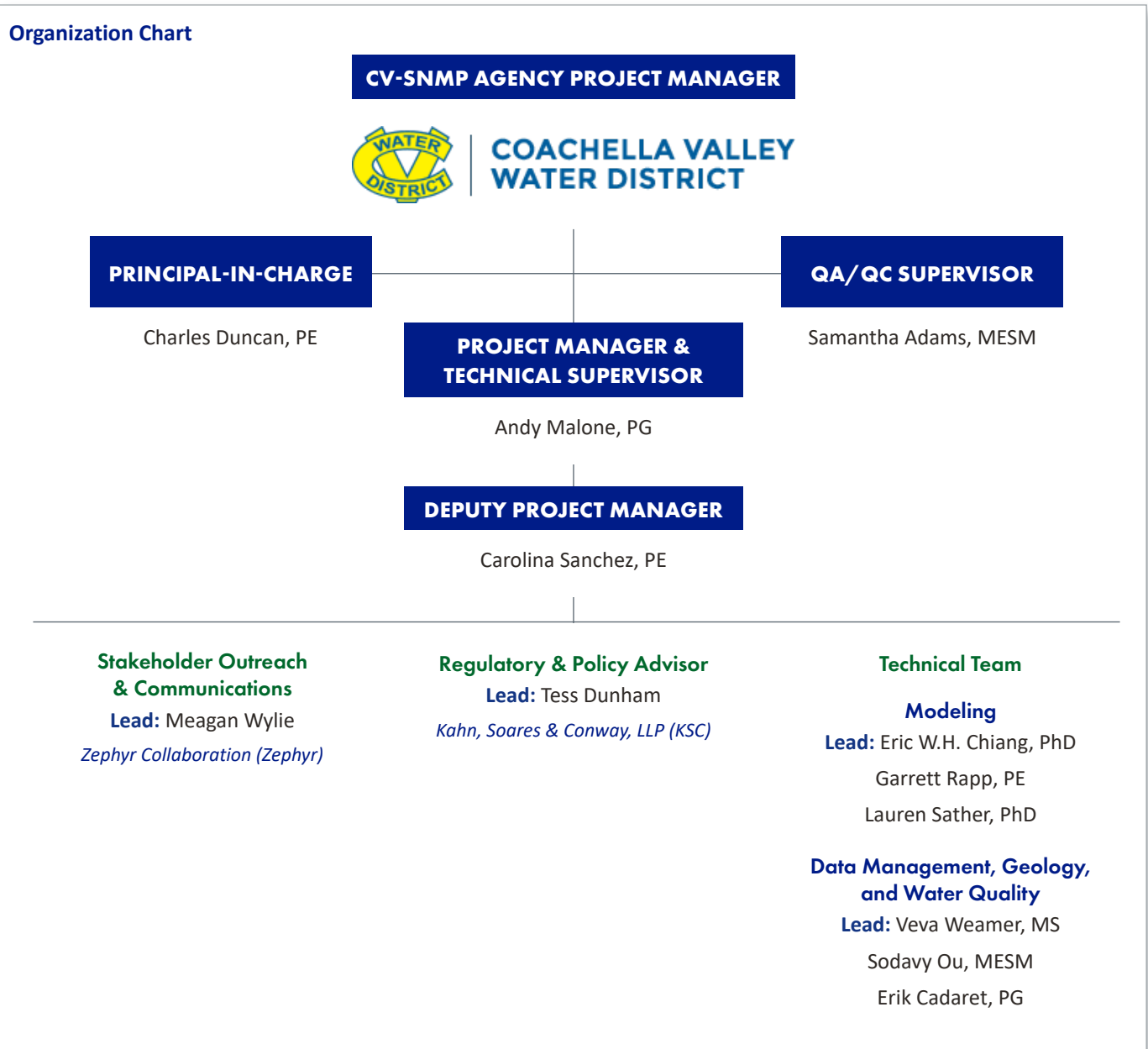
FAST FACTS

25 YEARS SERVING CLIENTS IN SOUTHERN CALIFORNIA	9 SALT NUTRIENT MANAGEMENT PLANS DEVELOPED	25+ GMZ'S WHERE TDS BASIN PLAN OBJECTIVES WERE DEFINED
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The West Yost Team

We have selected a team of highly skilled scientists, geologists, engineers, and policy and engagement experts to execute the Scope of Services described in the RFP. With our collective experience, you can be certain that our team will execute this important project in a technically proficient and time-efficient manner. Our key personnel assigned to the project have extensive experience with salt and nutrient management planning, regulatory compliance, the Basin Plan, water quality characterizations, the 2018 Recycled Water Policy, data collection and management, and groundwater and surface-water modeling.

Brief biographies of our team members are presented below. Detailed resumes with project experience are included as Appendix A. Complete project descriptions for projects of similar size and scope completed by members of this team are presented in Section 4: References.



Project Team

Management



Andy Malone, PG **PROJECT MANAGER AND** **TECHNICAL SUPERVISOR**

Andy will serve as the Project Manager and will oversee all aspects of the project team. He will serve as the CV-SNMP

Agencies' primary point of contact and provide effective communication and leadership throughout the contract period. Andy will engage the CV-SNMP Agencies' staff in the process and keep the contract on schedule and within budget. He will ultimately be responsible for the CV-SNMP Agencies' satisfaction with the quality of our team's work products, deliverables, and client service.

Andy is a Principal Geologist at West Yost with over 25 years of professional experience in water resources consulting and geologic sciences. His technical expertise includes basin characterization, hydrogeologic and hydrologic analyses, groundwater management planning, salt and nutrient management planning, development, and implementation of monitoring programs to support basin management and regulatory compliance, GIS, and database design and implementation. Andy was the lead geologist in the delineation of the current groundwater management zones (GMZs) within the Santa Ana River (SAR) watershed, and the recalculation of their TDS and nitrogen objectives, to support the 2004 Basin Plan amendment. Andy has extensive experience in leading Technical Advisory Committees - including to support land subsidence management in the Chino Basin and implementation of the Groundwater Management Plan in the Borrego Springs Subbasin. Recently, Andy was the project manager for the stakeholder process in the Coachella Valley to develop the CV-SNMP Workplan. Andy's abilities to communicate to clients and decision-makers in an accurate and understandable manner on the meaning of complex technical information are second to none.



Charles Duncan, PE **PRINCIPAL-IN-CHARGE**

Charles, as Principal-in-Charge, will oversee the project and allocate the staff time and company resources to keep this project on schedule and within budget.

Charles is President and CEO of West Yost. His experience is focused in water resources master planning of water and recycled water systems and in his career has overseen the successful execution of numerous multi-year planning

projects of the scale and importance of the CV-SNMP. Charles will be responsible for allocating the necessary resources to complete this project on time and within budget. He has 30 years of experience and specializes in model development, calibration, analysis of reservoir outage plans, and analysis of alternative demand and system configuration scenarios. Charles will be available for consultation or input on any aspect of the project and to ensure that the project and the project team meet the expectations of the CV-SNMP Agencies.



Samantha Adams, MESM **QA/QC SUPERVISOR**

Samantha will be responsible for reviewing all interim deliverables and final work products and ensure the project team delivers a final product that meets and exceeds the technical, regulatory, and outreach specifications laid out in the RFP.

Samantha has 15 years of professional experience in the water resources industry. Her technical expertise includes salt and nutrient management planning, regulatory compliance support and reporting, groundwater management planning, surface and groundwater quality analysis, development and implementation of field monitoring programs, and database management. Samantha has managed, developed, negotiated, and implemented salt and nutrient management compliance plans for the Elsinore Valley MWD, Eastern MWD, the Chino Basin Watermaster and Inland Empire Utilities Agency, the City of Beaumont, the South Orange County Wastewater Authority, and Coachella Valley Water District. Many of these efforts included leading multi-stakeholder groups through collaborative decision-making processes based on complex technical information.



Carolina Sanchez, PE **DEPUTY PROJECT MANAGER**

Carolina will serve as Deputy Project Manager leading the administrative side of the project management, organizing meetings, responsible for communicating

decisions, and working collaboratively with Andy, our subconsultants, and the CV-SNMP Agencies.

Carolina has nine years of professional experience in the water resources industry. Her skills include SNMP implementation, development of groundwater management plans, leading stakeholder groups, groundwater monitoring,

numerical analysis, water resources, and GIS. As a Senior Engineer, Carolina is involved in a variety of projects. Her tasks include: administration of a Watermaster Board operating pursuant to Court-ordered water rights adjudications, analysis of groundwater level and water quality data; data management; CASGEM compliance; developing charts and contour maps to characterize groundwater flow systems and associated water quality; conducting hydrologic and hydraulic analyses of groundwater recharge using imported, recycled, and storm waters; modeling groundwater production trends; creating tables, charts, and maps to analyze and characterize surface water discharge and associated water quality; and reconnaissance-level design of surface water management facilities.

Stakeholder Outreach & Communications



Meagan Wylie | Zephyr Collaboration **LEAD, STAKEHOLDER OUTREACH & COMMUNICATIONS**

Meagan will be responsible for leading stakeholder outreach and communication across the various project committees. She will develop a communication framework for achieving outreach goals, support development of all meeting agendas to achieve objectives, lead all Stakeholder Outreach and Public Engagement meetings, and attend other meetings, as appropriate.

Meagan, Project Facilitator, has worked in the field of collaborative policy for nearly 15 years. Her experience includes projects in the fields of water supply and management, land use and natural resource management, marine and coastal issues, climate adaptation planning, and environmental justice issues for disadvantaged communities. Her work involves coordinating jurisdictional issues and priorities, working with stakeholders of diverse backgrounds and cultures towards resolutions, and integrating complex scientific and technical information and community knowledge into consensus-building policy.

Meagan has conducted process design and provided facilitation of diverse stakeholders in multiple ground water basins in California to achieve collaborative planning outcomes for implementation of the Sustainable Groundwater Management Act (SGMA). This includes stakeholder outreach, assessment, strategic planning, communications and engagement planning, public engagement design and Tribal engagement.

In addition to working with Tribes through SGMA, she facilitates efforts of the Patsiata Cultural Resources Task Force in the Owens Valley, and has worked with numerous Tribes via her work with the Forest Service, marine protected area planning, and California Census 2020 engagement.

Regulatory & Policy



Tess Dunham | KSC **REGULATORY & POLICY ADVISOR**

Tess will be responsible for supporting the development of the SNMP to verify that it satisfies the requirements of the Recycled Water Policy and is consistent with State law and policy, particularly with regard to the establishment of numeric Basin Plan objectives for TDS. Tess will attend all technical advisory and stakeholder and public meetings and will be involved in the writing and/or review of all project deliverables.

Tess's practice has been laser-focused on California and federal water quality laws for more than 20 years, during which she has become known statewide for expertise on the Porter Cologne Water Quality Control Act, the Clean Water Act, and other related regulatory schemes. Tess works closely with agriculture, publicly owned treatment works, stormwater agencies, industry, and others on a variety of water quality issues. She appears regularly before the State Water Resources Control Board, and the state's regional water quality control boards on various and complex water quality issues. Tess' water quality law practice also carries over to the state and federal courts where she has represented clients at all levels.

For the last decade, Tess has represented the Central Valley Salinity Coalition (CVSC), and served as one of the chief architects of the Central Valley Salt and Nitrate Management Plan, which is designed to deal with the problem of salt and nitrate in Central Valley groundwater basins. Tess actively participates in the CV-SALTS Executive Committee along with the Central Valley Regional Water Quality Control Board, environmental justice advocates, state agencies, federal agencies, and others. Tess also provides regulatory and facilitation services to the Santa Ana Watershed Project Authority for several Task Forces, including the Basin Monitoring Task Force, which oversees implementation of the Santa Ana region's historic SNMP. Tess is also providing regulatory facilitation assistance to the Middle Santa Ana River's Bacteria TMDL Task Force and the Lake Elsinore/Canyon Lake Nutrient TMDL Task Force.

Technical Team

Modeling



Eric Chiang, PhD **MODELING LEAD**

Eric will be responsible for developing the appropriate methods for water quality forecasting and overseeing the construction and implementation of the

water quality analysis tools.

Eric has 33 years of professional experience in hydrogeologic engineering. His areas of expertise include hydrology, groundwater modeling, statistical analysis, numerical computer modeling, database management, and software development. Eric conducted the modeling for the Chino Basin SNMP. He is proficient in major programming languages, relational database design, and the development of client-server applications. Eric develops cutting-edge software tools to support the work of West Yost staff and clients. One of his most significant contributions is the development and deployment of HydroDaVESM, which enables professionals to remotely visualize and analyze groundwater, surface water, and climatic data, and model results that are stored on the HydroDaVESM Management Service Platform.



Garrett Rapp, PE **MODELING SUPPORT**

Garrett will be responsible for supporting all efforts related to modeling and model review and will also support the development of project deliverables.

Garrett has eight years of experience in the water resources industry. His technical expertise as a professional engineer includes water resources engineering and planning, surface and groundwater computer simulation modeling and software development, surface and groundwater hydrology and hydraulics, water resources planning, ground-level monitoring, water rights, regulatory compliance, surface water and groundwater quality analysis, assessment of municipal recycled water discharge impacts in receiving waters, and water supply and flood control facility design. Eric conducted surface water modeling to support the Middle San Juan SNMP.



Lauren Sather, PhD **MODELING SUPPORT**

Lauren will be responsible for supporting all efforts related to modeling and model review and will also support the development of project deliverables.

Lauren has three years of professional experience in the water resources industry. Her technical expertise includes surface and groundwater computer simulation modeling, water resources and water quality statistical analysis, GIS, and geospatial analysis. She is experienced in the evaluation of Storage and Recovery Programs, using modeling results to support decision-making under deep uncertainty, and developing data processing and analysis tools in python to analyze large amounts of measured environmental data. Lauren performs statistical analysis like the Mann-Kendall trend test to characterize historical trends and predict future trends in water quality, and estimates spatially distributed groundwater contaminant concentrations through kriging. She is proficient in major programming languages (Python, R, FORTRAN, MATLAB, Visual Basic) and major surface water and groundwater numerical models. Her passion is harnessing the power of computers to create automated modeling workflows that generate robust and reproducible results in an efficient manner. For her Doctorate, Lauren worked on an NSF funded numerical and experimental investigation into improving the efficacy of in-situ groundwater remediation.

Data Management, Water Quality, Geology



Veva Weamer, MS **WATER QUALITY LEAD AND DATA** **MANAGEMENT LEAD**

Veva will serve as the Lead for Data Management and Water Quality Analysis. In this role, she will be responsible

for coordinating the work of West Yost's scientists and geologists in implementing the data collection and analysis tasks.

Veva has 13 years of professional experience in water-resources consulting. Her technical expertise includes hydrologic and hydrogeologic data analysis, database management, water-quality analysis, implementation of SNMPs, GIS, and the development and implementation of groundwater and surface water monitoring programs. Veva has been a critical resource to the timely implementation of multiple of regulatory compliance programs, including watershed-wide assimilative capacity assessments for Basin Plan compliance in the Santa Ana River Watershed, the Chino Basin maximum-benefit SNMP, and the Prado Basin Habitat Sustainability Program. She is responsible for overseeing the collection and processing of massive and complex datasets for the Chino Basin Watermaster and the Main San Gabriel Water Quality Authority, each of which includes over one thousand groundwater and other types of monitoring sites with production, elevation, water quality, discharge, and other data.



Sodavy Ou, MESM **DATA ANALYST**

Sodavy will be responsible for data collection and supporting all data analysis. She will also support the development of project deliverables.

Sodavy is an environmental scientist with 5 years of experience in water resources industry. Her areas of expertise include implementation and management of field groundwater and surface water monitoring programs, analysis of water quality data, implementation of SNMPs, analysis of salt offset requirement and compliance, utilization of visual tools to analyze the interactions between surface water quality and groundwater quality, regulatory support and compliance reporting, and database management. As a project scientist and manager, Sodavy works with the regional and local governments to ensure that the science-based approach employed in technical reports prepared for her clients meet the strict criteria of the state and regional regulators. Sodavy is an advanced user of GIS, Grapher, and HydroDaVESM. She has worked

as a project manager and scientist on salt and nutrient management projects for the Chino Basin Watermaster, Elsinore Valley MWD, and Eastern MWD and Santa Ana Watershed Project Authority.



Erik Cadaret, PG **GEOLOGIST**

Erik will serve as the Project Geologist supporting the execution of all tasks to ensure all work appropriately addresses geologic considerations.

Erik's professional experience includes a mix of technical and project management roles related to environmental and water resources. His project management experience includes managing large regional and complex projects involving regional water quality evaluations, water resources planning and engineering, and the Sustainable Groundwater Management Act (SGMA). His technical experience includes construction management and oversight of monitoring wells, municipal supply wells, and injection wells; field management of groundwater and surface water monitoring programs; development of ambient water quality reports for Basin Plan compliance, SNMPs, GSPs, and watershed scale models using PRMS and GSFLOW; and performing water quality evaluations, aquifer testing, and groundwater basin analysis using GIS. He provides innovative solutions to clients and colleagues by leveraging knowledge of and accessibility to readily available technology. Outside of work, he sits on the Board of Directors as a Board Member of the Groundwater Resources Association (GRA) of California, where he regularly works with a wide variety of leaders in the water industry to engage GRA's membership to help achieve sustainable groundwater for all.

03 // UNDERSTANDING OF PROJECT



Project Understanding and Approach

Our understanding of the project and our proposed approach are based on:

1. Our extensive experience in successfully developing and implementing SNMPs in large watersheds and groundwater basins in California like the Coachella Valley Groundwater Basin.
2. Our collaborative and successful work with the CV-SNMP Agencies to develop the Regional-Board approved *Workplan to Develop the Coachella Valley Salt and Nutrient Management Plan*.
3. A thorough review of the RFP and its attachments.

Based on West Yost’s work to prepare the CV-SNMP Workplan, we have identified two critical success factors for completion of the project:

Establish Technically-Defensible, Policy-Based, Numeric Water Quality Objectives. Currently, the Basin Plan includes a nitrate-nitrogen objective of 10 mg/l for groundwater in the Coachella Valley-based on the primary drinking water maximum contaminant level; however, it lacks scientifically derived numeric TDS objectives that are protective of appropriate beneficial uses. The SNMP must establish scientifically-based numeric groundwater quality objectives for TDS that address the State Board Antidegradation Policy and meet the requirements of CA Water Code Sections 13241 and 13242. Absent a rigorous technical and policy process to establish TDS objectives, the Regional Board could establish objectives that are more conservative than necessary to protect beneficial uses, result in unreasonably conservative waste discharge limits, jeopardize the use of Colorado River for water supply and recharge, jeopardize the use recycled water for irrigation, and require costly and inefficient

water-supply plans that could adversely impact the local economy and regional/state-wide water-supply reliability.

Inclusive and Consistent Engagement and Outreach. The CV-SNMP Workplan is a complex, multi-year technical process designed to achieve consensus on an SNMP that addresses the key tenets of regulatory requirements for the protection of beneficial uses, maximum beneficial use of the groundwater basin, and a plan of implementation for complying with applicable water quality objectives. Given the technical and policy complexities and anticipated long time frame to complete the CV-SNMP, it will be important to establish multiple modes and methods of engagement and outreach that can be adapted over time to keep stakeholders invested and motivated to participate and contribute feedback to the process. The CV-SNMP must be developed through engagement with multiple decision-making or advisory/outreach groups.

Key Principles and Methods

The West Yost Team is comprised of experienced technical, policy, and engagement experts that have a track record of demonstrated success in developing complex management plans over multi-year periods in open and transparent processes that seek to address the needs of project proponents, stakeholders, and the State and Regional Water Boards. Invariably, our collective successes have depended on a common set of key principles and methods, which we propose to employ in this effort to achieve similar success.

These key principles and methods include:

Establishing a common understanding of foundational principles. The objective here is to develop a well-informed group of decision-makers and stakeholders, including the Regional Board staff, with common understandings of base

information and the objectives of the effort to prepare the CV-SNMP. This approach typically requires more up-front work but minimizes conflict at the conclusion of the project and advances approval of the SNMP and any Basin Plan amendments. Common understanding must be obtained on:

- The regulatory framework, which includes State policy and law regarding the management and regulation of salts and nutrients and the establishment of Basin Plan water quality objectives.
- The hydrogeology, hydrology, and water quality of the Coachella Valley Groundwater Basin and its sub-basins.
- The new CV-SNMP approach to address the specific challenges the Regional Board identified in the 2015 SNMP that was not approved.
- The goals and objectives for a successful CV-SNMP. For example, how will the CV-SNMP address protection of beneficial uses, maximum beneficial use of the groundwater basin, and compliance with water quality objectives in a manner that is consistent with the water resources management plans of the SNMP stakeholders, supports the achievement of sustainability under SGMA, and provides for cost efficiency?

This approach to establishing common understandings of foundational principles has been effective for the West Yost team, not only in the development of SNMPS, but also in many other groundwater management, planning, and regulatory compliance efforts. A prime example of past West Yost success with this approach was the development of the Chino Basin Optimum Basin Management Plan where the regulatory framework, the stakeholder-derived goals for the management plan, and the physical description of the groundwater basin (including its water quality) were described in early draft chapters. Similarly, the CV-SNMP Workplan was designed to ensure the early tasks thoroughly characterize the existing physical system, including current salt and nutrient loading mechanisms and water-quality conditions.

Our outreach and engagement efforts for this project will establish common understandings by educating all stakeholders, considering and thoughtfully responding to all stakeholder input, demonstrating alignment of the goals and objectives across interest groups, and presenting a clear understanding of the intended outcomes, costs, and responsibilities for implementing the CV-SNMP when it is complete.

Collaboration and Transparency. The objective here is to develop trust within an equally-informed stakeholder group: trust in the data through transparent sharing of the basic data and information; trust that the consultant is

performing the work fairly and correctly; and trust between the CV-SNMP stakeholders that all voices are being heard and considered. Again, this approach typically requires more work but minimizes conflict at the conclusion of the project and advances approval of the CV-SNMP in a more expeditious manner.

We are proposing to form and lead several stakeholder groups. The roles of these groups will vary depending on stakeholder type. These stakeholder groups will include:

- **Steering Committee (SC):** The SC will initially be comprised of the eight CV-SNMP Agencies charged with funding the implementation of the CV-SNMP Workplan and will drive the CV-SNMP to completion. The SC is comprised of agencies with diverse interests and priorities, and therefore, collaboration and consensus among them is a critical success factor.
- **CV-SNMP Technical Advisory Committee (TAC):** The TAC is responsible for providing critical review and feedback on the technical work performed by the West Yost team. The TAC will be designed to include representatives/technical consultants of the CV-SNMP Agencies, at least one neutral technical expert, and Regional Board staff.
- **CV-SNMP Stakeholder Group (SG):** The stakeholders will provide initial input for the CV-SNMP development process, will be kept informed of development progress, will be provided opportunities to offer informed feedback to TAC, and can submit comments on draft deliverables. The SG will comprise representatives from the golf course industry, agriculture, the Coachella Valley Regional Water Management Group, the Groundwater Sustainability Agencies in the Coachella Valley, industrial dischargers, county and city land use planning agencies, federal and state agencies, the Colorado River Basin Salinity Control Forum; Metropolitan Water District of Southern California; non-governmental organizations (NGOs), and/or other disadvantaged community representatives and interested parties. The CV-SNMP Agencies and Regional Board staff will be invited to attend SG meetings and will sometimes be asked to participate and present information.
- **Tribal Outreach:** The CV-SNMP Agencies and Regional Board have identified that targeted outreach to the local Native American tribes in the Coachella Valley is critical to the development of the CV-SNMP. Thus, we will conduct additional targeted outreach to Tribes beyond the SG throughout the development of the CV-SNMP.
- **Public Outreach:** Public outreach will also be a critical component to developing a successful CV-SNMP. Communication and involvement with the public is important to enhance understanding and inform the

public about the CV-SNMP. Public workshops will be held at the beginning of the project to invite public participation in the SG, and at key project milestones following SG meetings. In addition, all meetings of the SG and TAC will include opportunities for public comment and input. A final public workshop will be held at the end of the project to review the draft CV-SNMP and to solicit public feedback and comments. A public-facing website will be continually updated to inform the public of progress and upcoming SG and TAC meetings.

Other methods that will be employed to build trust within the various decision-making and interests groups include:

- Storing the basic data that will be used to develop the CV-SNMP within an online database (HydroDaVESM) and allowing stakeholders access to view or download the data via a web-enabled interface (HDX). HydroDaVESM is a cloud-based relational database that stores hydrogeologic, hydrologic, water quality, and GIS data. HDX is a password-protected, Windows application that allows database access through an online, map-based interface for data viewing, download, analysis, and reporting. Stakeholders can be offered HDX access within limits defined by the SC.
- Communicating complex topics in understandable terms with explanatory maps, data graphics, presentations, and HDX. West Yost is known for this expert ability.
- Soliciting comments and suggestions for all deliverables and responding completely to all comments and suggestions.
- Establishing a website and an FTP site for storage and dissemination of all meeting materials, draft and final deliverables, references, and other relevant information.

Consensus on technical methods prior to performing technical work and producing regulatory compliance criteria. The objective here is to infuse the process with integrity, creativity, and certainty as to the cost of implementation. This requires:

- Experienced consultants that are well-versed in SNMP policy and well-equipped with creative ideas and the ability to build a sound technical basis for non-traditional approaches to SNMP development.
- A diverse group of stakeholders that are willing to explore alternative methods to achieve the project goal, including the pros and cons of each method, before testing methods and seeing potential results.

Successful completion of the CV-SNMP requires certainty that the technical methods proposed in the CV-SNMP Workplan will be acceptable to the Regional Board, and as

applicable, the State Board. This was a primary objective of developing the CV-SNMP Workplan upfront and obtaining Regional Board approval. However, the implementation of the CV-SNMP Workplan must also include opportunities for the Regional Board, TAC, and other stakeholders to review and comment on interim work products and suggest modifications to the methods if appropriate and consistent with State law and Policy. This process will further the education of all stakeholders, enhance the integrity of the process, and promote acceptance of the analysis results.

West Yost successfully utilized this method in the development of the updated SNMP for the Santa Ana Region which resulted in the 2004 Basin Plan amendment without a dissenting opinion or vote.

Project Approach

Our approach to this project will faithfully comport with the scope of services described in Attachment A of the RFP and the CV-SNMP Workplan, and includes the following three main tasks:

- **Task 1:** Project Administration
- **Task 2:** Kickoff and Progress Reviews and Meetings
- **Task 3:** Implement Approved Development Workplan

The tasks, subtasks, level of effort, and costs to execute the scope of services are listed in the Cost Proposal section of this proposal. Because the RFP and the CV-SNMP Workplan describe the scope of services in detail, we do not restate the scope of services here. Instead, we describe below three distinct but related efforts/disciplines that are needed to develop a successful CV-SNMP: Technical, Policy/Regulatory, and Stakeholder Engagement/Outreach. A key expert on our team is assigned to lead each discipline to ensure that all critical success factors of the project are thoroughly addressed.

The primary objectives of the technical work are to:

- Provide the scientific justification for numeric TDS objectives for groundwater that will result in the long-term protection of the beneficial uses of the groundwater basin.
- Support the development of a management plan that will maintain water quality in the basin pursuant to the numeric groundwater objectives and will result in maximum beneficial use of the basin at the lowest possible cost.

The technical scope of services will be executed under the guidance and advice of the TAC. The technical work will build upon itself in a logical sequence, which will progressively educate all stakeholders and can inform

subsequent tasks in the scope of services. Each step in the scope-of-work typically includes a technical memorandum to describe the results, which will undergo review and comment by the TAC and, in some cases, the Stakeholder Group.

The technical work starts with the characterization of salt loading (Workplan Task 4.3) and the history of groundwater quality in the basin to current conditions (Task 4.4). This characterization will be used in Task 4.5 to delineate draft “Management Zones” within the groundwater basin and to define computational “metrics” to characterize “ambient” N/TDS concentrations in groundwater and the protection of beneficial uses.

The technical work then proceeds to constructing, verifying, and using forecasting tools to estimate future N/TDS concentrations in the groundwater basin (Tasks 4.6 and 4.7). It is envisioned that the forecasting tools will be constructed atop the existing MODFLOW models that are being used to evaluate groundwater sustainability pursuant to the SGMA. The forecasting tools will first be used to simulate a “baseline” scenario that represents the current water management plans in the basin. The “baseline” results will be evaluated to determine if and when “salt management strategies” are needed to protect beneficial uses in the basin. Based on this evaluation, the “salt management strategies” are described as model scenarios and evaluated with the forecasting tools for their effectiveness in protecting beneficial uses (Task 4.8).

The technical work then proceeds to prepare engineering cost analyses of the “baseline” scenario and the scenarios that include “salt management strategies” to characterize and evaluate economic considerations (Task 4.9). Economic feasibility will be defined and will consider the sources of revenue and the factors that could restrict the sources of revenue.

At this point, the technical work is evaluated in its entirety to choose a “preferred” scenario for the CV-SNMP that complies with State law and policy and achieves maximum beneficial use of groundwater basin at the lowest possible cost (Task 4.10).

In summary, the technical work will answer the following questions:

- What are logical management areas within the Basin (management zones) and the beneficial uses of groundwater within the management zones?
- What is current groundwater quality? And, is current groundwater quality protective of beneficial uses?

- How is groundwater quality expected to change in the future, both across the basin and within the depth-specific aquifer systems?
- Will these changes in groundwater quality impact beneficial uses? If so, where, and when?
- What are economically and technically feasible salt management strategies, that when implemented, will achieve the objectives of both the CV-SNMP stakeholders and the Regional Board?

Andy Malone, PG, will lead and supervise the technical work to implement the CV-SNMP Workplan. He will be supported by several West Yost scientists and engineers with extensive experience in SNMP development and implementation.

POLICY/REGULATORY APPROACH

The primary objectives of the policy/regulatory work are to:

- Work closely with stakeholders, including Regional Board staff, to ensure that the CV-SNMP meets the intent and purposes of the Recycled Water Policy and is acceptable to the Regional Board.
- Ensure that the CV-SNMP and necessary supporting documentation comply with applicable State law and policy, including the Water Code, the State Antidegradation Policy, and the California Environmental Quality Act.
- Work closely with stakeholders and Regional Board and State Water Board staff so that there will be agreement and support for any Basin Plan amendments that may accompany or follow Regional Board approval of the CV-SNMP.

The West Yost Team has extensive experience and success in developing and implementing SNMPS and associated Basin Plan amendments in large watersheds and groundwater basins in California. The Team’s success is largely based on its in-depth understanding of California law and policy, and the State’s administrative processes. Importantly, this includes not just understanding the elements of a SNMP and Basin Plan amendments but truly understanding the scope of Regional Board authority and how an SNMP and Basin Plan amendment may impact beneficial uses and authorize discharges to waters of the State.

The policy/regulatory approach is incorporated into all aspects of the scope of work because it is instrumental to the overall success of the program. It is imperative that all committees and committee members have a clear understanding of applicable law and policy, and the constraints on Regional Board authority as it pertains to

SNMPs and Basin Plan amendments. Understanding the law, policy and Regional Board authority informs the scope of the technical work and the alternative approaches that may be considered.

The policy/regulatory approach will make sure that all relevant and necessary information is developed for the Regional Board to consider the adoption of numeric TDS objectives. Specifically, when the Regional Board adopts numeric TDS objectives, it must do so in a manner that reasonably protects the beneficial uses of that water and prevents nuisance. Also, the Regional Board must consider several factors at the time of adoption, including what is reasonable to achieve, economic considerations, and most notably, the need to develop and use recycled water. Further, when a TDS objective is adopted, a program of implementation must also be adopted that includes a time schedule for actions to be taken as well as a description of actions. Besides explaining the statutory requirements, the policy/regulatory approach will highlight and bring forward State Water Board guidance and precedential orders that assist in determining how to properly apply Water Code sections 13241 and 13242.

Similarly, the policy/regulatory approach will highlight the State Antidegradation Policy and applicable guidance and precedential decisions that better describe how to satisfy the policy when adopting TDS objectives. This includes the need to consider what constitutes Best Practicable Treatment or Control if high-quality waters will be degraded by Regional Board actions.

The policy/regulatory approach will ensure that compliance with the law and policy is considered in each task and step of the process. In addition to considering the law and policy, it is important to understand the goals and objectives of Regional Board staff and Regional Board members. In general, the Regional Board maintains substantial discretion in how it intends to set and implement water quality policy. Thus, it is imperative to understand the goals and objectives of the Regional Board in establishing the CV-SNMP and implementing Basin Plan amendments.

Because the Regional Board itself must ultimately accept the CV-SNMP and adopt any Basin Plan amendments, the policy/regulatory approach includes working with Regional Board staff to schedule workshops before the Regional Board at critical junctures along the way to obtain Regional Board input. This helps to ensure that the products developed in this effort reflect the goals and objectives of the Regional Board.

Tess Dunham of KSC will serve as the Policy/Regulatory lead. Tess contributed to the successful completion of the Central Valley SNMP and subsequent Basin Plan Amendments by working closely with over 30 stakeholders to address differing viewpoints and to find a mutually agreeable path forward. This meant listening carefully to all stakeholder viewpoints and concerns to propose creative alternatives that still complied with applicable State law and policy.

STAKEHOLDER ENGAGEMENT AND OUTREACH APPROACH

The primary objectives of stakeholder engagement and outreach are to:

- Understand the needs, interests, and concerns of all stakeholders.
- Educate and inform the stakeholders through the process to develop the CV-SNMP.
- Understand the ability/authority of the stakeholders to implement best management practices for salt and nutrient management.
- Provide a mechanism to receive input on draft CV-SNMP deliverables.
- Garner public participation.
- Identify potential cost-sharing partners in CV-SNMP implementation.

Our team will work with the SC to plan and facilitate meetings of the TAC and SG, engage and collaborate with the tribes in the Coachella Valley, and develop customized engagement of key communities and the public. Major stakeholder outreach and engagement activities will include:

- Working with the SC to develop an “Engagement and Project Communication Framework.” The Framework will describe the goals and objectives for stakeholder engagement, stakeholder roles and responsibilities, and the process for stakeholder outreach and engagement including key outreach activities, milestones, deliverables, and timeline. The Framework will likely evolve through the development of the CV-SNMP.
- Identifying individual or small groups of stakeholders and tribal points of contact, and design/conduct early engagement interviews to gain insight and input on the development of an inclusive and accessible public process and tribal engagement process.
- Generating stakeholder contact lists along with storage and privacy management protocols.

- Identifying and implementing online engagement and traditional tools and strategies to elicit stakeholder and public input.
- Preparing for, publicizing, hosting, facilitating, and summarizing all TAC and SG meetings and public workshops. Meeting objectives and agendas will be thoughtfully developed with input from the SC.
- Preparing meeting summaries that synthesize stakeholder input, comments, recommendations, and questions. Summary documents will be used for tracking evolution of discussions and deliverables development, capturing public input, and can be shared on the public-facing website.
- Communicating frequently with key stakeholders, tribes, advisors, and interested individuals and groups by phone, video conference or in-person when possible.

We intend to implement best practices to provide meaningful and effective public engagement, including:

- Maximizing participation of all stakeholders while supporting the unique role of the CV-SNMP Agencies through the SC.
- Being responsive to the values, needs, and preferences of different communities. We will ask early and often on how and where to engage and communicate. Wherever possible, we will seek guidance from respected community leaders.
- Recognizing that much of the most valuable engagement work is done before and between meetings and workshops.
- Recognizing that conflict and complexity are present in all difficult public policy questions. With safe and respectful engagement, tension can inspire breakthroughs which make possible durable relationships and solutions.

Meagan Wylie of Zephyr Collaboration will lead and supervise stakeholder outreach and engagement. Meagan has over 15 years of experience in leading stakeholders of diverse backgrounds and cultures towards resolutions by integrating complex scientific and technical information and community knowledge into consensus-building policy. She has successfully served as an outreach and engagement facilitator in the development of several Groundwater Sustainability Plans, including the critically overdrafted Borrego Springs Subbasin.

04 // REFERENCES



Workplan to Develop the Coachella Valley Salt and Nutrient Management Plan

COACHELLA VALLEY WATER DISTRICT

Relevance:

Demonstrates West Yost’s experience with the Coachella Valley hydrology, hydrogeology, water resources, regulatory compliance challenges, and ability to collaborate with the Regional Board staff in a manner that meets the objectives of the CV-SNMP and the Recycled Water Policy.

The Coachella Valley Groundwater Basin (Basin) is a large alluvial groundwater basin located in southern California within the northwest portion of the Salton Sea Watershed. While groundwater is a major source of water supply to the region, imported water from the Colorado River, which is typically higher in salt concentration than the native groundwater, is a critical supplemental water supply that is extremely important to the economy of the Coachella Valley. It is used for outdoor irrigation and groundwater recharge and is necessary for the sustainable management of the Basin.

The State Water Board’s Recycled Water Policy requires the stakeholders in the Coachella Valley to develop an SNMP to sustainably manage salt and nutrient loading in the Basin to protect its beneficial uses. In 2015, several Coachella Valley stakeholders (CV-SNMP Agencies) submitted an SNMP to the Regional Board (2015 SNMP). However, the Regional Board found the 2015 SNMP insufficient for the following reasons: insufficiency of the proposed monitoring program to fill data gaps and adequately characterize the spatial and vertical distribution of water quality conditions; lack of an antidegradation analysis to support salt and nutrient loading from the use and recharge of Colorado River water; and the absence of proposed implementation measures to manage salt and nutrient loading on a sustainable basis.

Subsequently, the CV-SNMP Agencies committed to update the 2015 SNMP in an effort to comply with the Recycled Water Policy, and at the same time, allow the use of Colorado River water (and recycled water) without spending \$100s of millions to attain water quality objectives that do not have a nexus to protecting beneficial uses of the groundwater. In 2020/21, the CV-SNMP Agencies hired West Yost to lead a multi-stakeholder effort, including the Regional Board staff, in the development of a Workplan to update the 2015 SNMP (CV-SNMP Workplan). The CV-SNMP Workplan included:

Updated SNMP Groundwater Monitoring Program. The updated monitoring program was designed to determine whether the concentrations of salts and nutrients in groundwater are consistent with water quality objectives and are thereby protective of

REFERENCE

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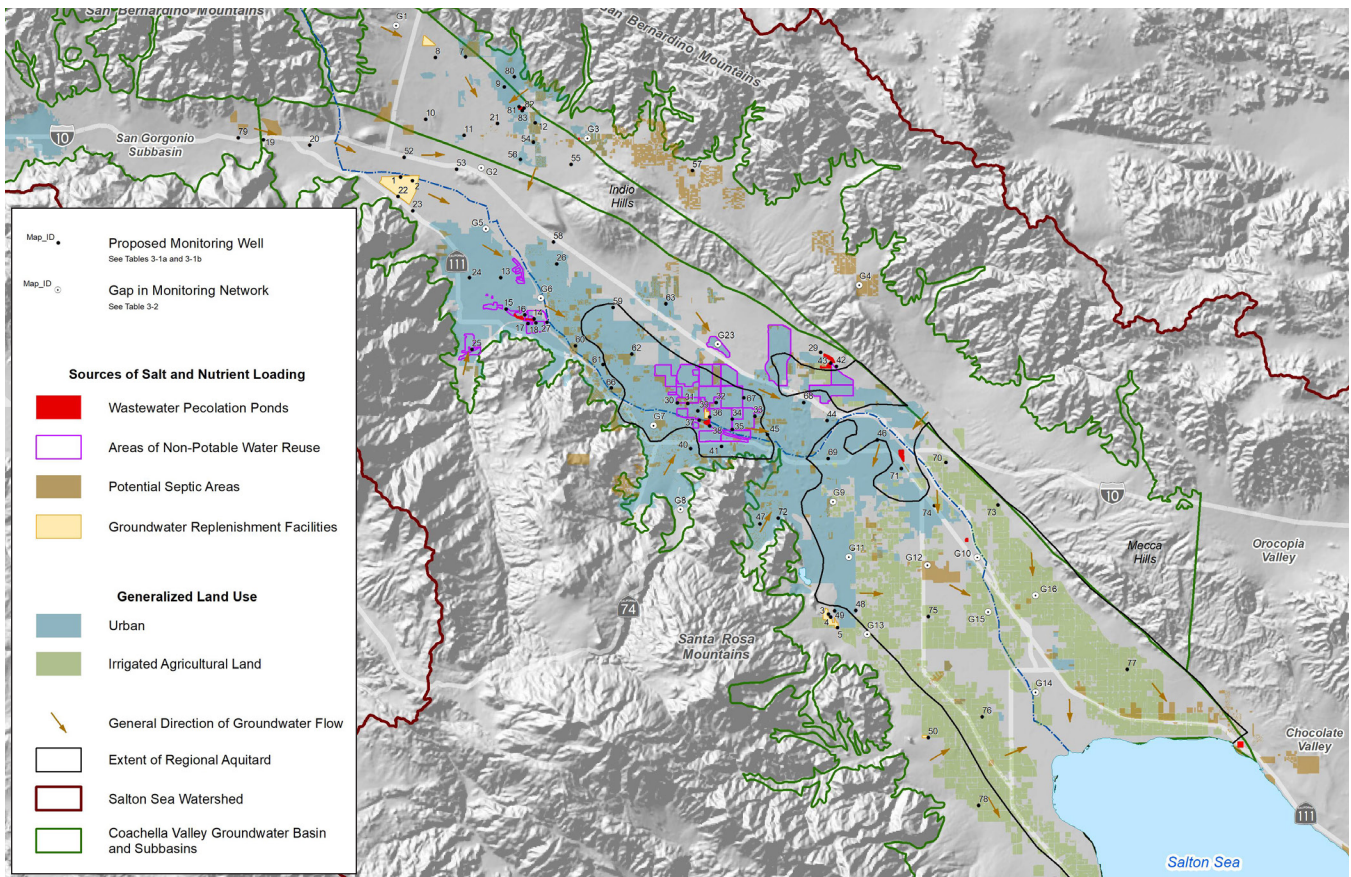
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- Eric Chiang
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PROJECT DATES

2020 - 2021



This map illustrates the SNMP monitoring network in the Coachella Valley Groundwater Basin for the shallow aquifer system. The monitoring network is shown relative to all major sources of salt and nutrient loading, including the overlying land uses that are sources of irrigation return flows and the groundwater replenishment facilities where Colorado River water is artificially recharged.

beneficial uses. The monitoring network was designed to cover all subbasins and subareas within the Basin; to monitor all three major aquifer systems: Deep, Shallow, and Perched; to monitor the influence of known sources of salt or nutrient loading on groundwater quality within the Basin; and to monitor the fate and transports of salts and nutrients along all major groundwater-flow systems, from areas of recharge to areas of discharge, and within and between the groundwater subbasins.

To be cost efficient, active municipal production or monitoring wells were preferentially selected if they currently participate in similar monitoring programs. Chemical analytes, sampling frequency, and reporting protocols were described. The monitoring program identified critical gaps in the monitoring network and included a plan and timeline to fill the gaps. It also identified the stakeholders responsible for conducting, compiling, and reporting the monitoring data.

The Regional Board approved the groundwater monitoring program in February 2021.

Technical Process to Set Numeric TDS Objectives. The current Basin Plan in the Colorado River region does not define numeric objectives for TDS in groundwater. Through

discussions and advice from West Yost, the CV-SNMP Agencies and the Regional Board concluded that numeric TDS are necessary for an SNMP that complies with the Recycled Water Policy and resolves the concerns of the Regional Board with the 2015 SNMP. Numeric objectives are necessary to demonstrate that beneficial uses will remain protected; to quantify the magnitude of available assimilative capacity for salt and nutrient loading; to provide a technical basis for the Regional Board to allocate the use of assimilative capacity; and to set triggers for implementation measures at appropriate locations and times.

The CV-SNMP Workplan described a detailed scope of work, cost estimate, and timeline to set TDS objectives by addressing all factors in California Water Code section 13241 to ensure that the Basin is put to maximum beneficial use while also protecting water quality pursuant to State law and its Antidegradation Policy (State Board Resolution 68-16).

The Regional Board approved the CV-SNMP Workplan in October 2021.



Nitrogen/Total Dissolved Solids (N/TDS) Studies for the Santa Ana Watershed

BASIN MONITORING PROGRAM TASK FORCE (BMPTF) AND SANTA ANA WATERSHED PROJECT AUTHORITY (SAWPA)

Relevance:

Demonstrates the West Yost Team’s capabilities to collaborate with a multi-stakeholder work group that includes Regional Board staff to implement projects and programs for compliance with the Basin Plan water quality objectives for surface water and groundwater. West Yost has served the Basin Monitoring Program Task Force (BMPTF) since 1995 and is currently working to support their planning efforts to update the Basin Plan SNMP to comply with the 2018 Recycled Water Policy. West Yost collaborates and coordinates regularly with Tess Dunham, who is separately contracted as the regulatory and policy advisor to the BMPTF.

The Porter-Cologne Water Quality Control Act and the Federal Clean Water Act both mandate the periodic review of water quality control plans. During the consideration of the adoption of the updated Basin Plan for the Santa Ana Basin in 1995, watershed stakeholders questioned the validity of the groundwater quality objectives for N/TDS and the Regional Board’s N/TDS management plan that implemented those objectives. A principal underlying concern was that an updated Basin Plan would result in inappropriate constraints on wastewater recycling opportunities. The reuse of recycled water was a critical component of many agencies’ plans to meet the rapidly increasing water demands in the region.

In response, the N/TDS Task Force was formed in 1995-96 to conduct studies regarding the N/TDS objectives and other components of the N/TDS management plan. In 2004, the Task Force was re-named to the Basin Monitoring Program Task Force (BMPTF). The BMPTF comprised 22 water supply and wastewater agencies throughout the region. The Task Force effort was coordinated by the Santa Ana Watershed Project Authority. Regional Board staff members were active participants in the BMPTF efforts.

West Yost, in conjunction with Risk Sciences, developed a workplan and stakeholder process to address all of the N/TDS related issues in the Basin Plan. West Yost developed and implemented methodologies (i) to redefine the sub-basin boundaries into GMZs based on the most recent hydrologic and hydrogeologic data; (ii) to redefine the N/TDS concentration objectives for the new GMZs based on groundwater data over the 20-year historical period of 1954-1973; (iii) to determine the current ambient N/TDS concentrations for the new GMZs over the then-current 20-year period of 1978-1997, as well as the existence and magnitude of assimilative capacity in each GMZ; (iv) to develop regulatory nitrogen-loss coefficients for various surface water environments; and (v) to develop a new wasteload allocation (WLA) for publicly owned treatment works (POTW) dischargers to comply with the N/TDS objectives.

REFERENCE

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- Garrett Rapp
- Tess Dunham (separately advised client on this project)

PROJECT DATES

1995 - Present

West Yost worked with certain water and wastewater agencies to replace the proposed new N/TDS objectives with numerically higher objectives that were protective of beneficial uses. These higher objectives are called “maximum benefit” water quality objectives and were developed based on criteria specified in California Water Code Section 13241 and the requirements of the State’s Antidegradation Policy (State Water Board Resolution No. 68-16), which required a demonstration that the change in the objective would be “[...] consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.” These maximum benefit showings have allowed for more efficient and pragmatic water supply planning and salt and nutrient management. Maximum benefit objectives were developed for the following management zones: Chino-North, Cucamonga, Beaumont, San Timoteo, Yucaipa, and, later, the San Jacinto Upper-Pressure.

Wasteload Allocation

As part of the original N/TDS studies, West Yost also developed a new methodology to evaluate the current WLA in the 1995 Basin Plan. A new WLA for POTW dischargers would be needed if the 1995 WLA was found to be non-protective of beneficial uses.

West Yost developed the Wasteload Allocation Model (WLAM)—a numerical surface water model that simulated discharge from precipitation and non-tributary sources, streambed infiltration and evaporation, and associated water quality—and a set of elegant statistical-based procedures to evaluate the 1995 WLA. The study area was the Santa Ana Watershed tributary to Prado Reservoir. The following reaches were included: SAR reaches 3 through 5, San Timoteo Creek reaches 1 through 4, and Temescal Wash from Lake Elsinore to Prado Reservoir. The GMZs that could be influenced by the WLA were: Beaumont, San Timoteo, Bunker Hill-B, Colton, Riverside-A, Chino-South, and Orange County.

The main input data for the WLAM included: N/TDS concentrations for current and future levels of POTW discharges, land use and water management practices (present and select future planning years), and long daily precipitation and evaporation time series.

The WLAM then simulated the discharge and quality (TDS and total inorganic nitrogen [TIN]) of the SAR and its tributaries on a daily time-step as waters commingle from POTW discharges, rainfall/runoff, and rising groundwater. The WLAM also simulated the volume and quality of streambed recharge of the SAR and its tributaries to the underlying GMZs and the fraction of the recharge of wastewater origin. Nitrogen losses

were simulated in surface water as a travel-time-dependent, first-order decay function, and in streambed recharge by applying the reach-specific nitrogen-loss coefficients. The daily WLAM results were computed from the long period historical precipitation record and were post-processed to develop volume-weighted TDS and TIN concentration statistics for surface-water discharge and streambed recharge to the GMZs. These statistics were then compared to the relevant surface and groundwater quality objectives (and to current ambient quality and the availability of assimilative capacity in GMZs) to update the WLA.

2004 Basin Plan Amendment

The findings and recommendations of West Yost’s work were presented to the Regional Board and the Task Force at numerous meetings and public workshops during the course of the studies. These studies were guided by current law, policy, and regulations, and they considered the economic implications of all recommended changes to the N/TDS management plan.

The results of West Yost’s work were included in the 2004 Basin Plan amendment with the support of all stakeholders—there were no dissenting comments or opinions. The Basin Plan amendment assures the reasonable protection of the beneficial uses of surface and ground waters within the Santa Ana Basin and is consistent with the State’s Antidegradation Policy. The approach taken by the Task Force was cited in a Little Hoover Commission report in 2009: “The boards should emulate the model created by the Santa Ana Regional Water Quality Control Board, which created a stakeholder task force that led to robust research, consensus building and a largely re-written basin plan in 2004.”

Recomputation of Ambient Water Quality (AWQ)

From 2004-2012, West Yost contracted with the BMPTF to perform the recomputation of AWQ four (4) times for the following 20-year periods: 1984-2003, 1987-2006, 1990-2009, and 1993-2012. West Yost was selected by the Task Force to perform the recomputations based largely on the quality of our work, our experience in working with the stakeholders in the watershed, and our deep understanding of technical and policy components of salinity management in the SAR watershed.

The determination of current AWQ was accomplished using the same methodology that was employed by the N/TDS Task Force (20-year running averages) to develop the N/TDS concentration objectives in the 2004 Basin Plan amendment. At the request of the Task Force, Interpretive Tools were developed by West Yost during the 1990-2009 effort to better understand how and why AWQ is changing across the GMZs

and to identify ways to improve the monitoring program. These tools include maps that depict the change in water quality over time and time-series charts of N/TDS concentrations at key wells. The Interpretive Tools were modified and improved by West Yost during the 1993-2012 effort.

Support for Basin Planning Priorities

West Yost and Tess Dunham of KSC are currently contracted (separately) with the BMPTF to support the development, prioritization, and implementation of planning priorities to address salinity management in the watershed, including:

- Assessing the Basin Plan SNMP for compliance with the 2018 Recycled Water Policy
- Updating the Basin Plan SNMP surface water and groundwater monitoring programs
- Preparing recommendations for updated methods to assess assimilative capacity through periodic computation of ambient water quality
- Supporting Basin Plan amendments to the SNMP

This maps shows the groundwater management zones (GMZs) that were adopted in the 2004 Basin Plan amendment for the Santa Ana Region. We defined the GMZs based on the current understanding of sub-basin geohydrology, which has assisted efforts in salt/nutrient regulation and water-supply planning.





Update of the Salt and Nutrient Management Plan for the Chino Basin

CHINO BASIN WATERMASTER AND INLAND EMPIRE UTILITIES AGENCY

Relevance:

Demonstrates West Yost’s capabilities in the development and implementation of SNMPs that included alternative, science-based TDS objectives and the detailed and meticulous characterization of water quality and the fate and transport of salt and nutrients on a basin-scale.

From 2002 - 2003, West Yost led the development of an SNMP for the Chino Basin. The water quality constituents of concern in the SNMP were total dissolved solids (TDS) and nitrate. The SNMP was subsequently incorporated into the Basin Plan in 2004. The key elements of the Chino Basin SNMP—developed by West Yost, the Chino Basin stakeholders (including numerous agriculture pumpers) and Regional Board staff—included:

- A detailed articulation of the stakeholders’ plans for water-supply and water quality-management activities, including irrigated agriculture and dairies. West Yost collected and compiled these plans to estimate TDS and nitrate discharges to groundwater, and later, used models to demonstrate whether the implementation of these plans would impair beneficial uses.
- Collaboration with the Regional Board to determine appropriate TDS and nitrate objectives, which was based on the model projections and demonstrations that raising the TDS and nitrate objectives would protect beneficial uses and provide maximum benefit to the people of California.
- Commitments to implement a series of management actions to ensure the protection of beneficial uses of groundwater in the Chino Basin. The commitments included (among other things): implementing monitoring programs; constructing recharge basins to increase the recharge of recycled, storm and imported waters; constructing groundwater desalters; and the implementing a recycled water quality improvement program when recycled water concentrations exceed a specific trigger concentration.

In 2015, the 12-month running average TDS concentration in recycled water produced by the IEUA approached the trigger concentration that would require the IEUA and Watermaster to submit a plan and schedule to improve recycled water TDS concentrations. Research performed by the IEUA found that the primary driver for the increasing TDS concentration in its recycled water was the increase in the TDS concentration of the water supply, which was directly related to drought conditions that had persisted since 2012. Although the 12-month running average TDS concentration declined from the 2015 peak before

REFERENCES

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PROJECT DATES

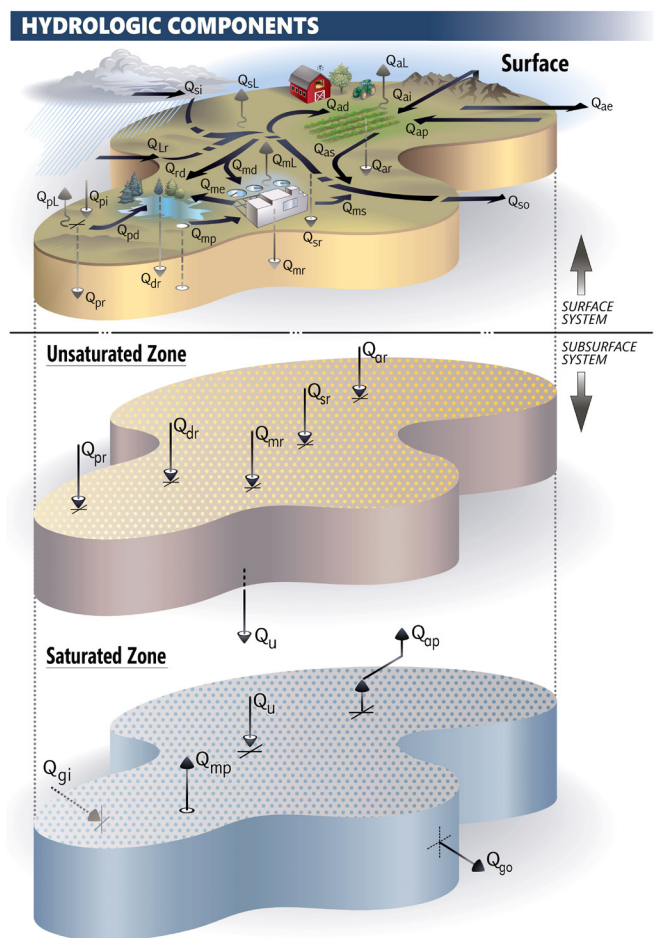
2017 – Ongoing

the trigger was exceeded, it was an important indicator that the TDS concentration of recycled water is likely to trigger the requirement for recycled water quality improvements during the next prolonged dry period. Given the potential cost of implementing recycled water quality improvements for what might only be short-term exceedances of the 12-month running average limitation, the IEUA and Watermaster retained West Yost to support the development of a proposal to the Regional Board to revise the averaging period for recycled water compliance to a longer period (5 or 10 years). The scope of work included making model projections of future TDS concentrations in recycled water, projecting the impacts of future recycled water reuse and discharge on groundwater and the SAR, and recommending changes to the SNMP to address conservation and drought impacts on TDS concentration.

As part of this work, West Yost is developing the most detailed and sophisticated surface and groundwater flow modeling system ever developed in the Santa Ana Watershed for the purpose of estimating TDS and nitrate impacts to surface and ground waters from agriculture, dairy, municipal, and industrial discharges. The figure to the right graphically illustrates a free-body diagram of all the potential water sources and discharges that are being addressed in the work. Examples of the salinity loading and fate and transport factors included in this evaluation are: the source waters used for irrigation; estimated applied water, evapotranspiration, runoff, and deep infiltration beyond the root zone; salt and nutrient loads from fertilizer application and liquid and solid dairy wastes; TDS and nitrate loads from atmospheric deposition and precipitation; nitrogen loss to the atmosphere, uptake, and leaching beyond the root zone; and precipitation of salts in the vadose zone. Vadose zone routing studies were conducted for several locations in the basin to develop spatially distributed estimates of solute travel time from the root zone to groundwater.

West Yost also developed the most detailed characterization of current TDS and nitrate concentration ever developed in the Chino Basin, representing current conditions for the modeling work. West Yost is using the information described above, the calibrated groundwater flow model, and a newly developed MT3D solute transport model to project the TDS and nitrate impacts of recycled water reuse under a range of salinity management plan alternatives.

As was done for the development of the initial SNMP in 2003, West Yost is implementing a collaborative process with Watermaster, the IEUA, and the Regional Board to discuss progress of the work and to get buy in on all technical and regulatory assumptions and computations.



This figure shows the various hydrologic components considered in modeling groundwater quality impacts. In the surface system, TDS and nitrate concentrations are assigned to each source. The TDS and nitrate concentrations are modified through mass additions (e.g. fertilizer application) and consumptive use (e.g. ET) as the water moves from the source through use to discharge either to surface water or the vadose zone. TDS and nitrate concentrations in deep infiltration in the vadose zone are modified by sorption/desorption, precipitation, and microbial processes. The models used in this project include R4, Hydrus-2d, MODFLOW, and USGS-MT3D.



Law and Policy Advisor for the Central Valley Salt and Nutrient Management Plan

CENTRAL VALLEY SALINITY COALITION

Relevance:

Demonstrates Tess Dunham’s expertise in the development of a Regional Board-approved SNMP and implementing Basin Plan amendments in a complex groundwater basin through a collaborative, multi-stakeholder process.

The salinity and nitrate problems in the Central Valley are complex, multi-faceted, and present a daunting challenge for the Central Valley Regional Water Quality Control Board to confront alone. To assist the Central Valley Water Board with their long-term planning efforts, a broad group of agriculture, cities, industry, and regulatory agencies joined together in 2006 to form the Central Valley Salinity Alternatives for Long-Term Sustainability initiative. CV-SALTS is a collaborative stakeholder driven and managed program focused on addressing the Central Valley’s salinity and nitrate problems.

The CV-SALTS Executive Committee is a decision-making body with 30 voting members that represent diverse stakeholder groups, including agriculture, cities, industry, regulatory agencies, and community and environmental justice representatives. In addition, dischargers participating in CV-SALTS formed the non-profit Central Valley Salinity Coalition (CVSC) to manage and fund the effort and entered into a Memorandum of Agreement with the State Water Board and the Central Valley Water Board to formalize their commitment.

CV-SALTS was tasked with developing a Salt and Nitrate Management Plan (SNMP) for the entirety of the Central Valley Water Board’s jurisdictional area. Tess Dunham served as the attorney and policy advisor for the CVSC. In this roll, she was one of the chief architects of the Central Valley SNMP, and provided critical support to the process to develop a plan that met stakeholder objectives and appropriately addressed the water quality requirements and expectations of the State Water Board and Central Valley Water Board.

To achieve desired outcomes for the management of salt and nitrate within the Central Valley, the Central Valley SNMP addresses both the requirements of the Recycled Water Policy and legacy and ongoing salt and nitrate accumulation issues. The Central Valley SNMP is designed to address nitrate concerns in

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TEAM

- Tess Dunham

PROJECT DATES

2010 – Ongoing

groundwater, and salt concerns in both surface and groundwaters. However, the primary focus of early actions (first ten years) is on groundwater quality and in particular nitrate impacts to drinking water supplies. Ultimately, the Central Valley SNMP is built on the following management goals and priorities:

- **Goal 1:** Ensure a Safe Drinking Water Supply
- **Goal 2:** Achieve Balanced Salt and Nitrate Loadings
- **Goal 3:** Implement Managed Aquifer Restoration Program

Once the Central Valley SNMP was accepted by the Central Valley Water Board, Tess helped to draft the Central Valley's Basin Plan Amendments to implement the SNMP. This process encompassed working with diverse stakeholders to draft amendments that were generally acceptable by all stakeholders, including the Central Valley Water Board and other participating agencies. Tess continues to actively participate in the CV SALTS Executive Committee along with the Central Valley Water Board, environmental justice advocates, state agencies, federal agencies, and others to implement the Basin Plan Amendments.

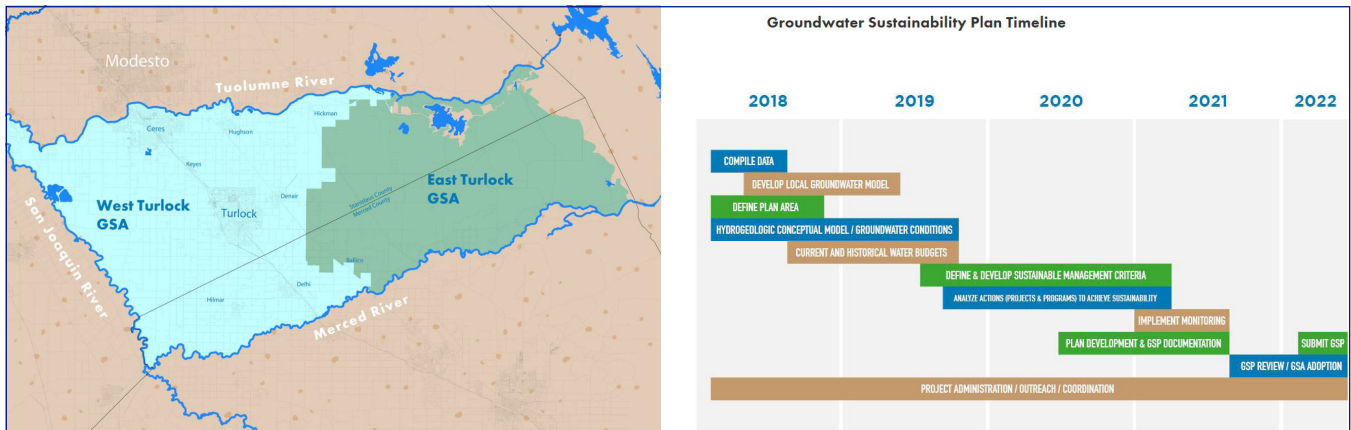


Image Credit: <https://turlockgroundwater.org/>

Turlock Subbasin Groundwater Sustainability Plan Community Engagement

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Relevance:

Demonstrates Meagan Wylie's expertise in working with multiple stakeholders of diverse backgrounds and cultures towards resolutions and integrating complex technical information and community knowledge into regulatory plans.

Pursuant to the Sustainable Groundwater Management Act (SGMA), facilitated the successful creation of a basin-wide Communications Committee, led the development of a robust Groundwater Sustainability Plan (GSP) Communication and Engagement Plan to assist agencies in their efforts to engage Turlock Subbasin stakeholders in groundwater management activities, and managed/supported implementation of activities outlined in the Communication and Engagement Plan. Stakeholder and public engagement over the five-year effort included community workshops, technical workshops, technical advisory committee meetings, virtual "office hours", outreach materials development, website design, and social/digital media content. An archive of efforts is available on the project's website: www.turlockgroundwater.org

REFERENCES

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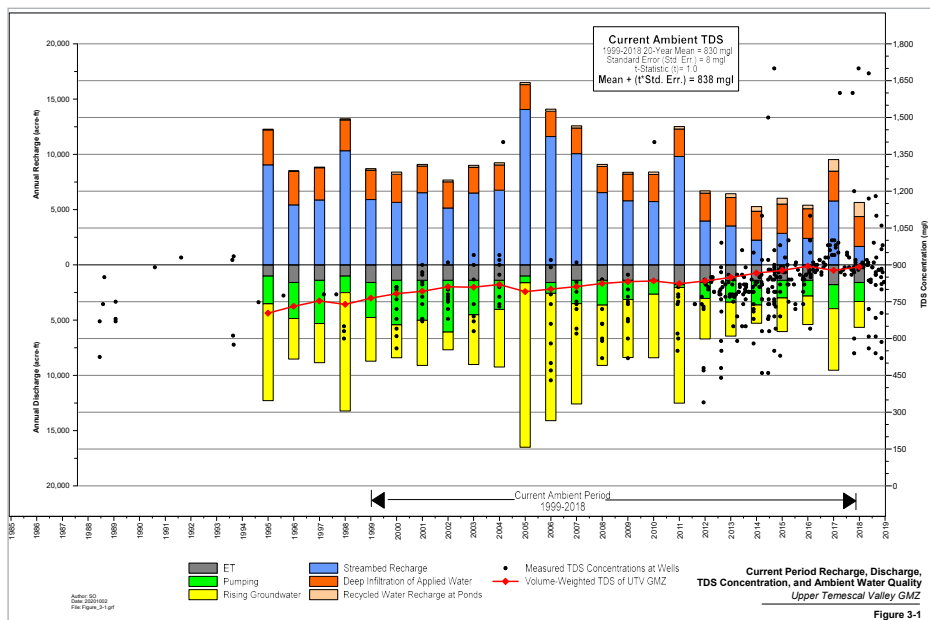
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TEAM

- Meagan Wylie, Zephyr

PROJECT DATES

2017 – 2022



This figure is a time-history plot of the numerous datasets used to estimate the historical AWQ of the Upper Temescal Valley GMZ, including annual recharge volumes for stormwater infiltration (as computed by the WLAM) and the deep percolation of applied water; annual discharge volumes for production, evapotranspiration, and basin outflow; TDS concentrations at wells; and the volume-weighted TDS concentration as estimated by the constantly stirred reactor model.

Development and Implementation of the Upper Temescal Valley Salt and Nutrient Management Plan

ELSINORE VALLEY MUNICIPAL WATER DISTRICT AND EASTERN MUNICIPAL WATER DISTRICT

Relevance:

Demonstrates West Yost’s experience in the development of innovative management plans to solve salinity management challenges and scientifically-based numeric basin plan objectives for TDS as well as performing collection and management of complex water resources datasets to support SNMPS, and implementing field and surface water monitoring programs.

The Upper Temescal Valley (UTV) GMZ is an updated GMZ that combines the existing Warm Springs, Lee Lake, and Bedford GMZs into one management unit for the purposes of salinity management. The UTV GMZ is an approximately 20-mile long, narrow, and shallow alluvial groundwater basin that is drained by the Temescal Wash between Lake Elsinore and the City of Corona. Three water supply agencies overlie and provide water supply services within the UTV GMZ: the City of Corona, Temescal Valley Water District, and Elsinore Valley MWD. These agencies also own and operate water reclamation facilities in the UTV that treat wastewater to tertiary standards before the water is discharged to Temescal Creek and percolation ponds or is reused for irrigation. The Eastern MWD also discharges tertiary treated wastewater to Temescal Wash.

The Regional Board issued mandatory minimum penalties to both the Elsinore Valley and Eastern MWDs for discharging recycled water to the Temescal Wash with TDS concentrations in excess of their respective discharge limitations and required both agencies to develop and implement a salt-offset program to mitigate the mass load from discharges that were in excess of the Basin Plan TDS objective of the receiving groundwater basin (the UTV GMZ). However, due to historically limited

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TEAM

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- Veva Weamer
- Carolina Sanchez
- Sodavy Ou

PROJECT DATES

2013 - Ongoing

data and information about the UTV GMZ, there were no established Basin Plan objectives from which to determine the mitigation requirement.

The Regional Board proposed using “best professional judgment” as the means for setting a Basin Plan Objective and a new TDS concentration discharge limitation in the absence of historical and current AWQ determinations for the UTV. This approach could have set arbitrarily low TDS compliance metrics and subsequently high compliance costs for the Elsinore Valley and Eastern MWDs with no substantive benefit to the environment. As an alternative compliance strategy, West Yost proposed to develop a scientific methodology to calculate the historical, current, and projected future AWQ for the UTV GMZ, and to prepare an SNMP to document the technical work performed, to provide recommendations for setting antidegradation objectives for TDS and nitrate, to define a monitoring program to collect the data needed to compute AWQ on an on-going basis in the future, and to provide management actions to address any regulatory issues that arise as a result of the current and future recycled water plans of the agencies discharging and reusing recycled water in the UTV.

The work performed to develop the SNMP represents the most comprehensive modern effort to collect, summarize, and analyze historical and current data and information on the water resources of the UTV Watershed. The work included:

- An extensive data mining effort to collect and catalog all available hydrogeologic datasets.
- Estimation of historical and future irrigation return flows and associated TDS and nitrate concentrations.
- Refinement and recalibration of the WLAM in the UTV, a complex surface water model used to estimate historical and projected stormwater runoff and streambed infiltration.
- Development of a constantly stirred reactor model to estimate historical, current, and future projected ambient TDS and nitrate concentrations in the UTV GMZ.
- Development of a long-term management plan with implementation actions to address salt and nutrient loading.
- Presentation of technical results and policy recommendations to regional stakeholders.
- Negotiation of regulatory compliance with the Regional Board.

The implementation plan included a new, comprehensive watershed-wide surface and groundwater monitoring program, cooperator data collection, periodic analysis and reporting on the data to assess compliance with the

Basin Plan objectives, and preparing annual compliance reports to the Regional Board. The SNMP was accepted by the Executive Officer of the Regional Board in 2017, formally approved by the Regional Board in December 2020, and approved by the State Board in and the Office of Administrative Law in 2021. West Yost has been supporting its implementation since January 2018, including performing the monitoring program field work. The data collected for the UTV SNMP are managed using HydroDaVESM, a comprehensive environmental data management system. The interface used to access and evaluate the information in the database is map-driven and contains powerful analytical tools to enable rapid interpretation of data as it is received from the field and laboratory.

West Yost updated the UTV SNMP in 2020 and is now implementing the revised management actions defined in the plan, including:

- Development and implementation of a stormwater monitoring program.
- Development of a workplan to improve existing surface water modeling tools to better characterize the fate and transport of TDS in the watershed tributary to the UTV SNMP.
- Development of a salt mitigation framework to address potential future exceedances of recycled water TDS permit limits.



Development and Implementation of a Salt and Nutrient Management Plan for the San Juan Creek Watershed

HDR ENGINEERING FOR THE SOUTH ORANGE COUNTY WASTEWATER AUTHORITY (DEVELOPMENT), SAN JUAN BASIN AUTHORITY (IMPLEMENTATION)

Relevance:

Demonstrates West Yost's technical and policy competencies in salinity management as evidenced by the State Water Board singling out this SNMP as a model to be followed by others in the State. Demonstrates West Yost's success in developing and implementing a local stakeholder-driven regulatory compliance plan pursuant to a strict regulatory schedule.

In May 2009, the State Water Board adopted a Recycled Water Policy to move aggressively towards a sustainable water future by encouraging local and regional water agencies to move toward clean, abundant, local water for California, emphasizing the need to increase the reuse of recycled water in addition to water conservation, the maintenance of infrastructure, and the capture of stormwater, including dry-weather urban runoff. Recognizing that not all Basin Plans include the adequate implementation procedures for achieving or ensuring compliance with the water quality objectives for salt and nutrients, the Policy mandates the development of SNMPs for every groundwater basin or subbasin in California and requires that the Regional Boards develop appropriate procedures for permitting recycled water projects and ensuring compliance with the relevant objectives, based on the locally designed SNMPs.

The South Orange County Wastewater Authority (SOCWA) led the regional stakeholder effort to develop the SNMP for South Orange County, specifically for the San Juan Creek Watershed. HDR Engineering and West Yost teamed to perform the technical analyses and design of the SNMP. The work performed included:

- Characterization of the groundwater resources of the study area to determine the complexity of salt and nutrient management planning needed
- Identification of current recycled water reuse, the recycled water reuse and stormwater capture goals of the stakeholders, and future groundwater and stormwater projects
- Development and use of methodologies to evaluate existing groundwater quality and assimilative capacity
- Identification of sources of salt and nutrient loading in each hydrologic sub-area of the watershed

REFERENCE

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TEAM

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- Carolina Sanchez
- Garrett Rapp

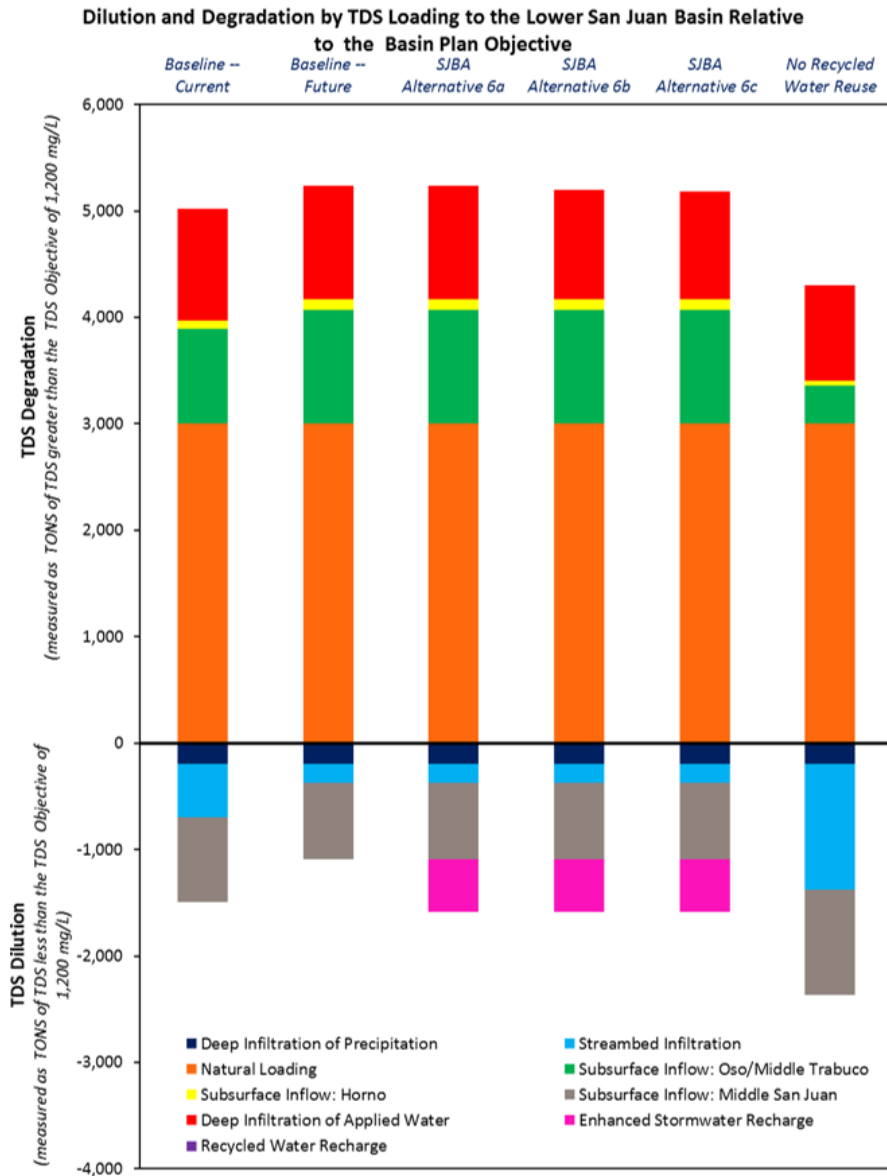
PROJECT DATES

2012-2014 (Development)
2015-Ongoing (Implementation)

- Estimation of historical and future irrigation return flows and associated TDS and nitrate concentrations from historical and projected land use and period-appropriate irrigation and fertilizer practices
- Modeling of future groundwater quality to demonstrate how much assimilative capacity will be used in meeting the recycled water and stormwater goals of the stakeholders
- Performing antidegradation analyses to support expanded recycled water reuse
- Preparing a report documenting the technical findings, assessing regulatory compliance concerns, and developing an implementation plan to manage salts and nutrients in the San Juan Creek Watershed

watershed-wide data collection and monitoring program recommended in the SNMP and contracted with West Yost to design and implement it. The monitoring program was designed to obtain the minimum set of data required to evaluate watershed-wide compliance with the Basin Plan objectives, to assess the impact of recycled water reuse on groundwater, and to take advantage of the monitoring efforts already being performed in the Watershed to avoid redundancy. Implementation of the monitoring program began in September 2016, and the first annual report of the monitoring program was submitted to the San Diego Regional Board in June 2018. In 2018, during a workshop presenting proposed amendments to the Recycled Water Policy, State Board staff singled out the San Juan Creek Watershed SNMP as a model to be followed by others in the State.

In 2015, the San Juan Basin Authority assumed responsibility for implementing the comprehensive



This figure characterizes the salt loading sources in the lower San Juan Basin and which of the loading sources are driving degradation in the groundwater basin and contributing to exceedances of the Basin Plan objective.

05 // LIST OF REPRESENTATIVE PROJECTS

The table below identifies the nexus of the required skills and experience to Implement the CV-SNMP Workplan to the skills and experience of the West Yost Team in implementing representative projects that were active within the last five year period. These are the same projects that are included in Section 4: References, above.

Project Experience	Workplan to Develop the Coachella Valley SNMP, 2021	Nitrogen/Total Dissolved Solids Studies for Santa Ana Watershed, 1995 - Ongoing	Update of the SNMP for the Chino Basin, 2017 - Ongoing	Law and Policy Advisor for the Central Valley SNMP, 2010 - Ongoing	Turlock Subbasin Groundwater Sustainability Plan Community Engagement, 2017 - 2022	Development and Implementation of the Upper Temescal Valley SNMP: 2013 - Ongoing	Development and Implementation of SNMP for San Juan Creek Watershed, 2021 - 2014, 2015 - Ongoing
Develop, Implement, and Update SNMPS for Basin Plan compliance		■	■	■		■	■
Coordinate and facilitate multi-stakeholder processes to develop water resources management plans, including SNMPS, for large watersheds or basins	■	■	■	■	■		■
Prepare detailed workplans to develop, implement, and update SNMPS		■	■			■	■
Develop and implement data management systems to support stakeholder processes	■	■	■			■	■
Develop and/or implement monitoring programs to support SNMPS	■	■	■			■	■
Develop technical methods to compute basin-wide groundwater quality and assimilative capacity through a stakeholder process		■					■
Collaborate with Regional Board staff to define technical methods to compute ambient water quality and assimilative capacity in compliance with the Recycled Water Policy				■		■	■
Collaborate with Regional Board staff to define technical methods to prepare projections of basin-wide groundwater quality under alternative management programs to support antidegradation analyses			■			■	
Develop practical SNMP implementation plans that address long-term protection of beneficial uses, water quality, and cost effectiveness in consideration of the local hydrogeologic conditions and other factors			■	■	■	■	■

Project Experience	Workplan to Develop the Coachella Valley SNMP, 2021	Nitrogen/Total Dissolved Solids Studies for Santa Ana Watershed, 1995 - Ongoing	Update of the SNMP for the Chino Basin, 2017 - Ongoing	Law and Policy Advisor for the Central Valley SNMP, 2010 - Ongoing	Turlock Subbasin Groundwater Sustainability Plan Community Engagement, 2017 - 2022	Development and Implementation of the Upper Temescal Valley SNMP: 2013 - Ongoing	Development and Implementation of SNMP for San Juan Creek Watershed, 2021 - 2014, 2015 - Ongoing
Develop the technical and policy demonstrations required to develop Basin Plan groundwater quality objectives based on the Antidegradation Policy and California Water Code Sections 13241 and 13242			■	■		■	■
Characterization and numerical modeling of the fate and transport of salts and nutrients on a basin-scale			■				
Expert knowledge of the legal, policy, and regulatory issues regarding SNMPs	■			■			
Successful experience in leading technical committees		■			■		
Knowledge of Coachella Valley hydrology, hydrogeology, and water resources	■						
Outreach and engagement to Native American Tribes					■		

06 // DISCLOSURE OF CLAIMS/LAWSUITS



Regarding RFP Section 4.h, i and ii, West Yost has had no claims or lawsuits against our firm and has not made any claims in the past five years. We have nothing to report.

07 // COST PROPOSAL



Table 1 below summarizes the total labor hours and the estimated cost by Task to execute the required Scope of Services described in Attachment 1 of the RFP.

Table 1: Summary Labor Hours and Cost Estimate		
Task	Labor Hours	Estimated Cost
Task 1 Project Administration	506	\$142,370
Task 2 Kickoff and Progress Review Meetings	319	\$93,225
Task 3 Implement Approved Development Workplan	8,954	\$2,320,703
4.2 Establish CV-SNMP Stakeholder Group and TAC	647	\$163,885
4.3 Characterize N/TDS Loading to the Groundwater Basin	556	\$123,747
4.4 Characterize Current Groundwater Quality	657	\$146,010
4.5 Delineate Management Zones and Describe Metrics	643	\$167,120
4.6 Develop Technical Approach for Forecasting N/TDS...	455	\$124,296
4.7 Construct N/TDS Forecasting Tools/Evaluate Baseline	2,705	\$684,514
4.8 Forecast N/TDS Concentrations for CV-SNMP Scenarios	1,818	\$480,638
4.9 Characterize/Compare Cost of Baseline and CV-SNMP	583	\$160,239
4.10 Select the Preferred CV-SNMP Scenario	624	\$199,822
4.11 Prepare Final CV-SNMP	265	\$70,432
Contingency (10%)		\$255,630
Total	9,779	\$2,811,927

Table 2 is a detailed, line-item breakdown of the labor hours and cost estimate broken down by task and subtask, and hence, outlines the specific steps that will be taken by the West Yost team to execute the Scope of Services. For each task and subtask, the table shows the team members (and their staff classifications) that are expected to work on each task/subtask. The cost estimate is inclusive of any anticipated travel, per-diem, and other incidental costs and charges. Billing rates for the entire team are at the end of

this section. Rates correlate with the Staff Title listed on the team resumes in Appendix A.

The total estimated cost to perform the Scope of Services is \$2,811,927 and reflects the detailed planning of the necessary level of effort to implement the approved CV-SNMP Workplan and includes a 10% contingency to account for unforeseen or unplanned work that may be necessary over the five-year duration of the project. This cost estimate is slightly lower than the \$2,870,000 cost

estimate in the CV-SNMP Workplan. Our proposed scope-of-work and level-of-effort in Table 1 deviates from the scope-of-work and cost estimates in the CV SNMP Workplan in the following ways:

- Progress reporting to the Regional Board is not included in Table 1 but was included in the CV-SNMP Workplan.
- **Task 1 – Project Management:** The RFP calls for more work in this task than was assumed in the CV-SNMP Workplan. The CV-SNMP Workplan assumed a cost of \$80,000. Our proposal includes a cost estimate of about \$142,000. The additional work and cost in our proposal is mainly for the QA/QC tasks for the Technical Supervisor and the Quality Assurance Supervisor on interim and final deliverables, as called for in the RFP. In the CV-SNMP Workplan, these QA/QC tasks were assumed to occur within the tasks where the specific interim and final deliverables are prepared.
- **Task 2 – Kickoff and Progress Review Meetings:** This task was not included in the CV-SNMP Workplan. Our proposal includes a cost estimate of about \$93,000. This task involves kickoff meetings with all stakeholder committees, monthly 1-hour virtual status meetings with the CV-SNMP Agencies that are serving as the Steering Committee for CV-SNMP Workplan implementation, and monthly project status meetings with the CVWD project management team.
- **Task 3 – Implement Approved Development Workplan, Task 4.2:** Establish CV-SNMP Stakeholder Group and TAC. Our proposal calls for more work in this task than was assumed in the Workplan. The Workplan assumed a cost of \$25,000. Our proposal includes a cost estimate of about \$164,000. After consultation with our team members for Policy/Regulatory and Stakeholder Engagement/Outreach, we prepared a more robust scope of services for stakeholder, TAC, and tribal engagement processes to ensure the ultimate success and acceptance of the CV-SNMP, which will require an approach for consistent and frequent engagement over the five-year project period. Examples include:
 - **Task 4.2.1:** Develop Stakeholder Engagement and Project Communication Framework. In this task, we propose to develop a guidance document for stakeholder engagement and communication (with input from the CV-SNMP Agencies) which will be used to guide the outreach and engagement activities over the duration of the project.
 - **Task 4.2.3:** Convene Tribal Consultation Process. This task includes a separate outreach/engagement process for the tribal interests in the Coachella Valley and

assumes up to four (4) engagement meetings over the project duration.

- **Task 4.2.4:** Convene Stakeholder Group. In this task, we propose to conduct up to six (6) additional status review meetings for the Stakeholder Group (in addition to the planned meeting to review interim deliverables) to keep the Stakeholder Group engaged over the 5-year duration of the project.

The West Yost 2022 Billing Rate Schedule, following the fee sheet, shows the 2022 rate schedule by West Yost staff classification and the 2022 hourly rates for KSC and Zephyr. West Yost updates its schedule of billing rates and fees annually on January 1st. To estimate the cost of implementing CV-SNMP Workplan tasks over the five-year contract period in Table 2, we assumed a nominal annual increase of the billing rates over time. We understand that the CVWD will negotiate a not-to-exceed dollar limit with the successful respondent. All work included in this proposal, and any additional work that may arise throughout the term of the Agreement, will be invoiced based on the then-current annual billing rates and not-to-exceed the contract budget negotiated with CVWD.

Table 2: Cost Estimate to Implement the CV-SNMP Workplan

Task and Subtask Descriptions	West Yost Labor Hours														Sub-Consultants Labor Hours		Total Team Labor Hours	Travel and Other Direct Costs	Total Estimated Project Costs	
	Principal-in-Charge Charles Duncan	Manager I Samantha Adams	Principal Geologist II Andy Malone	Principal Geologist II Eric Chiang	Senior Scientist II Veva Weamer	Senior Engineer I Carolina Sanchez	Associate Geologist II Erik Cadaret	Associate Engineer II Garrett Rapp	Associate Scientist I Sodavy Ou	Engineer II Lauren Sather	Scientist/Geologist I	Administrative III	Task Multiplier	Total West Yost Person Hours	Policy Lead Tess Dunham	Stakeholder Lead Meagan Wiley			Sub-Task	Task
Task 1 Project Administration															506				\$142,370	
1.1 Project administration - coordination, budget/schedule tracking, invoicing, meeting scheduling, etc.	0.25		2			2					1	56	294	28	28			\$93,219		
1.2 Technical supervisor QA/QC of technical work and 8 technical deliverables (interim and final reviews)	0.25		10									8	82					\$25,277		
1.3 Quality assurance and QA/QC of nine project deliverables (interim and final reviews)	0.25	8										9	74.25					\$23,874		
Task 2. Kickoff and Progress Review Meetings															319				\$93,225	
2.1 Prepare for and participate in CV-SNMP Agency (Steering Committee) kickoff meeting		8	8			8				4	2	1	30	8	10		\$600	\$13,966		
2.2 Conduct periodic virtual meetings with the Steering Committee			1			1						54	108	54	54			\$63,666		
2.2 Conduct monthly virtual meetings with the CVWD Project Management Team			0.5			0.5						55	55					\$15,593		
Task 3. Implement Approved Development Workplan															8,954				\$2,320,703	
<i>Workplan Task 4.2: Establish CV-SNMP Stakeholder Group and TAC</i>																			<i>\$163,885</i>	
4.2.1 Develop Stakeholder Engagement and Project Communication Framework																				
4.2.1.1 Develop draft Stakeholder Engagement and Communication Framework document		2	2									1	4	4	28			\$8,169		
4.2.1.2 Prepare for and meet with Steering Committee to review draft document		1	2			1						1	4	1	8			\$3,110		
4.2.1.3 Prepare final Stakeholder Engagement and Communication Framework document		1	1			1						1	3	2	8			\$3,228		
4.2.2 Convene Technical Advisory Committee																				
4.2.2.1 Coordinate with SNMP Agencies to establish TAC membership			4			2						1	6					\$1,749		
4.2.2.2 Prepare directory of contact info for TAC and establish email listserve						1						1	1					\$260		
4.2.2.3 Prepare agenda and materials for TAC kick-off meeting		1	6	2		4						1	13	4	4			\$6,267		
4.2.2.4 Lead TAC kick-off meeting		2	3	3		2						1	10	2	4		\$600	\$5,202		
4.2.2.5 Prepare minutes and document action items from kick-off meeting			1			1						1	2		2			\$939		
4.2.3 Conduct Tribal Engagement Process																				
4.2.3.1 Identify and establish tribal contacts. Conduct initial informal meetings with tribes.												1	0		15			\$2,790		
4.2.3.2 Prepare for and attend engagement kick-off meeting			4			2						1	6	4	8		\$600	\$5,541		
4.2.3.3 Document tribal needs and amend Framework as appropriate		1	1			1						1	3		12			\$3,120		
4.2.3.4 Prepare for and attend up to 4 engagement meetings (including documentation)			6			8			2			4	64	16	40			\$31,600		
4.2.4 Convene Stakeholder Group																				
4.2.4.1 Support informal outreach to Stakeholders to inform of SNMP development process			2			4						1	6	3	20			\$6,651		
4.2.4.2 Prepare agenda and materials for Stakeholder Outreach kick-off meeting		1	2			2						1	5	4	12			\$5,391		
4.2.4.3 Lead Stakeholder Outreach kick-off meeting		2	2			2						1	6	2	6		\$600	\$4,344		
4.2.4.4 Prepare minutes and document action items from kick-off meeting						2						1	2		2			\$891		
4.2.4.4 Prepare for and attend up to 6 status review meetings (including documentation)			6			4			2			6	72	24	36			\$36,708		
4.2.5 Conduct Two (2) Public Outreach Kick-off Meetings																				
4.2.5.1 Prepare agenda and materials for Public kick-off meetings; Notice meetings			2			2						1	4	3	12			\$4,644		
4.2.5.2 Prepare for and attend two (2) public outreach kick-off meetings			8									2	16	4	12		\$1,200	\$10,056		
4.2.5.3 Prepare minutes and document action items from kick-off meetings			2									1	2	2	4			\$2,211		

Task and Subtask Descriptions	West Yost Labor Hours														Sub-Consultants Labor Hours		Total Team Labor Hours	Travel and Other Direct Costs	Total Estimated Project Costs	
	Principal-in-Charge Charles Duncan	Manager I Samantha Adams	Principal Geologist II Andy Malone	Principal Geologist II Eric Chiang	Senior Scientist II Veva Weamer	Senior Engineer I Carolina Sanchez	Associate Geologist II Erik Cadaret	Associate Engineer II Garrett Rapp	Associate Scientist I Sodavy Ou	Engineer II Lauren Sather	Scientist/Geologist I	Administrative III	Task Multiplier	Total West Yost Person Hours	Policy Lead Tess Dunham	Stakeholder Lead Meagan Wiley			Sub-Task	Task
4.3.4.1 Prepare admin-draft memorandum		1	8		24	4			16		8	8	1	69	6				\$18,305	
4.3.4.2 Meet with TAC to review admin-draft memorandum and receive feedback			8		8	2			2				1	20	3	2			\$6,980	
4.3.4.3 Prepare draft memorandum and distribute to TAC and Stakeholders			2	4	6	2			4	4	8	4	1	34	3	1			\$8,829	
4.3.4.4 Meet with TAC to review draft memorandum, Stakeholder comments, and receive feedback			8		8	2			2	2			1	22	3	4			\$7,738	
4.3.4.5 Prepare final memorandum			2	2	4	2			4	4		2	1	20	2	4			\$6,194	
Workplan Task 4.5: Delineate Draft Management Zones and Describe Metrics to Characterize Beneficial Use Protection																			\$167,120	
4.5.1 Delineate draft groundwater management zones																				
4.5.1.1 Prepare maps of hydrogeology, groundwater-flow, and sources of TDS/nitrate loading			8						16		12		24							\$12,744
4.5.1.2 Prepare hydrogeologic cross-sections along major groundwater-flow systems			8						24					1	32					\$7,888
4.5.1.3 Prepare map exhibits of draft management zones			16						16				60		1	92				\$18,736
4.5.2 Describe beneficial uses for management zones and numeric beneficial-use thresholds																				
4.5.2.1 Describe beneficial uses for each management zone		4			12									1	32	16				\$14,364
4.5.2.2 Describe numeric beneficial-use thresholds for TDS and nitrate for each management zone		4			8									1	12	24				\$13,172
4.5.3 Define compliance metrics and determine current protection of beneficial uses																				
4.5.3.1 Define compliance metrics for TDS and nitrate in each management zone		8	24		24	4								1	60	8				\$20,144
4.5.3.2 Prepare time-series charts of compliance metrics for 1996-2020		8	24		20	4				6	16			1	78	8				\$23,048
4.5.4 Prepare task memorandum																				
4.5.4.1 Prepare admin-draft memorandum and send to TAC for review		1	16		24	2	8		8		8	8	1	75	8					\$21,121
4.5.4.3 Meet with TAC to review admin draft memorandum and receive feedback			8		8	2	2		2				1	22	3	4				\$7,798
4.5.4.2 Prepare draft memorandum based on TAC comments; send to TAC/Stakeholders for review			2	4	8	2	4		4		4	4	1	32	6	1				\$10,015
4.5.4.4 Meet with Stakeholder Committee to review draft memorandum; follow-on Public workshop			8		8	2	2		2				1	22	4	16		\$600		\$10,956
4.5.4.5 Prepare final memorandum			2	2	4	2	4		4			2	1	20	4	4				\$7,134
Workplan Task 4.6: Develop Technical Approach for Forecasting N/TDS Concentrations in Groundwater																			\$124,296	
4.6.1 Evaluate existing MODFLOW models																				
4.6.1.1 Review modeling reports			4	12					12					2	56					\$15,360
4.6.1.2 Review model input data files				16					16					2	64					\$17,248
4.6.1.3 Review model results				12					12					2	48					\$12,936
4.6.1.4 Meetings with Mission Creek and Indio Subbasin modeling teams			6	6					6					2	36					\$10,104
4.6.2 Develop procedures, assumptions, and technical approach			2	16					16					1	34					\$9,230
4.6.3 Prepare task memorandum																				
4.6.3.1 Prepare admin-draft memorandum		1	16	32		2			32	8		8	1	99	10					\$29,869
4.6.3.2 Meet with TAC to review admin-draft memorandum and receive feedback			8	8		4							1	20	3	2				\$7,498
4.6.3.3 Prepare draft memorandum and distribute to TAC and Stakeholders			2	8		2			8	8		4	1	32	3	1				\$9,065
4.6.3.4 Meet with TAC to review draft memorandum, Stakeholder comments, and receive feedback			8	8		4							1	20	3	4				\$7,864
4.6.3.5 Prepare final memorandum			2	4		2			4			2	1	14	2	4				\$5,122

Task and Subtask Descriptions	West Yost Labor Hours														Sub-Consultants Labor Hours		Total Team Labor Hours	Travel and Other Direct Costs	Total Estimated Project Costs	
	Principal-in-Charge Charles Duncan	Manager I Samantha Adams	Principal Geologist II Andy Malone	Principal Geologist II Eric Chiang	Senior Scientist II Veva Weamer	Senior Engineer I Carolina Sanchez	Associate Geologist II Erik Cadaret	Associate Engineer II Garrett Rapp	Associate Scientist I Sodavy Ou	Engineer II Lauren Sather	Scientist/Geologist I	Administrative III	Task Multiplier	Total West Yost Person Hours	Policy Lead Tess Dunham	Stakeholder Lead Meagan Wiley			Sub-Task	Task
Workplan Task 4.7: Construct N/TDS Forecasting Tools and Evaluate the Baseline Scenario																		\$684,514		
4.7.1 Develop a Baseline Scenario based on SGMA Alternative Plans																				
4.7.1.1 Describe/quantify all water budget terms expected under SGMA Alternative Plans		4	8	40				40		24			1	116				\$30,584		
4.7.1.2 Describe/quantify all N/TDS loading estimated to occur under SGMA Alternative Plans		4	8	16	40			16	40	8			1	132				\$33,935		
4.7.2 Construct N/TDS forecasting tools and run Baseline Scenario																				
4.7.2.1 Construct groundwater quality forecasting tools		4	20	160				100		60			2	688				\$185,968		
4.7.2.2 Model verification; Prepare summary memorandum and distribute to TAC		4	24	100				80		40	40		1	288				\$73,974		
4.7.2.3 Prepare initial model input files for Baseline Scenario				24				24		40			1	88				\$21,416		
4.7.2.4 Run Baseline Scenario and illustrate results with maps and charts		4	2	16				24		40	24		5	550				\$125,695		
4.7.2.5 Meet with TAC to share model results and develop recommended adjustments				2	4			6		6			5	90	5			\$24,750		
4.7.2.6 Implement TAC recommendations to Baseline Scenario and repeat Task 4.7.2.4				2	16			24		24			5	330				\$81,255		
4.7.3 Prepare task memorandum																				
4.7.3.1 Prepare admin-draft memorandum and send to TAC/Regional Board for review		12	16	32		8		48		40	40	8	1	204	15			\$55,110		
4.7.3.2 Meet with TAC (including Regional Board) to review draft memorandum		2	8	8		2		8		8			1	36	6	4		\$12,953		
4.7.3.3 Prepare draft memorandum based on TAC/RB comments; send to TAC/Stakeholders			4	8				16		16		4	1	48	4	2		\$13,470		
4.7.3.4 Meet with Stakeholder Committee to review draft memorandum; follow-on Public workshop			8	8		2		8			8		1	34	4	16	\$600	\$13,459		
4.7.3.5 Prepare final memorandum based on Stakeholder/TAC/RB comments			4	4				8			2	2	1	20	3	4		\$7,031		
4.7.3.6 Coordination with Steering Committee and Regional Board to obtain approval			4					4				2	1	10	4	4		\$4,914		
Workplan Task 4.8: Forecast N/TDS Concentrations for CV-SNMP Scenarios																		\$480,638		
4.8.1 Evaluate Baseline Scenario and prepare recommended SNMP implementation measures		24	40	24		20		20			40		1	168	16	16		\$54,888		
4.8.2 Prepare task memorandum																				
4.8.2.1 Prepare admin-draft memorandum and distribute to TAC		4	16	4		16					4	8	1	52	6			\$16,146		
4.8.2.2 Meet with TAC to review admin-draft memorandum and receive feedback			8	8		2		8					1	26	3	2		\$9,105		
4.8.2.3 Prepare draft memorandum and distribute to TAC and Stakeholders			2	2		4					4		1	12	3	2		\$4,525		
4.8.2.4 Meet with Stakeholder Committee to review draft memorandum; follow-on Public workshop			8	8		2		8					1	26	3	16	\$600	\$12,337		
4.8.2.5 Prepare final memorandum		1	2	4		2		4			2	2	1	17	2	4		\$5,939		
4.8.3 Evaluate SNMP Scenarios																				
4.8.3.1 Develop SNMP Scenario input files			1	8				4		12			8	200				\$50,296		
4.8.3.2 Modify and run groundwater-flow models				8				4		16			8	224				\$54,528		
4.8.3.3 Modify and run solute-transport models				12				4		16			8	256				\$64,480		
4.8.3.4 Evaluate the model results and develop recommendations for a subsequent SNMP Scenario based on the evaluation findings.		2	8	8				4		4	16		7	294	12			\$77,370		
4.8.3.5 Meet with TAC to explain model results, findings, and recommendations and receive feedback			8	8				8					7	168	16	12		\$57,536		
4.8.4 Prepare task memorandum																				
4.8.4.1 Prepare admin-draft memorandum and distribute to TAC		1	20	32		24		24		8	4	8	1	121	15			\$38,586		
4.8.4.2 Meet with TAC to review admin-draft memorandum and receive feedback			8	8		4							1	20	3	2		\$7,693		
4.8.4.3 Prepare draft memorandum and distribute to TAC and Stakeholders			2	8		2		8		8		4	1	32	4	2		\$9,914		
4.8.4.4 Meet with Stakeholder Committee to review draft memorandum; follow-on Public workshop			8	8		4							1	20	3	16	\$600	\$10,925		
4.8.4.5 Prepare final memorandum		1	2	4		2		4			2	2	1	17	3	4		\$6,370		

Task and Subtask Descriptions	West Yost Labor Hours													Sub-Consultants Labor Hours		Total Team Labor Hours	Travel and Other Direct Costs	Total Estimated Project Costs																	
	Principal-in-Charge Charles Duncan	Manager I Samantha Adams	Principal Geologist II Andy Malone	Principal Geologist II Eric Chiang	Senior Scientist II Veva Weamer	Senior Engineer I Carolina Sanchez	Associate Geologist II Erik Cadaret	Associate Engineer II Garrett Rapp	Associate Scientist I Sodavy Ou	Engineer II Lauren Sather	Scientist/Geologist I	Administrative III	Task Multiplier	Total West Yost Person Hours	Policy Lead Tess Dunham			Stakeholder Lead Meagan Wiley	Sub-Task	Task															
Workplan Task 4.9: Characterize and Compare the Cost of Baseline and CV-SNMP Scenarios																		\$160,239																	
4.9.1 Develop planning criteria for capital improvements and O&M	8		4			20		8		8			1	48				\$13,168																	
4.9.2 Develop cost estimates and projection of water supply cost for the Baseline and SNMP Scenarios	16		8			80		40			40		1	184				\$47,008																	
4.9.3 Estimate costs due to increased salinity	16					20		40			8		1	84	20			\$31,236																	
4.9.4 Prepare task memorandum to document cost of Baseline and SNMP Scenarios																																			
4.9.4.1 Prepare admin-draft memorandum and send to TAC for review	4		8	8		36		20			8	8	1	92	15			\$30,422																	
4.9.4.2 Prepare draft memorandum based on TAC comments; send to TAC/Stakeholders for review	2		6	4		16		8			8	4	1	48	3			\$13,566																	
4.9.4.3 Meet with Stakeholder Committee to review draft memorandum; follow-on Public workshop			8			8		2					1	18	4	16	\$600	\$10,656																	
4.9.4.4 Meet with TAC to review draft memorandum and Stakeholder comments			8			8							1	16	3	4		\$6,802																	
4.9.4.5 Prepare final memorandum	1		2			8		4		4		2	1	21	3	4		\$7,381																	
Workplan Task 4.10: Select the Preferred CV-SNMP Scenario, Finalize Management Zones and Beneficial Uses, and Recommend TDS Objectives																		\$199,822																	
4.10.1 Evaluate all forecasted information and propose a preferred SNMP		8	16		8	16				8			1	56	16			\$23,248																	
4.10.2 Select draft-final management zones and TDS objectives based on all components of CWC 13241		8	16		8					8			1	40	16			\$18,944																	
4.10.3 Finalize assignment of beneficial uses		2	6		8					4			1	20	24			\$16,372																	
4.10.4 Perform antidegradation demonstration pursuant to State Board Policy 68-16		16	4			8				40	16		1	84	40			\$38,596																	
4.10.5 Describe process for adaptive management and updates to the SNMP		4	8			8				4			1	24	20			\$15,796																	
4.10.6 Prepare task memorandum													1	0																					
4.10.6.1 Prepare admin-draft memorandum and send to TAC/Regional Board for review		8	8		8	16				16	4	8	1	68	24			\$27,972																	
4.10.6.2 Meet with TAC (including Regional Board) to review draft memorandum		4	8		2	8				4	2		1	28	8			\$11,428																	
4.10.6.3 Prepare draft memorandum based on TAC/RB comments; send to TAC/Stakeholders		2	4		4	8				8	2	4	1	32	8			\$11,552																	
4.10.6.4 Meet with Stakeholder Committee to review draft memorandum; follow-on Public workshop		6	8		8	4				4	2		1	32	8	16	\$600	\$16,404																	
4.10.6.5 Prepare final memorandum based on Stakeholder/TAC/RB comments			2		4	4				2	2	2	1	16	8	4		\$8,274																	
4.10.6.6 Coordination with Steering Committee and Regional Board to obtain approval		4	12										1	16	12	4		\$11,236																	
Workplan Task 4.11: Prepare Final CV-SNMP																		\$70,432																	
4.11.1 Prepare admin-draft report and send to TAC/Regional Board for review			4			8					8	40	1	60	15	4		\$18,110																	
4.11.2 Meet with TAC (including Regional Board) to review draft report		4	4			4					2		1	14	4	4		\$6,594																	
4.11.3 Prepare draft report based on TAC/RB comments; send to TAC/Stakeholders			4			8					4	8	1	24	6	2		\$8,366																	
4.11.4 Prepare for and meet with Stakeholder Committee to review draft report			8			8							1	16	6	16	\$600	\$11,044																	
4.11.5 Prepare for and lead a Public meeting to review draft report			2			2							1	4	6	16		\$6,916																	
4.11.6 Prepare final report based on Stakeholder/TAC/RB/Public comments		2	4			4					4	8	1	22	6	8		\$9,114																	
4.11.7 Coordination with Steering Committee and Regional Board to obtain approval			12			8							1	20	8	4		\$10,288																	
Project Subtotals																		65	291	1,255	1,437	344	826	104	1,284	330	1,227	974	301		718	623	9,779	9,300	\$2,556,297
Contingency (10%)																																			\$255,630
Project Total																																			\$2,811,927

West Yost 2022 Billing Rate Schedule

(Effective January 1, 2022 through December 31, 2022)*

Positions	Labor Charges (Dollars per Hour)
ENGINEERING	
Principal/Vice President	\$318
Engineer/Scientist/Geologist Manager I / II	\$301 / \$315
Principal Engineer/Scientist/Geologist I / II	\$272 / \$289
Senior Engineer/Scientist/Geologist I / II	\$244 / \$256
Associate Engineer/Scientist/Geologist I / II	\$209 / \$224
Engineer/Scientist/Geologist I / II	\$168 / \$195
Engineering Aide	\$98
Field Monitoring Services	\$90
Administrative I / II / III / IV	\$86 / \$109 / \$130 / \$144
ENGINEERING TECHNOLOGY	
Engineering Tech Manager I / II	\$313 / \$315
Principal Tech Specialist I / II	\$287 / \$297
Senior Tech Specialist I / II	\$263 / \$275
Senior GIS Analyst	\$238
GIS Analyst	\$225
Technical Specialist I / II / III / IV	\$168 / \$191 / \$215 / \$240
Technical Analyst I / II	\$120 / \$144
Technical Analyst Intern	\$97
Cross-Connection Control Specialist I / II / III / IV	\$125 / \$136 / \$152 / \$170
CAD Manager	\$189
CAD Designer I / II	\$147 / \$166
CONSTRUCTION MANAGEMENT	
Senior Construction Manager	\$304
Construction Manager I / II / III / IV	\$185 / \$199 / \$211 / \$267
Resident Inspector (Prevailing Wage Groups 4 / 3 / 2 / 1)	\$162 / \$180 / \$201 / \$209
Apprentice Inspector	\$147
CM Administrative I / II	\$79 / \$106
Field Services	\$209

- Hourly rates include Technology and Communication charges such as general and CAD computer, software, telephone, routine in-house copies/prints, postage, miscellaneous supplies, and other incidental project expenses.
- Outside Services such as vendor reproductions, prints, shipping, and major West Yost reproduction efforts, as well as Engineering Supplies, etc. will be billed at actual cost plus 15%.
- The Federal Mileage Rate will be used for mileage charges and will be based on the Federal Mileage Rate applicable to when the mileage costs were incurred. Travel other than mileage will be billed at cost.
- Subconsultants will be billed at actual cost plus 10%.
- Expert witness, research, technical review, analysis, preparation and meetings billed at 150% of standard hourly rates. Expert witness testimony and depositions billed at 200% of standard hourly rates.
- A Finance Charge of 1.5% per month (an Annual Rate of 18%) on the unpaid balance will be added to invoice amounts if not paid within 45 days from the date of the invoice.

* This schedule is updated annually

West Yost 2022 Billing Rate Schedule (continued)

(Effective January 1, 2022 through December 31, 2022)*

Equipment Charges

EQUIPMENT	BILLING RATES
2" Purge Pump & Control Box	\$270 / day
Aquacalc / Pygmy or AA Flow Meter	\$28 / day
Emergency SCADA System	\$35 / day
Gas Detector	\$80 / day
Generator	\$39 / day
Hydrant Pressure Gauge	\$10 / day
Hydrant Pressure Recorder, Impulse (Transient)	\$55 / day
Hydrant Pressure Recorder, Standard	\$40 / day
Low Flow Pump Controller	\$75 / day
Powers Water Level Meter	\$32 / day
Precision Water Level Meter	\$19 / day
Stainless Steel Wire per Foot	\$0.03 / day
Storage Tank	\$15 / day
Sump Pump	\$24 / day
Transducer Components (per installation)	\$23 / day
Trimble GPS – Geo 7x	\$220 / day
Tube Length Counter	\$22 / day
Turbidity Meter	\$22 / day
Vehicle	\$10 / day
Water Flow Probe Meter	\$20 / day
Water Quality Meter	\$27 / day
Water Quality Multimeter	\$185 / day
Well Sounder	\$30 / day

* This schedule is updated annually

Subcontractor Hourly Rates

- Tess Dunham = \$400/hour
- Meagan Wylie = \$175/hour

A APPENDIX A - RESUMES

Appendix A presents full resumes for the entire West Yost team in the following order:

- Andy Malone, PG
- Charles Duncan, PE
- Samantha Adams, MESM
- Carolina Sanchez, PE
- Eric Chiang, PhD
- Veva Weamer, MESM
- Erik Cadaret, PG, CHG
- Sodavy Ou, MESM
- Garrett Rapp, PE
- Lauren Sather, PhD
- Meagan Wylie | Zephyr Collaboration
- Tess Dunham | Kahn, Soares & Conway, LLP



Andy Malone, PG

Project Manager and Technical Supervisor

Andy is a hydrogeologist with over 25 years of professional experience in water resources consulting and in geologic sciences. His technical expertise includes sedimentary geology, tectonics, basin characterization, hydrogeologic and hydrologic analyses, aquifer mechanics, Geographic Information Systems, and database design and implementation. Andy develops investigative strategies for hydrogeologic studies, leads stakeholder technical committees, manages projects and staff, works to increase the technical expertise of the company, and mentors and guides junior staff as they develop into the next generation of expert water-resources professionals. At present, Andy is: managing engineering services for the Chino Basin Watermaster, where he is leading sophisticated hydrogeologic investigations in pumping-induced land subsidence, groundwater/surface-water interactions, and the monitoring of groundwater-dependent ecosystems; leading an effort with the Six Basins Watermaster to develop and implement an improved water-resources management program in the Six Basins to maximize the beneficial use of the groundwater basin; leading an effort to develop a Groundwater Sustainability Plan for the Spadra Basin; leading all technical services for the newly-established Borrego Springs Watermaster; and, developing a groundwater monitoring program in the Coachella Valley Groundwater Basin to support a Salt and Nutrient Management Plan.

Earlier in his career, Andy was the lead geologist in the development of a hydrogeologic conceptual model of the Chino Basin that was subsequently translated into a very well calibrated numerical groundwater-flow model. Andy continues to work with the modeling team to refine the conceptual model based on new geologic and monitoring data and to use the model to inform numerous basin-management initiatives, such as the management of land subsidence. Andy's professional experience also includes employment as a field geologist for the Indiana State Geological Survey and as a geology instructor at Saddleback College in Southern California.

EXPERIENCE

Coachella Valley Salt and Nutrient Management Plan Update, Coachella Valley Water District, Coachella, CA: Project Manager and Principal Geologist. The State Water Board's Recycled Water Policy requires the stakeholders in the Coachella Valley to develop an SNMP that sustainably manages salt and nutrient loading in the Coachella Valley Groundwater Basin (Basin) to protect its beneficial uses. In 2015, the Coachella Valley stakeholders submitted an SNMP to the Regional Board (2015 SNMP); however, the Regional Board found the 2015 SNMP insufficient. Of concern to the Regional Board was the insufficiency of the proposed monitoring program to fill data gaps and adequately characterize the spatial and vertical distribution of water quality conditions; lack of an antidegradation analysis to support salt and nutrient loading from the use and recharge of Colorado River water; and the absence of proposed implementation measures to manage salt and nutrient loading on a sustainable

STAFF TITLE: Principal Geologist II

YEARS OF EXPERIENCE: 25

PROFESSIONAL REGISTRATIONS

- Professional Geologist, California No. 8700

EDUCATION

- MS, Geological Sciences, Indiana University Bloomington
- BA, Geological Sciences, University of California, Santa Barbara
- BA, Environmental Studies, University of California, Santa Barbara

PROFESSIONAL AFFILIATIONS

- National Ground Water Association
- Groundwater Resources Association of California
- South Coast Geological Society

basis. Of concern to the Coachella Valley stakeholders is the ability for continued use and recharge of Colorado River water, which is a critical source of supplemental water to support the sustainability of the Basin and the economy of the Coachella Valley. In 2020/21, Mr. Malone led a multi-stakeholder effort, including the Regional Board staff, in the development of a workplan to update the 2015 CV-SNMP (CV-SNMP Development Workplan). The workplan includes a major re-design of the SNMP groundwater monitoring program and a technical process to set numeric TDS objectives for the Basin. The Regional Board approved the proposed groundwater monitoring program in February 2021, and approved the CV-SNMP Development Workplan in October 2021.

Land Subsidence Management Programs, Chino Basin Watermaster, Riverside, San Bernardino and Orange Counties, CA: Project Manager conducting ongoing investigations to determine the extent, rate, and mechanisms of land subsidence and ground fissuring in the Chino Basin. Manages and directs a technical committee of hydrogeologic consultants that are responsible for designing and implementing land subsidence investigations and monitoring programs. A common cause of ground fissuring within alluvial basins is the removal of subsurface fluids, which results in the compaction of poorly consolidated aquifer materials and land subsidence. Andy supervised the construction of multiple depth piezometers and a dual-borehole extensometer, a highly sophisticated monitoring facility that records the data necessary to establish relationships between pore pressure changes and aquifer system compaction in the area of acute subsidence and historical ground fissuring. Though this is an ongoing project, its results were used to develop an adaptive management plan in the Chino Basin that will minimize and/or abate permanent land subsidence and ground fissuring in the future.

Nitrogen/Total Dissolved Solids Studies, Santa Ana Watershed Project Authority – N/TDS Task Force, Riverside County, CA: Lead hydrogeologist conducting studies to revise the water quality objectives for groundwater sub-basins throughout the Santa Ana River Watershed. The result of this study was a comprehensive update to the salt and nutrient management plan for the entire Santa Ana River Watershed. For this effort, Andy developed revised sub-basin boundaries—based on a reassessment of hydrogeology, groundwater flow paths, and groundwater quality—to create “management zones” for more effective management and stewardship of these groundwater systems. This effort also included the development and testing of sophisticated statistical techniques to set new TDS and nitrate groundwater quality objectives based on historical water quality data. He has since directed four subsequent recomputations of ambient water quality in the groundwater management

zones, which were compared to the objectives and used by the Regional Board to assess the existence and magnitude of assimilative capacity.

Investigation of the Cause(s) of Recent Exceedances of the TDS Concentration Objective for Reach 3 of the Santa Ana River, Santa Ana Watershed Project Authority – Basin Monitoring Program Task Force, Riverside County, CA: Lead hydrogeologist conducting a study to characterize the causes of an increasing trend in the TDS concentration of Reach 3 of the Santa Ana River (SAR). The increasing trend had resulted in summertime exceedances of the TDS objective for Reach 3 in the Basin Plan. The purpose of the investigation was to provide the Regional Board with insight as it reviews and revises its approach to regulating SAR water quality. The study employed a mass-balance analysis and sensitivity study of the inflows and outflows to Reach 3 during the summertime months of 2004-2012. The investigation showed that the observed summertime increases in the TDS concentration of the SAR from 2004-2012 was correlated with a decrease in POTW discharges with relatively low TDS concentrations. In other words, the TDS concentration of the SAR is diluted by these POTW discharges. The decrease in summertime POTW discharge resulted from increased recycled-water reuse, decreased wastewater influent due to the 2008-09 economic recession, and implementation of indoor water-conservation measures.

Hydraulic Control Monitoring Program, Watermaster Engineering Services, Chino Basin Watermaster, Riverside, San Bernardino and Orange Counties, CA: Project manager designing monitoring programs for regulatory compliance. Andy is conducting ongoing investigations to determine the state of groundwater outflow from the Chino Basin as rising groundwater in the Santa Ana River. Crucial groundwater management practices, such as the recharge of recycled water, are dependent upon the demonstration that Chino Basin producers are controlling groundwater outflow. Through an extensive literature review and analyses of geologic, geophysical, and hydrologic data, Andy generated a conceptual hydrogeologic model of the Chino Basin near the river. Based on this model, he developed a detailed groundwater monitoring program that included the construction of nine nested, multiple-depth monitoring wells. The data derived from this monitoring program has characterized: the three-dimensional hydraulic gradients in this part of the basin over time and in response to specific management practices and the hydraulic relationships between the groundwater basin and the river.

Arlington Basin Desalter Expansion Studies, Western Municipal Water District, Norco and Riverside, CA: Project manager conducting a feasibility study to expand the Arlington Desalter facility in western Riverside County. The

study included hydrogeologic investigations, groundwater and surface water monitoring programs, and the development and calibration of a numerical, computer-simulation, groundwater-flow model of the Arlington Basin aquifer system. This model was used to predict the hydrologic impacts of an expanded desalter and the ability of the aquifer system to supply the expanded desalter with the required volumes of raw groundwater over the life of the facility (at least 30 years) without causing unacceptable impacts at the desalter wells, within the groundwater basin, or within neighboring basins. The model results indicated that the desalter expansion was feasible but that new wells would need to be constructed and that the drawdown caused by pumping these new wells would impact the neighboring Riverside Basin. Additional feasibility studies and model runs were conducted, which included the artificial recharge of supplemental waters in the Arlington Basin. The objectives of artificial recharge are to temporarily store supplemental water supplies, increase the yield of the Arlington Basin, and mitigate the regional drawdown impacts that would be caused by increased desalter pumping.

Prado Basin Habitat Sustainability Program, Watermaster Engineering Services, Chino Basin Watermaster, Riverside, San Bernardino and Orange Counties, CA: Project manager designing monitoring programs for regulatory compliance. Andy conducting ongoing investigations to determine whether the groundwater management plan in the Chino Basin is having adverse impacts on a groundwater-dependent riparian habitat in the downgradient portion of the basin. The investigation is a monitoring and mitigation requirement of the EIR for the groundwater management plan. The intent of this investigation is to characterize the historical, current, and future extent and quality of riparian habitat, and if degradation of the riparian habitat is documented, to provide information on the cause(s) of that degradation. If the cause(s) of degradation are attributed to the implementation of the groundwater management plan, the data from the investigation will aid in the development of efficient and effective mitigation measures. Andy and his team designed the monitoring program and investigation, and they are now implementing it. The investigation includes: remote-sensing and field surveys of the riparian habitat, the construction of monitoring wells and ongoing monitoring of water levels and quality, monitoring of surface water discharge and quality, monitoring of climatic trends, and analysis of other factors that can affect riparian habitat such as pests and wildfire. These data are analyzed and reported annually to a Watermaster sub-committee, which is led by Andy. The annual reports include recommendations for modifications to the monitoring program and a proposed budget for the following fiscal year.

Technical and Administrative Services, Six Basins

Watermaster, Lake Forest, CA: Manages and directs the technical and administrative services for the Six Basins Watermaster. In this role, Andy and Ms. Sanchez perform the following functions: prepare for and lead Board meetings; conduct monitoring programs; database management; coordinate recharge activities; review and revise Watermaster governing documents; prepare annual reports, annual budgets and assessments; determine the annual operating safe yield; perform water rights and storage accounting; and perform other tasks requested by the Board.

Andy is also managed the development of a Strategic Plan for the Watermaster Board. The objective of the Strategic Plan is to develop a water-resources management program that sustains and enhances the water supplies available to the Six Basins in a cost-effective manner and in accordance with the Judgment. This effort began in 2012 and included defining the goals and objectives of the stakeholders: maintaining or improving the yield of the Six Basins, maintaining and/or improving groundwater quality—especially in areas where beneficial uses are constrained by poor groundwater quality, minimizing losses due to rising groundwater and/or subsurface outflow, and optimizing the management of the Six Basins such that all Watermaster parties can reliably pump their shares of the basin yield. This effort also included a description of the water demands and supplies of the Six Basins and the physical nature of the Six Basins, such as surface-water availability and quality, recharge, groundwater production, groundwater quality, groundwater levels, basin boundaries and groundwater barriers, aquifer geometry and aquifer properties, groundwater flow, storage, and yield. From this information, impediments to achieving the stakeholders' goals were identified, which assisted in the development of concepts for improved basin management that will remove impediments and achieve the goals.

Subsequently, Andy directed an effort to develop and evaluate the potential components of the Strategic Plan (e.g. project alternatives). This included: describing the so-called "Baseline Alternative," which is the parties' operations without the Strategic Plan; developing and describing multiple Project Alternatives in enough detail to estimate the expected yield and the associated capital and operating costs; developing and using computer-simulation tools to evaluate the physical impacts of the project alternatives; evaluating and ranking the Project Alternatives based on yield and cost; and developing a plan for the implementation of the preferred alternative(s). Currently, the stakeholders in the Six Basins are moving forward to project implementation and financing for the Strategic Plan. Andy is assisting this effort by leading the technical work to support the preparation of a program EIR for the Strategic Plan.



Charles Duncan, PE

Principal-in-Charge

Charles Duncan is President of West Yost Associates. His experience is focused in water resources master planning of water and recycled water systems. His expertise includes the development and use of hydraulic network distribution system models to optimize water systems and associated infrastructure. Charles specializes in model development, calibration, analysis of reservoir outage plans, and analysis of alternative demand and system configuration scenarios, using InfoWater, EPANET, H₂ONET, KYPIPE, CYBERNET, and SynerGEE. He has used hydraulic simulation models to analyze water quality constituents to locate, size, and evaluate various water supply sources, reservoirs and elevated storage tanks, wells, booster pump stations, main transmission lines and turn-outs and other points of demand in a distribution system network under various average day, maximum day, peak hour, fire-flow demand, and emergency conditions. In addition, Charles is known for establishing technically feasible and constructible reservoir outage plans and cost-effective capital improvement projects that optimize the system performance based on the results of distribution system model analyses.

EXPERIENCE

Recycled Water Feasibility Study/Urban Reuse Plan – California Water Service Company, Chico District: Project Manager for development of a recommendation on recycled water for California Water Service Company's (Cal Water's) future water supply to identify the ultimate size of Cal Water's Urban Reuse Project, and develop a phased approach to Project implementation. The project was completed in two phases. One of the main objectives of the first phase was to determine the potential "size" of Cal Water's Urban Reuse Project. Enhanced the existing GIS database by adding additional data sets such as existing/known wells used to irrigate other parks, school fields, etc., that are not served by Cal Water, to help identify those potential application areas not currently served by Cal Water supplies, and to also add Cal Water's "government" water meter data set. Identified the most cost effective project elements and determined requirements for seasonal storage. A key element of Phase 1 work included interviewing and discussing the reuse project with potential end users, including the City of Chico, Chico Area Recreation and Park District, California State University, Chico, and Caltrans. Facilitated a workshop with key individuals from each stakeholder group to discuss and present the proposed project and evaluate their interest in future participation. For Phase 2, developed a conceptual reuse system and created a hydraulic system model. Based on the physical location and required demands of each potential user (developed in Phase 1), and the required seasonal storage quantities and potential storage locations identified in Phase 1, two (2) conceptual urban reuse system alternatives were developed and evaluated. Alternative 1 evaluated the supply of recycled water from the existing water pollution control plant (WPCP). This alternative would evaluate the conceptual layout of a recycled water backbone system from the existing WPCP



STAFF TITLE: Principal

YEARS OF EXPERIENCE: 30

PROFESSIONAL REGISTRATIONS

- Professional Civil Engineer, California No. 55498
- Professional Civil Engineer, Oregon No. 91819

EDUCATION

- MA, Business Administration, California State University, Sacramento
- BS, Civil Engineering, University of Southern California, Los Angeles

PROFESSIONAL AFFILIATIONS

- American Society of Civil Engineers
- American Water Works Association
- Bay Area Water Works Association

SPECIALIZED TRAINING

- InfoWater
- EPANET
- H₂ONET
- H₂OMAP
- SynerGEE
- KYPIPE
- CYBERNET
- KYPIPE III

PUBLICATIONS

- "Unidirectional Flushing Headlines Water Quality Programs," Brenda Estrada & Charles Duncan, AWWA Opflow, June 2016

(with all assumed seasonal storage located at the WPCP). Alternative 3 evaluated supplying recycled water from multiple (2) decentralized wastewater treatment facilities (WWTF) throughout the City. This alternative would evaluate the conceptual layout of multiple satellite WWTF systems to serve clusters of recycled water demand customers. Each alternative's potential backbone system pipelines, pump stations, and storage tanks, were identified, sized, and located. A feasibility-level cost estimate for the system was also prepared.

Water Facilities Master Plan Update, Eastern Municipal Water District, Perris, CA: Principal-in-Charge for a potable water facilities master plan update for the Eastern Municipal Water District. The District serves customers in a 550 square mile area in western Riverside County. The potable water system has five major service areas with a total of 70 pressure zones. The District anticipates significant future growth, with demand projected to increase approximately threefold through buildout of the District's service area. The water master plan update, which will identify needed capital facilities to meet future growth. The fast-track nature of the project necessitated managing six modeling teams to evaluate potable water system needs. Project tasks included preparing demand and supply projections, updating the hydraulic model with new facilities not in the GIS, validating the hydraulic model through comparisons with field operating data, preparing hydraulic evaluations to identify deficiencies and needed improvements, developing cost estimates for capital facilities and documenting results of the master plan in a comprehensive report. The Master Plan was completed in 2016.

Water Treatment Plant and Distribution System Master Plan, City of Yuba City, CA: Principal-in-Charge for a comprehensive master plan update that included developing a new hydraulic model for the City in InfoWater, providing a completed evaluation of the distribution system performance for existing and future demand conditions, including evaluations of system capacity and pressure, distribution system water quality, and performance of the system for different outage scenarios. West Yost also evaluated the future system configuration to assess transmission and distribution system needs to distribute water from the Water Treatment Plant to future growth area. Based on the analysis results, West Yost developed a list of necessary improvements to address existing deficiencies, serve the City's future growth areas, and a phasing plan to serve near-term development. The Master Plan also included an asset evaluation for key facilities and linear assets and used InfoMaster Water to develop a risk assessment model for City's water distribution pipelines.

2021 Water Master Plan, City of Sacramento, CA: Principal-in-Charge for the preparation of the City's 2021 Water Master Plan. Tasks include evaluation of existing and future demands,

including the impacts of the passages of SB 606 and AB 1668, which will establish urban water use efficiency standards for residential indoor water use, residential outdoor water use, commercial, industrial and institutional outdoor irrigation use, and water losses. The City's existing water supplies will be reviewed, and future potential supplies will be evaluated. A prioritized capital improvement program will be developed to meet the City's needs through buildout of the City's General Plan.

RiverArc Sacramento River Water Reliability Study, Placer County Water Agency, Auburn, CA: Principal-In-Charge for Phase 2 of the RiverArc Regional Water Supply Project. Phase 2 is a five year on-call contract that is focused on building momentum for the RiverArc Project through project promotion and strategy with strategic partners such as the Bureau of Reclamation, the Regional Water Authority/Sacramento Groundwater Authority, the Building Industry Association and the development community. Simultaneously, overseeing Project Implementation that focuses on refining the project's infrastructure needs and costs and developing a range of project phases, beginning with a quick start Initial Phase 1 Project to meet the requirements of those Project Partners with the most immediate surface water needs.

Sacramento River Water Reliability Study, Phase I, Placer County Water Agency, Auburn, CA: Project Manager for a multi-agency study involving stakeholders throughout the Sacramento area. The goal of the project is to regionally enhance water supply diversity and reliability, increase sustainability of regional groundwater supplies, and increase environmental protection in the American River watershed. The Phase I Study is a conceptual plan for the implementation and funding of the project and includes project phasing, project alternatives, and estimated planning-level costs.

French Valley and Winchester Sub-Regional Water Master Plan, Eastern Municipal Water District, CA: Principal-in-Charge for the development of a Sub-Regional Water Master Plan for the French Valley and Winchester area of Eastern Municipal Water District (EMWD). This planning effort includes reviewing EMWD's existing calibrated hydraulic model; adjusting facility control settings; updating existing demand assumptions; and projecting future demand assumptions within the study area. West Yost assessed the re-zoning of pressure zone areas to improve existing and future service to customers. Existing condition and ultimate buildout of the study area were evaluated. West Yost also evaluated various supply options and timing for the need of the supply; evaluated the system storage requirements for the study area; and made recommendations for the volume of storage required and propose preliminary site locations for the storage.



Samantha Adams, MESM

QA/QC

Samantha has over 15 years of professional experience in the water resources industry. Her technical expertise includes salt and nutrient management planning, groundwater management planning, regulatory support and compliance reporting, Watermaster services, water supply and demand analysis, surface and groundwater quality analysis, development and implementation of field monitoring programs, and database management. Samantha has managed, developed and negotiated, and implemented salt and nutrient management compliance plans for the Elsinore Valley MWD, Eastern MWD, the Chino Basin Watermaster and Inland Empire Utilities Agency, the City of Beaumont, the South Orange County Wastewater Authority, and Coachella Valley Water District. Many of these efforts included leading multi-stakeholder groups through collaborative decision-making processes based on complex technical information.

EXPERIENCE

Coachella Valley Salt and Nutrient Management Plan Update, Coachella Valley Water District, Coachella, CA: Principal Scientist and Technical Reviewer for the development of a work plan to update the Salt and Nutrient Management Plan (SNMP) for the Coachella Valley Groundwater Basin (Basin). The Regional Water Quality Control Board for the Colorado River Basin required that the stakeholders in the Coachella Valley develop an updated SNMP to comply with the 2018 Recycled Water Policy and that sustainably manages salt and nutrient loading in the Basin to protect its beneficial uses. Two key challenges in developing an actionable SNMP that complies with the Recycled Water Policy are the absence of water quality objectives for total dissolved solids in the Colorado River Basin Plan and the need for improved monitoring in the Coachella Valley. West Yost prepared a detailed work plan that will lead to the development of scientifically-based water quality objectives and a robust, adaptable monitoring and management program that will meet the objectives of the Regional Board to protect beneficial uses and achieve the desired level of certainty needed by the stakeholders to support financial investments in monitoring and for capital improvements where needed. The work plan was developed through a collaborative, step-wise process with the eight stakeholder agencies required to prepare the SNMP. The SNMP development work plan was submitted to the Regional Board for review and approval in April 2021.

FY 2021 / 22 Basin Planning Priorities to Update the Santa Ana River Watershed SNMP, Basin Monitoring Program Task Force (administered by the Santa Ana Watershed Project Authority), Riverside County, CA: Principal Scientist for regulatory and technical support in assessing the Santa Ana River Basin Plan SNMP for compliance with the 2019 Recycled Water Policy. For this project, West Yost is preparing an updated watershed-wide groundwater monitoring program, a surface water monitoring program, and recommendations for updated technical methods to assess assimilative capacity through periodic computation of ambient water quality.

STAFF TITLE: Scientist Manager I

YEARS OF EXPERIENCE: 15

EDUCATION

- Master of Environmental Science and Management (MESM), Water Resources Management, Donald Bren School of Environmental Science and Management, University of California, Santa Barbara, 2006
- BS, Environmental Science, University of Notre Dame, 2002

PROFESSIONAL AFFILIATIONS

- Groundwater Resources Association of California
- National Groundwater Association

Development and Implementation of the South Orange County Wastewater Authority (SOCWA) Salt and Nutrient Management Plan (2012 - present), South Orange County Wastewater Authority, and San Juan Basin Authority, Orange County, CA:

Project scientist in the development of the SOCWA SNMP from 2012 to 2014. As a subconsultant, developed the SNMP in accordance with the State Water Resources Control Board's 2009 Recycled Water Policy. In this role, Samantha directed the technical analyses to estimate current ambient water quality in the Lower San Juan Basin, performed antidegradation analyses to support the reuse of recycled water in the SOCWA service area, and prepared a detailed plan and schedule for implementing the recommended SNMP, which includes developing a comprehensive surface water and groundwater monitoring program and re-evaluating compliance with the San Diego Basin Plan in the future. In 2015, the San Juan Basin Authority assumed responsibility for the implementation of the SNMP. Since then, Samantha has developed and overseen the implementation of a new watershed-wide surface and groundwater monitoring program and supported negotiations with the San Diego Regional Board related to recycled water reuse and the SNMP. In 2018, during a workshop presenting the proposed amendments to the Recycled Water Policy, State Board staff singled out the San Juan Creek Watershed SNMP as a model to be followed by others in the State. The SNMP is currently being updated to comport with new requirements of the Recycled Water Policy.

Development, Implementation, and Update of the the Chino Basin Maximum Benefit Salt and Nutrient Management Plan, Chino Basin Watermaster and Inland Empire Utilities Agency, Rancho Cucamonga, CA:

Project scientist involved in the implementation of the Watermaster's salt and nutrient management planning efforts since 2006. As a project scientist, she worked for many years implementing and redesigning the surface and groundwater monitoring programs required to support the program and preparing annual compliance reports to the Santa Ana Regional Board. In 2012, Samantha led an effort to obtain a Basin Plan Amendment to revise the monitoring program requirements, which resulted in an annual savings of nearly \$250,000 for the Watermaster. Samantha is now managing a technical study and regulatory support process to obtain amendments to recycled water reuse/discharge permits and the Basin Plan to change the averaging period used to determine compliance with TDS discharge limitations. Due to conditions outside the control of the dischargers, the TDS concentration of recycled water is expected to increase above the current discharge limitation for short periods of time during dry periods. The objective of the study is to demonstrate the long-term impacts on the TDS concentration of the Chino Basin with and without the change to the objective, develop a regulatory

compliance strategy, and update the Watermaster's SNMP, incorporated in the Basin Plan. This work includes the development of complex fate-and-transport water quality models (surface and groundwater) that simulate the TDS and nitrate processes for the entire Chino Basin, including the historical, current, and future loading associated with land use management for agriculture and dairy operations.

Upper Temescal Valley Salt and Nutrient Management Plan (2013 - present), Elsinore Valley Municipal Water District and Eastern Municipal Water District, Lake Elsinore and Perris, CA:

Project manager and lead scientist for the development of the Upper Temescal Valley SNMP. The Santa Ana Regional Board required the EVMWD and EMWD to prepare an SNMP to support their recycled water discharge and reuse plans in the Upper Temescal Valley. The objectives of this project were to establish scientifically based antidegradation objectives for the Upper Temescal Valley groundwater management zones (these objectives currently do not exist); estimate current ambient water quality and assimilative capacity; project future TDS and nitrogen concentrations based on the water resources management plans of local water supply agencies; identify the regulatory challenges posed by the recycled water reuse and discharge plans of the EVMWD and EMWD; and develop an SNMP that addresses these challenges. Samantha was responsible for developing the technical basis of the demonstration, developing a long-term compliance strategy, leading negotiations with the Regional Board, and stakeholder outreach. The plan was approved for incorporation into the Basin Plan by the Executive Officer in November 2017 and the team is supporting the process to prepare and amendment to the Basin Plan to incorporate the SNMP. Also, Samantha serves as the current principal-in-charge to the team of scientists managing the implementation of the SNMP.

Maximum-Benefit Demonstration for the Elsinore Groundwater Management Zone (2014-present), Elsinore Valley Municipal Water District, Lake Elsinore, CA:

Project manager and lead scientist for developing a maximum-benefit demonstration to raise the TDS and nitrate concentration objectives for the Elsinore Groundwater Management Zone (GMZ) in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). The District is seeking new, maximum benefit-based TDS and nitrate concentration objectives so it can have the flexibility to develop and invest in a water resources plan that optimizes the management and use of all its water supply assets to achieve a reliable water supply in an environmentally sound manner. The District's maximum-benefit proposal is designed to facilitate the maximum reuse of recycled water, to protect the beneficial uses of groundwater in the Elsinore GMZ and downstream GMZs for future generations, and to be consistent with Executive Order 68-16, Water Code section 13241, and State Board orders

and policies that promote recycled water reuse. Samantha is responsible for: developing the technical basis of the demonstration; developing alternative salinity management alternatives for evaluation; managing a team of scientists that are using numerical groundwater modeling tools to develop TDS and nitrate concentration projections for the Elsinore GMZ; developing a long-term compliance strategy to ensure that the beneficial uses of the Elsinore GMZ will be protected under the maximum-benefit program; leading negotiations with the Santa Ana Regional Board; and stakeholder outreach. The proposal was accepted by the Regional Board staff in February 2020 and the team is now supporting the process to prepare and amendment to the Basin Plan to incorporate the new maximum benefit objectives and management plan.

Triennial Update of the Maximum-Benefit Salinity Management Plan (2013 - 2018), Eastern Municipal Water District, Perris, CA: Developed the technical basis and regulatory compliance program to support the adoption of maximum-benefit-based objectives for TDS and nitrate in the San Jacinto Upper Pressure GMZ. The maximum-benefit objectives and associated salt and nutrient management plan were incorporated into the Santa Ana Basin Plan in 2010. To support the maximum-benefit objectives, the Regional Board required that EMWD implement specific salinity monitoring and management programs, known as “maximum-benefit commitments” within the San Jacinto Upper Pressure GMZ and throughout their service area within the San Jacinto Watershed. One such commitment requires the EMWD to develop and implement a salinity management plan to control the TDS concentrations of source water and recycled water in the EMWD service area. This program is needed to ensure that groundwater quality is protected from degradation associated with the reuse and discharge of recycled water. The plan must be updated every three years. The EMWD contracted with in 2013 to develop the salinity management plan and again in 2015 to update it. The Maximum-Benefit Salinity Management Plan provides a comprehensive overview of the regulatory environment, the EMWD’s water and wastewater supply operations and associated water quality, the nexus of these source waters to groundwater quality, and the EMWD’s existing and planned salinity management activities. In 2013, Samantha was wholly responsible for designing and writing this first-of-its-kind report for the San Jacinto Watershed. In 2015, Samantha managed the team of scientists that prepared the first triennial update to the plan. In 2018, Samantha served as the technical advisor to for the triennial update.

2020 Update of the Chino Basin Optimum Basin Management Program (OBMP), Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA: Project manager for the 2020 update of the Chino Basin OBMP. The OBMP is the Chino Basin’s sustainable

groundwater management plan. In 2000, the OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders, described the physical state of the groundwater basin, developed a set of management goals, identified impediments to those goals, developed a series of actions that could be taken to remove those impediments and achieve the management goals, and developed agreements to implement the OBMP. Most of the planned actions contained in the 2000 OBMP were implemented and resulted in significant increases in the use of recycled water, increased storm and supplemental water recharge, groundwater storage, water quality protection and the maintenance of safe yield.

Watermaster is now working on the 2020 OBMP Update and is using the same process developed by the team for the 2000 OBMP. It is addressing current and projected challenges to water supply reliability from climate change, limitations in imported water supply and its reliability, new water quality challenges, basin salinity, land subsidence and groundwater dependent ecosystems. In addition to her role as project manager, Samantha is responsible for preparing meeting materials and leading a series of public listening sessions to obtain stakeholder feedback that will guide the development of basin management activities and the ultimate OBMP 2020 implementation plan. Following each meeting, Samantha prepares detailed memos to document the feedback provided during the Listening Sessions. The OBMP update will be completed in 2020.

Triennial Recomputation of Ambient Water Quality (2007 – 2014), Santa Ana Watershed Project Authority, Riverside County, CA: Participant in the Recomputation of Ambient Water Quality for the Santa Ana Watershed for the 1987-2006, 1990-2009, and 1993-2012 periods. The objective of this study is to calculate the ambient TDS and nitrate concentrations for 40 groundwater management zones (GMZs) in the Santa Ana River Watershed. The ambient water quality determinations are compared to water quality objectives and used to assess assimilative capacity, which is a measure used by the Regional Water Quality Control Board to set discharge permit limitations. This study involved a rigorous and stringent technical approach to collect, QA/QC, and analyze data and statistics. For the 1987-2006 and 1990-2009 efforts, Samantha was responsible for overseeing the collection, compilation, and QA/QC of the data used in the analysis, and for assisting in the development of water quality contours for the GMZs. In the 1993-2012 effort, Samantha was responsible for leading the effort to develop the water quality contours for the GMZs and to perform QA/QC of the contours.



Carolina Sanchez, PE

Water Quality (Salts and Nutrients)

Carolina has eight years of professional experience in the water resources industry. Her skills include groundwater monitoring, numerical analysis, water resources, and GIS. As a Senior Engineer, Carolina is involved in a variety of projects. Her tasks include: analysis of groundwater level and water quality data; data management; CASGEM compliance; developing charts and contour maps to characterize groundwater flow systems and associated water quality; conducting hydrologic and hydraulic analyses of groundwater recharge using imported, recycled, and storm waters; modeling groundwater production trends; creating tables, charts, and maps to analyze and characterize surface water discharge and associated water quality; and reconnaissance-level design of surface water management facilities.

EXPERIENCE

Salt and Nutrient Management Plan - Monitoring and Data Collection Implementation, San Juan Basin Authority, Orange County, CA: Project engineer responsible for the implementation of the monitoring and data collection work plan, which is an addendum to the Salt and Nutrient Management Plan (SNMP) for the South Orange County Aliso Creek, San Juan Creek, and Portions of Other Basins. The SNMP was developed for the South Orange County Wastewater Authority in 2014. The work plan, which is required by the San Diego Regional Water Quality Control Board as part of the State Board's Recycled Water Policy, was developed in collaboration with all of the regional agencies that serve recycled water in the San Juan Creek Watershed. Carolina was responsible for coordinating the field monitoring programs and for collecting, compiling, and checking recycled water, surface water, and groundwater data. Data collected through the SNMP monitoring program will be used to evaluate "current" groundwater quality, project future changes in groundwater quality, determine the impact of recycled water reuse on current and future groundwater quality, and determine if current or future groundwater quality exceeds the groundwater quality objectives.

Upper Temescal Valley Salt and Nutrient Management Plan, Elsinore Valley Municipal Water District (EVMWD) and Eastern Municipal Water District (EMWD), Lake Elsinore and Perris, CA: Project engineer for the Upper Temescal Valley SNMP. The Santa Ana Regional Board required the EVMWD and EMWD to prepare an SNMP to support their recycled water discharge and reuse plans in the Upper Temescal Valley. The objectives of this project were to establish technically based antidegradation objectives for the Upper Temescal Valley groundwater management zones (these objectives currently do not exist), estimate current ambient water quality and assimilative capacity, project future total dissolved solids (TDS) and nitrogen concentrations based on the water resources management plans of the local water supply agencies, identify the regulatory challenges posed by the recycled water reuse and discharge plans of the EVMWD and EMWD, and develop a salt and nutrient management plan that addresses these challenges. Carolina was responsible for

OFFICE LOCATION:

- Lake Forest, CA

STAFF TITLE: Senior Engineer I

YEARS OF EXPERIENCE: 8

PROFESSIONAL REGISTRATIONS

- Professional Civil Engineer, California, No. 85598

EDUCATION

- MS CEE Environmental Fluid Mechanics and Hydrology, Stanford University, Stanford, 2013
- BS, Civil Engineering, Loyola Marymount University, Los Angeles, 2012

PROFESSIONAL AFFILIATIONS

- Groundwater Resources Association of California
- Technical Board, Thirst Project

collecting, organizing and managing the data compilation and management efforts, and analyzing data to estimate historical and future irrigation return flows and associated TDS and nitrate concentrations from historical and projected land use and period-appropriate irrigation and fertilizer practices. Carolina was also the project engineer in the development of the 2020 update to the 2017 SNMP and is currently the project manager for the implementation of the SNMP.

Total Dissolved Solids and Nitrate Concentration Projections for the San Jacinto Upper Pressure and Canyon Groundwater Management Zones (2020). Eastern Municipal Water District, Perris, CA: Project engineer on a project to prepare a TDS and nitrate concentration projections for the San Jacinto Upper Pressure Groundwater Management Zone (SJUP GMZ) to demonstrate the water quality impacts of the various water management activities being implemented by the Eastern Municipal Water District (EMWD). Carolina served as the lead engineer for this study and was responsible for the collection and compilation of hydrogeologic and planning data, the coordination of meetings to develop model scenarios, and the implementation of a constantly stirred reactor model (CSR).

Total Dissolved Solids Studies, Santa Ana Watershed Project Authority, Orange County, CA: Project engineer on a TDS study to characterize the volume-weighted summertime TDS concentration of POTW recycled water discharges above Prado Dam. The objective of this study was to evaluate the causes of recent TDS concentration exceedances at the Santa Ana River Reach 3 above the TDS objective and to characterize the relative magnitude of each factor contributing to the exceedance of the summertime surface water objectives. Carolina was responsible for collecting and compiling data and preparing charts and graphics to support data analysis.

2020 Update of the Chino Basin Optimum Basin Management Program (OBMP), Chino Basin Watermaster, Rancho Cucamonga, CA: Project engineer for the 2020 update of the Chino Basin OBMP. The OBMP is the Chino Basin's sustainable groundwater management plan. The 2000 OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders, described the physical state of the groundwater basin, developed a set of management goals, identified impediments to those goals, developed a series of actions that could be taken to remove those impediments and achieve the management goals, and developed agreements to implement the OBMP. Most of the planned actions contained in the 2000 OBMP were implemented and resulted in significant increases in the use of recycled water, increased storm and supplemental water recharge, groundwater storage, water quality protection and the maintenance of safe yield.

Watermaster is now working on the 2020 OBMP Update and is using the same process developed for the 2000 OBMP. It is addressing current and projected challenges to water supply reliability from climate change, limitations in imported water supply and its reliability, new water quality challenges, basin salinity, land subsidence and groundwater dependent ecosystems. As the project engineer, Carolina is responsible for preparing meeting materials and documenting stakeholder feedback during a series of eight public listening sessions that will guide the development of basin management activities and the ultimate OBMP 2020 implementation plan. Carolina also presents technical information to the stakeholders and leads group sessions during the public listening sessions. The Inland Empire Utilities Agency (IEUA) recently completed and published the draft Programmatic Environmental Impact Report (PEIR) of the 2020 OBMP Update. Carolina was responsible for drafting and reviewing sections of the draft PEIR.

Development of a Strategic Plan for the Six Basins, Six Basins Watermaster, Lake Forest, CA: Project engineer for the development of the Strategic Plan for the Six Basins Watermaster. The objective of the Strategic Plan is to develop a water-resources management program that sustains and enhances the water supplies available to the Six Basins parties in a cost-effective manner and in accordance with the Six Basins Judgment. This effort began in early 2012 and included the preparation of a comprehensive "state of the basin" report and the articulation of the issues, needs, and wants of the Watermaster Parties—individually and collectively as a group. This information was used to define Strategic Plan project alternatives. The evaluation of the alternatives required the use of surface water and groundwater computer-simulation models. Carolina developed a project economic forecasting tool to estimate the annual water supply cost for each party for the "no strategic" plan, or baseline case, and for alternative management plans being considered in Strategic Plan development. She was responsible for analyzing water production trends; hydrologic and hydraulic modeling of increased stormwater diversion and recharge at the San Antonio and Thompson Creek Spreading Grounds; and the preparation, of maps, charts, and tables to communicate the results of groundwater model simulations of the Strategic Plan alternatives. She also worked on the final report, documenting the development of the Strategic Plan, and a planning proposal for the implementation of the Strategic Plan. Currently, she is working on the implementation of the Strategic Plan, which includes developing planning scenarios for the Six Basins Parties, coordinating with groundwater modelers, and coordinating with the environmental consultants for the preparation of the Programmatic Environmental Impact Report.

MEAGAN WYLIE

FACILITATION & STAKEHOLDER ENGAGEMENT

CONTACT

meagan@zephyrcollaboration.com
619-886-8152
San Diego, CA

EXPERTISE

- Facilitation and Mediation
- Participatory Planning
- Stakeholder Assessments
- Stakeholder Engagement and Large Stakeholder Processes
- Community Outreach
- Project Management
- Materials Development
- Meeting Logistics Planning

EDUCATION & CERTIFICATIONS

B.S., Marine Biology and Oceanography

Hawai'i Pacific University | Honolulu, HI

Non-Profit Management Solutions Certifications | San Diego, CA

- Succeeding as a Supervisor
- Producing Peak Performance
- Team Building
- Interviewing and Hiring for NGOs

Certificate, Professional Development

Center for Collaborative Policy,
Sacramento, CA

MEMBERSHIPS

Accord 3.0 Network

PUBLICATIONS

Groundwater Sustainability Plans:
California's Newly Formed
Groundwater Sustainability Agencies:
The Rewards of Optimizing Effective
Coordination and Collaboration. The
Water Report, Issue #162. 2017

SUMMARY

Senior Facilitator and Project Manager

Zephyr Collaboration | 2018 - Present
Seatone Consulting | 2015 - Present

Lead Facilitator and Project Manager

California State University, Sacramento | 2013 - Present

Marine Conservation Initiative Program Consultant

Natural Resources Defense Council | 2013 - 2015

Marine Conservation Program Manager

San Diego Coastkeeper | 2006 - 2012

SELECTED RECENT PROJECT EXPERIENCE

Landscape Stakeholder Advisory Group

California Department of Water Resources | 2017 to Present

Facilitation of the Landscape Stakeholder Advisory Group and its eight subcommittees for 300+ interested stakeholders in the landscape industry and public agency sector to provide input on landscape water use efficiency topics to DWR ([weblink](#)). Ms. Wylie also provides overall project management and document development support to DWR project staff.

Owens Lake Groundwater Development Program

Los Angeles Department of Water and Power | 2019 to Present

A component of the Owens Lake Master Project is to utilize groundwater from beneath Owens Lake to provide a portion of water demand for dust mitigation on Owens Lake in an environmentally sustainable manner. Ms. Wylie facilitates a technical Groundwater Work Group that was convened to provide feedback and recommendations to Los Angeles Department of Water and Power on their efforts, as well as the Patsiata Cultural Resources Task Force, comprised of the five Tribes, regulatory agencies, and technical consultants focused on protection of cultural resources in this area.

Sea Level Rise Working Group

California Coastal Commission | 2019 to Present

Facilitation support and document development for a Working Group of California Coastal Commissioners and elected officials of coastal cities and counties to address strategies and improved coordination for Sea Level Rise and coastal resiliency.

Peyton Slough Marsh Complex Management Planning

California Water Quality Regional Control Board | 2021 - Present

Performed a situation assessment and designed a collaborative process for stakeholders who have been working for 30 years to restore and manage a series of tidal wetlands in the California Bay-Delta. Facilitation support of a Planning Group of regulatory agencies, landowners, nonprofits and interested parties working to develop a marsh-wide Management Plan.

Turlock Subbasin Groundwater Sustainability Plan Community Engagement

[California Department of Water Resources | 2017 to 2022](#)

Pursuant to the Sustainable Groundwater Management Act (SGMA), facilitated the successful creation of a basin-wide Communications Committee, led the development of a robust Groundwater Sustainability Plan (GSP) Communication and Engagement Plan, and managed/supported implementation of activities outlined in the Plan including community workshops, technical advisory committee meetings, virtual "office hours", website and outreach materials development. www.turlockgroundwater.org

Cosumnes Subbasin Groundwater Sustainability Plan Community Engagement

[Cosumnes | 2021 to Present](#)

Supports the Cosumnes Groundwater Authority in stakeholder and public engagement efforts including updates to its comprehensive Communication and Engagement Plan, the development of outreach materials, website content, planning of public workshops and virtual meetings. <https://www.cosumnesgroundwater.org>

Sustainable Groundwater Management Program: Borrego Valley Groundwater Basin

[California Department of Water Resources | 2016 to 2020, and 2022](#)

Pursuant to SGMA, in October 2016, the Borrego Water District and the County of San Diego approved a Memorandum of Understanding (MOU) to establish the Borrego Valley Groundwater Sustainability Agency (GSA). The GSA was responsible for developing a GSP for the Borrego Basin, due January 31, 2020, with input provided by a formally established Advisory Committee (AC) to aid in the development of the planning and policy recommendations contained in the GSP. Ms. Wylie facilitated meetings of the AC, the GSA "Core Team" that includes representatives from the GSA agencies and GSP technical consultants, public workshops, and completes related project management activities.

Owens Valley Subbasin Groundwater Sustainability Plan Community Engagement

[Owens Valley Groundwater Authority | 2019 to 2021](#)

Facilitated an Ad Hoc Committee of the Owens Valley Groundwater Authority in the development of a Guiding Principles document and comprehensive Communications and Engagement Plan, including tribal engagement, that the OVGA will implement during GSP development and future implementation. <https://ovga.us>

California 2020 Census

[Governor's Office of Planning and Research | 2018 to 2021](#)

Public and engagement and project management for the Census 2020 series of 25 statewide Regional Convenings of grassroots project partners held in 2018/19 and again in 2020. Facilitation support of the California Complete Count Committee and its four working groups. Is part of team of writers who developed the state's census Statewide Outreach and Communication Strategy, as well as several other reports on Census 2020 efforts for submission to the Governor's Office and to the Legislature every six months beginning in early fall 2018 through March 2021.

Environmental Health Leadership Summit

[California Air Resources Board | 2017 to 2020](#)

The annual Environmental Health Leadership Summit in Imperial Valley draws attention to degradation of air quality and public health, associated air quality monitoring programs, and allied environmental justice efforts. Ms. Wylie assists with Summit preparation and organization efforts, Summit facilitation, and developed the comprehensive meeting reports. <https://www.ejsummit.com>

AB 32 Environmental Justice Advisory Committee

[California Air Resources Board | 2016 to Present](#)

Support facilitated discussions among ARB and Environmental Justice Advisory Committee (EJAC). The first EJAC was convened in 2007 to advise the ARB in developing a Scoping Plan, and any other pertinent materials for implementing AB 32. The EJAC is comprised of representatives from communities in the State with the most significant exposure to air pollution, including, but not limited to, communities with minority populations or low-income populations, or both. The EJAC was reconvened in 2013 to advise the Board on the 2013 Scoping Plan Update. The ARB must update the current Scoping Plan by March 2017. Project roles include meeting facilitation, coordination among the EJAC members and ARB, and assisting with preparation of community workshop agendas and materials.

Sediment Management and Technical Advisory Group

[University of California, Irvine | 2017 to 2021](#)

As a component of their FloodRISE project, University of California, Irvine (UCI) conducted a National Oceanic and Atmospheric Administration (NOAA) funded research project to analyze the potential implications of various sediment management options on the resiliency and vulnerability of coastal communities and coastal wetlands under climate change scenarios in two areas: the Tijuana River Valley and Newport Beach, California, and to develop modeling tools. Ms. Wylie provides collaborative services to UCI to coordinate and facilitate the annual meetings of the Management and Technical Advisory Group. Efforts include project coordination, meeting preparation, workbook development, meeting facilitation, and development of comprehensive meeting summary reports.

Central Valley Landscape Conservation Project

[U.S. Fish and Wildlife Service | 2014 to 2018](#)

Cooperative Landscape Conservation (CLC) is a process that achieves common goals and priorities across a network of partners to ensure sustainable ecosystems throughout a broad landscape. This project links CLC with climate adaptation planning for avian, fish, and terrestrial species of significance in California's Central Valley. Ms. Wylie facilitated the collaborative efforts of a group of over 100 stakeholders representing an array of agencies, organization, businesses, landowners and Tribes to produce climate-smart conservation goals and objectives for priority resources; vulnerability assessments for priority resources; adaptation strategies and actions, and spatially explicit design options to support prioritization of priority resources; and an online toolbox and outreach plan to help partners implement the adaptation strategies. This project's website with outputs and products developed to-date can be accessed at:

<http://climate.calcommons.org/cvlcp>.

Independent Technical Panel (ITP) for Demand Management Measures

[California Department of Water Resources | 2014 to 2016](#)

DWR convened an Independent Technical Panel (ITP) to provide information and recommendations to DWR and the Legislature on new demand management measures (DMM), technologies, and approaches. DWR convened the ITP in 2013, and submitted its first legislative report on DMM in December 2014. Shortly thereafter in early 2015, the ITP engaged in efforts to address urban landscape water use efficiency throughout the state. After 30 two-day intensive meetings, the ITP finalized its second legislative report in May 2016.

San Diego IRWM Regional Water Data Management Program

[County of San Diego | 2013 to 2015](#)

This project involved a collaborative, stakeholder-driven process to summarize current data gathering efforts, assesses and prioritizes data management needs, and recommend basic design parameters for the development of the Integrated Regional Watershed Management (IRWM) data management system. Ms. Wylie facilitated Advisory Work Group meetings, stakeholder workshops and public meetings, and supported outreach and coordination efforts.

Tijuana River Estuary Temporal Investigations of Marsh Ecosystems (TIME) Assessment and Technical Workshops

[National Estuarine Research Reserve System | 2013 to 2015](#)

Following a comprehensive needs assessment and a workshop devoted to scenario planning for climate change, the TIME project then focused on identifying ecosystem services and analyzing trade-offs between major management strategies in the Tijuana River Valley. Ms. Wylie facilitated Advisory Group meetings and technical Workshops with numerous agency partners.



Theresa (Tess) A. Dunham

Areas

- ❖ Water Quality
- ❖ Public Policy
- ❖ Regulatory Facilitation

Education

- McGeorge School of Law (J.D.)
- Boston University (B.A)
- California Agricultural Leadership Program (1999-2001)
- University of California Davis, Executive Leadership Program (2018)

Tess Dunham is a partner at Kahn, Soares & Conway. Her legal skills are combined with a unique background outside of law, allowing her to help clients more strategically. A leading water quality lawyer, Tess was raised on her family's farm. While still active in the family's business, she forged a career in politics, lobbying, environmental consulting, and public policy – eventually balancing some roles while attending law school at night. Now an accomplished advisor on water quality issues, she is called upon by municipalities, private industries, sanitation agencies, growers, ranchers and more to help with situations they face. She is also called upon by large associations and industry groups, including one of the largest statewide coalitions of dairy organizations and a trade group whose members provide half of the nation's fresh fruits and vegetables.

Tess also deftly handles highly complex work for some of California's largest cities, counties, publicly-owned treatment works, and public agencies.

Her policy experience, gained from working for the Governor's Office, the Department of Conservation, the California Farm Bureau Federation, and as a lobbyist, leaves her with not only an inside perspective of working with the public agencies that govern water quality, but with relationships that can mean the difference between reaching productive resolutions to problems.

When precedent-setting issues are at stake, she is often the attorney called on because of her substantive knowledge of water quality. She has submitted briefs to the U.S. Supreme Court, California Supreme Court, and California Appellate Courts. Tess routinely appears before the State Water Resources Control Board and many of the nine regional water quality control boards. She is well known by many Water Board staff and members and has developed a reputation of someone who is thoughtful and willing to work with the Water Boards to find mutually agreeable solutions for clients and the Water Boards.

REPRESENTATIVE MATTERS

Groundwater Policy

In her role as attorney/policy advisor for the Central Valley Salinity Coalition (CVSC), Tess served as one of the chief architects of the Central Valley Salt and Nitrate Management Plan (SNMP), which is designed to deal with the problem of salt and nitrate in Central Valley groundwater basins. Once the Central Valley SNMP was accepted by the Central Valley Water Board, Tess then helped to draft the Central Valley's Basin Plan Amendments to implement the Central Valley's SNMP. This process encompassed working with diverse stakeholders to draft amendments that were generally acceptable by all stakeholders, including the Central Valley Water Board and other participating agencies. Tess continues to actively participate in the Central Valley Salinity Alternatives for Long-term Sustainability (CV SALTS) Executive Committee along with the Central Valley Regional Water Quality Control Board, environmental justice advocates, state agencies, federal agencies, and others to implement the Basin Plan Amendments.

In addition to CV SALTS, Tess provides regulatory facilitation services and public policy expertise to the Santa Ana Watershed Project Authority in its administration of the Basin Monitoring Task Force, which oversees implementation of the Santa Ana region's historic salt and nitrate management plan. Tess also provides regulatory strategy and facilitation services to a special project under the Central Valley Clean Water Association (CVCWA), a 15+ year collaboration with lead policy staff from six of the Central Valley's largest publicly-owned treatment works (POTWs).

Agricultural Resources

Tess provides ongoing water quality regulatory and legal services to the California Rice Commission, East San Joaquin Water Quality Coalition, and others. For example, Tess assisted Central Valley agricultural entities in negotiating a Long-Term Irrigated Lands Program with the Central Valley Regional Water Quality Control Board, State Water Board and environmental justice advocates. She continues to advise and represent Central Valley agriculture in the implementation of this program. Tess also represents Central Coast agricultural interests in regards Waste Discharge Requirements issued by the Central Coast Regional Water Quality Control Board.

Besides representing irrigated agricultural interests, Tess also represents the California dairy industry on water quality issues that occur before the various regional water boards and the State Water Board.

Water Quality

- Provide ongoing water quality regulatory and legal services to the Pyrethroid Working Group.
- Provide ongoing regulatory and legal services to the Central Valley Clean Water Association, which represents over 50 POTWs located in the Central Valley.
- Represent numerous POTWs before various Regional Water Quality Control Boards, including the Lahontan and Central Valley Regional Boards, in negotiating and obtaining favorable NPDES permits and state issued waste discharge requirements.

- Represent numerous POTWs before the State Water Resources Control Board in various petition proceedings.
- Represent Ventura County in prolonged negotiations and proceedings before the Los Angeles Regional Water Quality Control Board for County-wide Phase I Municipal Separate Storm Sewer (MS4) Permit.
- Represent numerous public agencies in enforcement proceedings brought by various Regional Water Quality Control Boards.
- Represent various companies in negotiating reasonable settlement agreements with the State Water Board's Office of Enforcement as well as with environmental organizations that have brought Clean Water Act suits under the act's citizen suit enforcement provisions.

Insights and Activities

- Member, California Association of Sanitation Agencies (CASA)
- Member, California Association of Stormwater Quality Agencies (CASQA)
- Presenter, Groundwater Resources Association of California
 - 2020 David Keith Todd Lectureship
- Guest Columnist, "Balancing farming and water quality in the Central Valley," The Daily Journal, May 1, 2019
- Panelist, "Salt and Nitrate Control and Sustainable Groundwater Management: Challenges and Opportunities," ACWA Spring Conference, May 8, 2019
- Panelist, "Groundwater Contamination: Are We Stuck With It?," 15th Annual California Water Law Symposium, February 2, 2019
- Panelist, "Water Quality: What's Coming Next, and How to Prepare for the Challenges and Opportunities," California Dairy Sustainability Summit, November 2018
- Panelist, "CV-SALTS and Nitrate Control Program," First Annual Western Groundwater Congress, September 2018
- Presenter, "CV-SALTS – What it Means to Your Permits and Your Community," Central Valley Clean Water Association Annual Conference, May 2018



Eric W.H. Chiang, PhD

Modeling Lead



STAFF TITLE: Principal Scientist II

YEARS OF EXPERIENCE: 30

EDUCATION

- PhD, Civil Engineering, University of Kassel, Germany, 1998
- MS, Civil Engineering, University of Stuttgart, Germany, 1989
- BS, Civil Engineering, National Central University, Taiwan, 1983

PROFESSIONAL AFFILIATIONS

- Groundwater Resources Association of California
- National Ground Water Association
- International Association of Hydrological Sciences

Dr. Chiang's experience has focused on research and application in the areas of numerical groundwater and surface water modeling, 3D Visualization, software development, data management, planning and decision analysis, and geographic information systems (GIS). Eric develops and applies several computer software packages, notably Processing MODFLOW -- a graphical user interface for groundwater and surface water flow and transport modeling with MODFLOW, MODPATH, MT3D, GSFLOW, SEAWAT, and PEST. He applies Processing MODFLOW in many modeling projects to assist in planning, decision making, regulatory compliance, and to facilitate stakeholder involvement and understanding.

In addition, he develops and applies HydroDaVE -- a cloud-based groundwater and surface water data management system that enables users to remotely manage, visualize, analyze, and share groundwater, surface water, climatic data, and model results on a map-based user interface. He incorporates innovative remote-sensing or model-based data in HydroDaVE, such as Normalized Difference Vegetation Index (NDVI) to quantify vegetation and Next Generation Weather Radar (NEXRAD) and Global Circulation Models (GCMs) to provide historical and future daily/hourly precipitation estimates. Eric has extensive experience in several modeling software programs including MODFLOW, GSFLOW, PRMS, HYDRUS, MT3DMS, RT3D, SEAWAT, PEST, UCODE, GSLIB, ArcGIS, SURFER, and GRAPHER, and he is well versed in the SQL Database and several programming languages such as C, C#, C++, Python, Fortran, Visual Basic, and R.

Eric was a Professor at the University of the Free State, South Africa where he authored and published 3D Groundwater Modeling with PMWIN, a textbook that covers Processing MODFLOW and computer codes for groundwater flow and contaminant transport simulation. In addition, Eric served as a University Instructor at the University of Bremen, Germany where he taught Applied Groundwater Modeling short courses from 1996 to 2004.

EXPERIENCE

Update of the Salt and Nutrient Management Plan for the Chino Basin, Chino Basin Watermaster, Rancho Cucamonga, CA: Lead water quality modeler for the update of the salt and nutrient management plan for the Chino Basin. The objective of the study is to demonstrate the long-term impacts of recycled water reuse and recharge on the total dissolved solids (TDS) concentration of the Chino Basin during prolonged future droughts. This work includes the development of a series of numerical models, including complex fate-and-transport water quality models (land surface, streams, vadose zone, and groundwater) that simulates the water flow and TDS and nitrate transport processes for the entire Chino Basin, including the historical, current, and future loading associated with land use management for agriculture and dairy operations. The specific models used include R4, Hydrus-2D, MODFLOW-NWT

and USGS-MT3D. Dr. Chiang developed software to iteratively run the models to honor feedback loops in the system. This enables the projected changes in groundwater quality to be represented in projected water supply and recycled water quality, the returns flows of which contribute to subsequent changes in groundwater quality and Santa Ana River quality (the feedback loop). This model is the most detailed and sophisticated TDS and nitrate simulation ever done for the Santa Ana Watershed.

2015 and 2020 Safe Yield Recalculation for the Chino Basin, Chino Basin Watermaster, Rancho Cucamonga, CA: Lead Modeler. The safe yield of the Chino Basin is re-calculated pursuant to the Peace Agreement and Watermaster rules and regulations. For the 2015 investigation to recalculate the safe yield of the Chino Basin, Eric obtained all historical precipitation and temperature data from surface stations and radar estimates, PRISM, and spatially disaggregated and bias-corrected projections of precipitation and temperature from NASA for the available GCM projections. Eric compared historical and GCM projected precipitation information at various locations in the Upper Santa Ana Watershed to determine the reliability of using GCM-based projections of precipitation to compute stormwater recharge and the deep infiltration of precipitation and applied water. This information was used in the estimation of Safe Yield in the Chino Basin. Eric served as the project engineer for the 2020 investigation to recalculate the safe yield of the Chino Basin. The 2020 safe yield estimate was prepared consistent with the sustainable yield requirements in the SGMA. The 2020 safe yield estimate was prepared consistent with the sustainable yield requirements in the SGMA and went was also subjected to peer review. The 2020 Safe Yield Recalculation report was published on May 15, 2020.

Integrated Surface and Groundwater Model, Santa Margarita Water District, CA: Lead Modeler. The Santa Margarita Water District (District) retained West Yost to provide engineering and hydrogeologic services to support a preliminary design report and environmental documentation for the San Juan Watershed Project (Project) that included work to evaluate the amount of new stormwater recharge generated by the Project, to develop groundwater pumping plans to recover the new recharge and other hydrogeologic tasks. Dr. Chiang serves as the lead modeler for developing an integrated surface water and groundwater model for the San Juan Watershed and San Juan Creek groundwater basin to support the advanced planning, design and implementation of the Project; ensure that the facilities and associated operating plans are reliably developed; provide accurate estimates of Project yield and unit cost of the new yield; assess environmental responses; and develop the detailed information needed to obtain permits and allocate new yield

of the Project. Using the Processing MODFLOW software as well as climate data, such as PRISM and CIMIS, collected and stored in the HydroDaVE System, the model is built with the USGS coupled surface water and groundwater flow model called GSFLOW. GSFLOW is based on USGS's groundwater flow model MODFLOW and precipitation-runoff modeling system PRMS. A benefit of GSFLOW is that both headwater, valley settings and groundwater can be simulated simultaneously, so that flows throughout a watershed can be simulated comprehensively.

Recomputation of Ambient Water Quality, Santa Ana Watershed Project Authority, Riverside County, CA: Principal engineer providing high-level technical support for the Recomputation of Ambient Water Quality for the Santa Ana Watershed for the 1987-2006, 1990-2009, and 1993-2012 periods. In this study, the ambient water quality determinations in Santa Ana River Watershed groundwater management zones were compared to water quality objectives and used by the Regional Board to assess assimilative capacity as part of the basin monitoring program required by the Santa Ana Region Basin Plan. Eric was responsible for developing software code to generate the twenty-year statistics of TDS and nitrate data for all of the wells in the watershed. He was responsible for finding outliers in the data based on the methodology in the RFP, computing ambient water quality statistics, and the final computation of ambient water quality.

Maximum-Benefit Demonstration for the Elsinore Groundwater Management Zone, Elsinore Valley Municipal Water District, Lake Elsinore, CA: Lead groundwater modeler for developing a maximum-benefit demonstration to raise the total dissolved solids (TDS) and nitrate concentration objectives for the Elsinore Groundwater Management Zone (GMZ) in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). The District is seeking new, maximum benefit-based TDS and nitrate concentration objectives such that it can have the flexibility to develop and invest in a water resources plan that optimizes the management and use of all its water supply assets to achieve a reliable water supply in an environmentally sound manner. The District's maximum-benefit proposal is designed to facilitate the maximum reuse of recycled water, to protect the beneficial uses of groundwater in the Elsinore GMZ and downstream GMZs for future generations, and to be consistent with Executive Order 68-16, Water Code section 13241, and State Board orders and policies that promote recycled water reuse. Eric is responsible for developing a numerical groundwater model to develop TDS and nitrate concentration projections for the Elsinore GMZ, based on the EVMWD's Integrated Resources Supply Plan. The groundwater model is being developed with the Processing Modflow software, authored by Eric.



Garrett Rapp, PE

Modeling Support

Garrett has eight years of experience in the water resources industry. His technical expertise as a professional engineer includes water resources engineering and planning, including surface and groundwater hydrology and hydraulics, water resources planning, surface and groundwater computer simulation modeling and software development, ground-level monitoring, water rights, regulatory compliance, surface water and groundwater quality, municipal recycled water discharge impacts in receiving waters, and water supply and flood control facility design.

EXPERIENCE

Development of a Storage Framework for the Chino Basin, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA:

Project engineer that collaborated on the development of a storage framework for the Chino Basin. This is a comprehensive investigation to assess the groundwater basin response to the planned use of managed storage in the Chino Basin, including potential storage and recovery projects. Garrett worked with the Watermaster and various groundwater producers to develop planning estimates to project future behavior in the basin, including pumping and replenishment estimates. Garrett provided information to develop new groundwater model scenarios, reviewed and analyzed the results of the scenarios, and presented the groundwater model results to the Watermaster Board and other stakeholders. His analysis involved assessing potential impacts of future behavior on land subsidence, production sustainability, and the overall balance of recharge and discharge in the basin and making recommendations to mitigate any undesirable impacts. Garrett also collaborated on the report of this investigation, developing text, tables, and charts to characterize and document the results of the various model scenarios.

Evaluation of the Local Storage Limitation Solution, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA: Project engineer that collaborated on the development of a model and report documenting the evaluation of a storage and recovery project in the Chino Basin. His work involved developing the model assumptions, post-processing and interpreting the results, and writing the report to document the results and interpretations. Garrett also supported the development of project documentation pursuant to the California Environmental Quality Act, providing expert opinions on the hydrologic effects of the project and the project's effect on greenhouse gas emissions.

Development of the 2017 and 2021 Chino Basin Groundwater Model Update and Required Demonstrations Reports, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA: Project engineer developing the 2021 Chino Basin Groundwater Model Update and Required Demonstrations Report for Watermaster and assisting with the development of the 2017 Report. For the



STAFF TITLE: Associate Engineer II

YEARS OF EXPERIENCE: 8

PROFESSIONAL REGISTRATIONS

- Professional Civil Engineer, California, No. 86007

EDUCATION

- MS, Hydrology, University of Arizona
- BS, Civil Engineering, University of Virginia

PROFESSIONAL AFFILIATIONS

- Arizona Hydrological Society
- California Water and Environmental Modeling Forum
- Groundwater Resources Association of California

2021 Report, Garrett updated and ran the groundwater and surface water model to quantify the balance of recharge and discharge in the Chino Basin and to estimate the effects of water rights transfers across the basin. For both the 2017 and 2021 Reports, Garrett developed text, tables, and charts to characterize the results of the updated models. For the 2017 Report, he also developed text, tables, and figures to describe the modeled effects of the storm water recharge projects proposed in the 2013 Amendment to the 2010 RMPU on the Chino Basin.

Support for Recharge Master Plan Updates (RMPUs), Watermaster Engineering Services, Chino Basin

Watermaster, Rancho Cucamonga, CA: Project engineer performing as-needed technical work to support the implementation of the 2013 Amendment to the 2010 RMPU for the Chino Basin Watermaster. The implementation phase is focused on the design and operation of the storm water recharge projects recommended as part of the RMPU. Garrett's ongoing duties include building and running surface water models to quantify the storm water recharge for planned projects under various modes of operation, developing plans and engineering cost estimates for new projects, creating maps and documents to communicate these analyses, and coordinating with Watermaster on the operations of the Recharge Investigations/Projects Committee (RIPCom). This work included using surface water modeling to optimize pumping operations in the San Sevaine Basin to refine the design recommendations of the pump, including a sensitivity analysis of the basin volume to the volume of water recharged. Garrett was also responsible for developing a surface water model and cost opinions for several alternatives for a potential new storm water recharge project in eastern Chino Basin. This involved analyzing subsurface investigations to design several feasible project alternatives, estimating the cost and potential performance of each scenario, and presenting these findings to RIPCom and Chino Basin Watermaster's Appropriative Pool.

In 2018, Garrett was a project engineer for the development of the 2018 RMPU. The work to develop the 2018 RMPU included working with Watermaster Staff to lead the Steering Committee meetings and workshops and presenting technical information to the Chino Basin pools and Board. Garrett was also responsible for characterizing projected availability and cost of imported water, understanding and characterizing the future water supplies for the Chino Basin Parties, identifying the need for additional recharge capacity in the Basin, and preparing the report. The 2018 RMPU was approved by the Watermaster Board in September 2018 to meet the October 2018 deadline of the Court submittal.

Modeling Work to Support the Completion of a Title 22 Engineering Report, City of Beaumont, CA: Project engineer for the completion of a Title 22 Engineering Report for the City of Beaumont. The objectives of this project were to create surface water and groundwater models to characterize the impact of recycled water discharge in the Beaumont and San Timoteo Groundwater Management Zones as part of the development of a Title 22 Engineering study to allow the City of Beaumont to increase the capacity of its wastewater treatment plant, implement a recycled water reuse and recharge program, and receive credit for groundwater replenishment of new storm water in recharge basins. Garrett's work was focused on developing and running the HSPF surface water model of the study area, including gathering data to create model input files, characterizing the operation of stormwater recharge basins, and designing networks to characterize the watershed. Garrett was also responsible for supporting the development of a numerical groundwater-flow model, including summarizing lithology data from across the Beaumont Basin and quantifying the impact of riparian vegetation evapotranspiration on the groundwater table.

Upper Temescal Valley Salt and Nutrient Management Plan, Elsinore Valley Municipal Water District and Eastern Municipal Water District, Lake Elsinore and Perris, CA:

Project engineer for the development of an Upper Temescal Valley SNMP. The Regional Board has required the EVMWD and EMWD to prepare an SNMP to support their recycled water discharge and reuse plans in the Upper Temescal Valley. The objectives of this project are to establish antidegradation objectives for the Upper Temescal Valley groundwater management zones (these objectives currently do not exist), estimate current ambient water quality and assimilative capacity, project future total dissolved solids and nitrogen concentrations based on the water resources management plans of the local water supply agencies, identify the regulatory challenges posed by the recycled water reuse and discharge plans of the EVMWD and EMWD, and develop a salt and nutrient management plan that addresses these challenges. Garrett was responsible for implementing the Wasteload Allocation surface water model that is being used to characterize historical, current, and future surface water runoff and recharge (storm water and recycled water) in the Upper Temescal Valley. In support of the model, he implemented a procedure to create a daily precipitation record by synthesizing data from local precipitation gages and PRISM data, a spatial climatic dataset that accounts for changes in elevation, location, and topography. Garrett's work also involved creating maps and tables showing the inputs to the surface water model, including precipitation, land use, and delineated sub-watersheds in the Upper Temescal Valley study area.

Development of the 2014/15, 2015/16, and 2016/17 Annual Streamflow Monitoring Reports for Chino Basin Watermaster's Water Rights Permit 21225, Watermaster Engineering Services, Chino Basin

Watermaster, Rancho Cucamonga, CA: Project engineer for the completion of the 2014/15, 2015/16, and 2016/17 Annual Streamflow Monitoring Reports for Chino Basin Watermaster's Water Rights Permit 21225, serving as the primary project engineer for the latter two. The objective of this report is to assess the impacts of Watermaster's storm water diversions on the Santa Ana River. Garrett's work focused on developing and running surface water models to quantify the flows in several tributary creeks, quantifying the impacts to the Santa Ana River, and developing a report summarizing these impacts and the methodology used to quantify them.

Characterization of Potential for Stormwater Diversion and Hydrologic Impacts at Prado Basin, City of Corona, Corona, CA:

Project engineer for this analysis to characterize the potential for stormwater diversion to recharge groundwater in the Temescal Basin and to assess the resultant impacts at Prado Basin. The project objective was to update an existing surface water model of the watershed overlying and surrounding the City of Corona to quantify the stormwater available for capture and to assess downstream impacts on surface water flows entering Prado Dam from Temescal Creek. Garrett's responsibilities involved gathering data to update the model, running several operation scenarios to quantify the stormwater capture potential and downstream flow, and creating tables and charts quantifying the results.

Cloud/Web-based Advanced Modeling and Simulation Turnkey High-Performance Computing Environment for Surface and Subsurface Science, US Department of Energy:

Project developer for the design and development of an open-source, Python-based user interface (UI) for ParFlow-CLM, a fully integrated, parallel environmental modeling software tool. This project required combining the input from stakeholders across the academic and non-profit sectors to develop an accessible user interface that will improve the adoption and use of the ParFlow-CLM modeling software. Garrett was responsible for developing the UI and integrating it with the ParFlow-CLM software, interfacing between the software team and hydrologists, documenting and publishing the code, and conducting several tutorials for current and prospective users of ParFlow-CLM.

Watermaster Engineering Services, Chino Basin

Watermaster, Rancho Cucamonga, CA: Garrett, as project engineer, worked on various tasks and reports on 10+

projects for the Watermaster since 2013. A shortlist of projects include:

- Development of a Storage Framework for the Chino Basin
- Support for Recharge Master Plan Updates (RMPUs)
- Assessment of the Cumulative Effects of Water Transfers in the Chino Basin,
- Development of the 2017 Chino Basin Groundwater Model Update and Required Demonstrations Report

Evaluations of Potential Material Physical Injury to the Chino Basin Resulting from Various Recharge Applications, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA:

As project engineer since 2015, Garrett evaluates various agencies' applications to recharge water into the Chino Basin and determining whether they may cause Material Physical Injury (MPI) to the Chino Basin. The evaluation criteria to determine MPI included impacts related to land subsidence, liquefaction, water quality, and others. Garrett evaluated potential recharge activities that may include delivering water to existing spreading basins, constructing new spreading basins, or injection via Aquifer Storage and Recovery wells.

Development of the 2016 Annual Report of the Ground-Level Monitoring Committee, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA:

Project engineer for the development of the 2016 Annual Report of the Ground-Level Monitoring Committee. Garrett's role was to analyze vertical and horizontal survey data to determine relationships and trends in land movement and to make recommendations as to future monitoring activities. Garrett developed maps and charts to depict relationships between the horizontal and vertical survey data.

Development of the 37th, 38th, 39th, and 40th Annual Reports, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA:

Project engineer working with the team and Watermaster staff to develop three Annual Reports over a 12-month period to bring Watermaster's Annual Reporting to the current period. His work involved developing over 15 appendices that characterize Watermaster events and accounting for each of the three years, developing text and graphics to describe the highlighted events and statistics for each year, and coordinating on the review and design of each report. For the most recent report (40th Annual Report), Garrett compiled information for several of the appendices and coordinated on the review and design of the report.

Development of Water Rights Progress Reports and Certification of Water Diversion Measurements, Watermaster Engineering Services, Chino Basin

Watermaster, Rancho Cucamonga, CA: Primary project engineer, developing the Watermaster's progress reports for their three surface water diversion permits, including demonstrating compliance with the Emergency Regulation for Measuring and Reporting the Diversion of Water (Senate Bill 88). This involved extensive data collection and coordination with Watermaster's legal counsel to ensure compliance with the new measurement and reporting requirements.

Assessment of the Cumulative Effects of Water Transfers in the Chino Basin, Watermaster Engineering Services, Chino Basin Watermaster, Rancho Cucamonga, CA: Project engineer responsible for developing methods and quantifying the impacts of water transfers between water appropriators in the Chino Basin. He was responsible for developing a methodology to analyze Watermaster's water rights assessment packages to determine the magnitude and spatial variability in the water rights that have been transferred between parties since 2001 and determining the change in balance of recharge and discharge in the basin over this time period in the absence of the transfers.

Calculation of the Change in Groundwater Storage for Water Years 2015 and 2016, Cucamonga Valley Water District, Rancho Cucamonga, CA: Project engineer collaborating on the calculation of the change in storage of the Cucamonga Groundwater Basin, an adjudicated basin that must report this calculation to the Department of Water Resources each year pursuant to the Sustainable Groundwater Management Act. Garrett's duties included choosing water levels representative of the regional groundwater levels in the Cucamonga Basin, developing contour maps to characterize the change in groundwater levels, and preparing graphics to accompany the technical memoranda.

PUBLICATIONS

- Rapp, G. A., Condon, L. E., & Markovich, K. H. (2020). Sensitivity of simulated mountain block hydrology to subsurface conceptualization. *Water Resources Research*, 56, e2020WR027714. <https://doi.org/10.1029/2020WR027714>
- WEI. 2018 Recharge Master Plan Update. Prepared for the Chino Basin Watermaster, Sept. 2018.
- Rapp, G. and Wildermuth, M. Estimation of Evaporation Losses in Recharge Facilities in the Chino Basin. Prepared for the Chino Basin Watermaster, Sept. 2017.
- Rapp, G. and Wildermuth, M. Annual Streamflow Monitoring Report for Water Rights Permit 21225. 2015, 2016, and 2017.
- WEI. Chino Basin Optimum Basin Monitoring Program 2016 State of the Basin Report. Prepared for the Chino Basin Watermaster, June 2017.
- WEI. Stormwater Resources Plan Functional Equivalency Document. Prepared for the Inland Empire Utilities Agency, May 2016.

CONFERENCE PRESENTATIONS/ PROCEEDINGS

- Storage and Recovery Program Framework for the Chino Basin (Talk) – 17th Biennial Symposium on Managed Aquifer Recharge, Tempe, AZ (Remote), October 2020
- Sensitivity of Simulated Mountain-Block Hydrology to Heterogeneous Soil Depth and Recharge (Poster) – American Geophysical Union Fall Meeting, San Francisco, CA, December 2019
- Sensitivity of Mountain-Block Hydrology to Heterogeneous Soil Depth and Recharge (Talk) – Geological Society of America Annual Conference, Phoenix, September 2019
- Adaptive Management of Land Subsidence and Ground Fissuring in the Chino Groundwater Basin, CA (Poster) – Groundwater Resources Association of California Annual Conference, Sacramento, CA, October 2017
- 2013 Chino Basin Recharge Master Plan Implementation (Poster) – 16th Biennial Symposium on Managed Aquifer Recharge, San Diego, CA, March 2018
- 2013 Chino Basin Recharge Master Plan Implementation (Poster) – 16th Biennial Symposium on Managed Aquifer Recharge, San Diego, CA, March 2018
- 2013 Chino Basin Recharge Master Plan Implementation (Talk) – National Groundwater Association Annual Groundwater Summit, Nashville, TN, December 2017



Lauren Sather, PhD

Modeling Support

Lauren has three years of professional experience in the water resources industry. Her technical expertise includes surface and groundwater computer simulation modeling, water resources and water quality statistical analysis, Geographical Information Systems (GIS) and geospatial analysis. She is experienced in the evaluation of Storage and Recovery Programs, using modeling results to support decision-making under deep uncertainty, and developing data processing and analysis tools in python to analyze large amounts of measured environmental data. Lauren performs statistical analysis like the Mann-Kendall trend test to characterize historical trends and predict future trends in water quality, and estimates spatially distributed groundwater contaminant concentrations through kriging. She is proficient in major programming languages (Python, R, FORTRAN, MATLAB, Visual Basic) and major surface water and groundwater numerical models (MODFLOW, One-Water, IWFM, BCM, MODPATH, MT3D, HSPF). Her passion is harnessing the power of computers to create automated modeling workflows that generate robust and reproducible results in an efficient manner. For her Doctorate, Lauren worked on an NSF funded numerical and experimental investigation into improving the efficacy of in-situ groundwater remediation.

EXPERIENCE

Salt and Nutrient Management Planning, Chino Basin Watermaster, Rancho Cucamonga, CA:

Project scientist involved in the implementation of the Watermaster's salt and nutrient management planning efforts and technical study to support the regulatory process to change the averaging period used to determine compliance with TDS discharge limitations. Developed a procedure to predict the quarterly variations in the TDS concentration of State Water Project (SWP) water. The procedure was developed based on the relationship between the April 1st SWP allocation and the TDS concentration in SWP water for the four quarters following April 1st of each year. Use of this new predictive tool provides a greater temporal resolution of SWP water TDS concentrations, which directly influences the model-projected TDS concentrations in wastewater effluent.

Implementation of the South Orange County Wastewater Authority (SOCWA) Salt and Nutrient Management Plan, South Orange County Wastewater Authority, and San Juan Basin Authority, Orange County, CA:

Modeling Support for the 2020 Update development of the SOCWA SNMP. Contributed to the analysis of surface and groundwater quality conditions in accordance with the State Water Resources Control Board's 2018 Recycled Water Policy.

2020 Safe Yield Recalculation for the Chino Basin, Chino Basin Watermaster, Rancho Cucamonga, CA:

Modeling Support for the 2020 safe yield recalculation for the Chino Basin. Worked with the Watermaster and various groundwater producers to develop planning estimates to project future behavior in the basin, including pumping and recycled recharge estimates. Updated the Chino Valley Model to incorporate the

STAFF TITLE: Scientist II

YEARS OF EXPERIENCE: 3

EDUCATION

- PhD, Civil Engineering, University of Colorado, Boulder
- MS, Civil Engineering, University of Colorado, Boulder
- BA, Mathematics, University of California, Berkeley

new planning projections. Estimated the extent and density of the riparian vegetation along the Santa Ana River within the Chino Basin Groundwater Model Boundary for a range of years spanning the model calibration period. Replaced the MODFLOW Evapotranspiration (EVT) package with the MODFLOW Segmented Function Evapotranspiration (ETS1) package which uses a more realistic relationship between depth to groundwater and the rate of ET from groundwater. Collaborated on the report of this investigation, developing text, tables, and charts to characterize and document the results.

Support for Implementation of Safe Yield Court Order for FY 2021-2022, Chino Basin Watermaster, Rancho Cucamonga, CA: Modeling Support for recalculating the safe yield for the Chino Basin. Characterized uncertainty in the Chino Valley Model and are currently performing a survey of the state-of-the-art approaches to address these sources of uncertainty identified (i.e., model parameters, water supply/demand projections, and climate projections). Will support the determination of applicability and value of these approaches to the Safe Yield Reset.

Chino Basin Optimum Basin Management Program State of the Basin Report, Chino Basin Watermaster, Rancho Cucamonga, CA: Support staff for the water quality section of The Chino Basin State of the Basin Report, a court-ordered document, prepared pursuant to the Chino Basin Optimum Basin Management Plan and subsequent implementation plans and agreements. Estimated the spatially distributed VOC plume concentrations through kriging using measured concentrations and local groundwater flow patterns.

Development of a Groundwater Storage Management Plan for the Chino Basin Watermaster, Rancho Cucamonga, CA: Technical analyst for the development of the Chino Basin storage management plan. With the help of the client, developed the four storage and recovery scenarios to be analyzed. Updated the Chino Valley Model numerical groundwater flow model to incorporate the storage and recovery scenarios. Performed contaminant transport modeling using MT3D and particle tracking modeling using MODPATH. Performed analysis assessing potential impacts of future behavior on land subsidence, production sustainability, hydraulic control, and the overall balance of recharge and discharge in the basin and making recommendations to mitigate any undesirable impacts. Collaborated on the report of this investigation, developing text, tables, and charts to characterize and document the results of the various model scenarios.

Prado Basin Habitat Sustainability Program, Prado Basin Habitat Sustainability Committee, Chino Basin Watermaster, Rancho Cucamonga, CA: Support staff for the preparation of the Prado Basin Habitat Sustainability

Program (PBHSP) Water Year 2020 Annual Report. Performed the Mann-Kendall statistical trend test on the average growing-season NDVI metrics for the period of 1984 to 2020. The Mann-Kendall test was utilized to evaluate whether the average growing-season NDVI increased, decreased, or remained stable over time.

PUBLICATIONS

- Methods for Laser-Induced Fluorescence Imaging of Solute Plumes at the Darcy Scale in Quasi-Two-Dimensional, Refractive Index-Matched Porous Media; Authors Eric J Roth, David C Mays, Roseanna M Neupauer, Lauren J Sather, John P Crimaldi; Publication date 2021/2; Journal Transport in Porous Media; Volume 136; Issue 3; Pages 879-898; Publisher Springer Netherlands; Doi 10.1007/s11242-021-01545-x
- Contributions of Pore-Scale Mixing and Mechanical Dispersion to Reaction During Active Spreading by Radial Groundwater Flow; Authors Roseanna M Neupauer, Lauren J Sather, David C Mays, John P Crimaldi, Eric J Roth; Publication date 2020/7; Journal Water Resources Research; Volume 56; Issue 7; Doi 10.1029/2019wr026276
- Wall Effect Mitigation Techniques for Experiments with Planar Walls; Authors Eric J Roth, Roseanna M Neupauer, David C Mays, Lauren J Sather, John P Crimaldi; Publication date 2020/3; Journal Transport in Porous Media; Volume 132; Issue 2; Pages 423-441; Publisher Springer Netherlands; Doi 10.1007/s11242-020-01399-9

PRESENTATIONS

- L.J. Reising, R.M. Neupauer, and D.C. Mays, "Effects of active and passive spreading on mixing and reaction during groundwater remediation by engineered injection and extraction," at American Geophysics Union Fall Meeting, Washington, D.C. Dec 2018.
- L.J. Reising, R.M. Neupauer, and D.C. Mays, "Estimating mixing and reaction in porous media using a flow-based metric incorporating dispersion," at American Geophysics Union Fall Meeting, New Orleans, LA Dec 2017.
- L.J. Reising, R.M. Neupauer, and D.C. Mays, "A mechanistic approach to designing active spreading injection and extraction sequences for in situ remediation of contaminated groundwater," at Hydrologic Sciences Student Symposium, Boulder, CO Apr 2017.
- L.J. Reising, R.M. Neupauer, and D.C. Mays, "Relative contributions of heterogeneity and imposed time varying flows on spreading and contaminant degradation in groundwater," at American Geophysics Union Fall Meeting, San Francisco, CA Dec 2016.



Veva Weamer

Water Quality Lead and Data Management Lead

Veva Weamer has 13 years of professional experience in environmental and geological science. Veva is a supervising scientist with a focus on the managing the implementation of various regulatory compliance programs for agencies in Southern California. Her areas of expertise include database management, data analysis, water quality monitoring and analysis, salt and nutrient analysis, Geographical Information Systems (GIS), and groundwater and surface water monitoring program implementation and evaluation. Veva graduated from California State University, Fullerton in 2005 with a Bachelors in Geological Sciences. In 2007, she completed her Masters degree in Environmental Studies from California State University, Fullerton with an emphasis in water resources management. Her Master's research involved the quantification of groundwater movement and aquifer characterization of the Harper Lake Basin located in Mojave Desert, California, using GIS tools and bore log data. Veva was awarded the 2006 Prem K. Saint award for outstanding work in hydrogeology for her research.

EXPERIENCE

Triennial Recomputation of Ambient Water Quality, Santa Ana Watershed

Project Authority, Riverside, CA: Project scientist providing QA/QC and assisting with the Recomputation of Ambient Water Quality for the Santa Ana Watershed for the 1987-2006 and 1990-2009 periods and was the project manager for 1993-2012 period effort. In this study, ambient water quality determinations in Santa Ana River Watershed's Groundwater Management Zones are calculated and compared to water quality objectives, which are used by the Regional Water Quality Control Board, Santa Ana Region (Regional Board) to assess assimilative capacity as part of the basin monitoring program required by the Santa Ana Region Basin Plan. This study involves a thorough and stringent technical approach to collect, QA/QC, and analyze data to quantify ambient total dissolved solids (TDS) and nitrogen concentrations in Groundwater Management Zones. For the 1993-2012 effort, Veva was responsible for overseeing the collection, compilation, and QA/QC of the data used in the analysis; managing the development of water quality contours and spatiotemporal estimates of TDS and nitrogen; calculating the ambient TDS and nitrate concentrations for every Groundwater Management Zone in the Santa Ana Watershed; preparing descriptive technical maps on how and where ambient water quality is changing; and preparing a technical report documenting the results of the analysis.

Upper Temescal Valley Salt and Nutrient Management Plan, Elsinore Valley Municipal Water District (EVMWD) and Eastern Municipal Water District (EMWD), Lake Elsinore and Perris, CA:

Project scientist assisting with the data collection efforts and analysis required to estimate current ambient water quality and assimilative capacity for the Upper Temescal Valley groundwater management zone. The Santa Ana Regional Board required the EVMWD and EMWD to prepare a Salt and Nutrient Management Plan (SNMP) to support their recycled water

STAFF TITLE: Senior Scientist II

YEARS OF EXPERIENCE: 13

EDUCATION

- MS, Environmental Studies, California State University, Fullerton, December 2007
- BS, Geological Sciences, California State University, Fullerton, June 2005

PROFESSIONAL AFFILIATIONS

- Groundwater Resources Association of California

discharge and reuse plans in the Upper Temescal Valley. The objectives of this project were to establish technically based antidegradation objectives for the Upper Temescal Valley groundwater management zones; estimate current ambient water quality and assimilative capacity; project future TDS and nitrogen concentrations based on the water resources management plans of local water supply agencies; identify the regulatory challenges posed by the recycled water reuse and discharge plans of the EVMWD and EMWD; and develop a salt and nutrient management plan that addresses these challenges.

Database Management and Analysis of Groundwater and Surface Water Data using HydroDaVESM, Various Clients, CA: Veva is responsible for the management of various groundwater and surface water data collection programs using relational database software, HydroDaVE. This includes well information data, groundwater-quality data, groundwater-level data, production data, surface water station information, and surface water quality and flow data. The data is obtained through various field monitoring and cooperative collection programs and from publicly available datasets available online. Veva performs administrative tasks to maintain database integrity. The data are reviewed thoroughly, processed into HydroDaVE format, and uploaded into the database. The data are thoroughly checked for quality control and assurance upon uploads. Veva performs sophisticated analyses of data in HydroDaVE for various groundwater management issues and executes the analysis of data extracted from the database in support of client reports and investigations. She has managed data for numerous clients, including the Chino Basin Watermaster, San Gabriel Water Quality Authority, Elsinore Valley Municipal Water District, Mammoth Community Water District, Santa Ana Watershed Project Authority, Cucamonga Valley Water District, City of Beaumont, and San Juan Basin Authority.

Total Dissolved Solids and Nitrate Concentration Projections for the Temescal Groundwater Management Zone, City of Corona Department of Water and Power, Corona, CA: Project manager working on the projections of TDS and nitrate concentration projections for the Temescal Groundwater Management Zone pursuant to the requirements in the “Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin” (Cooperative Agreement). The Cooperative Agreement requires that signatory parties within the watershed monitor and analyze water quality to determine whether the conjunctive use of imported water has a significant impact on compliance with water quality objectives. Twenty-year TDS and nitrate projections for the Temescal Groundwater Management Zone were prepared using an existing calibrated MODLFLOW groundwater-flow model for the Chino and Temescal

Basins in conjunction with a MT3D fate-and-transport model. Veva served as the project manager for this study and was responsible for the collection and compilation of updated planning data for the groundwater flow model; the compilation of water-quality data for the fate-and-transport model; working with modeling staff on the implementation of model; the preparation of a technical report, summarizing the results; and the presentation of the results to the established Imported Water Recharge Committee in the watershed.

Triennial Reporting of the Salinity Management Plan, Eastern Municipal Water District, Perris, CA: Project scientist assisting with the reporting of the Salinity Management Plan. In October 2010, the Santa Ana Regional Water Quality Control Board adopted Resolution R8-2010-0039 to amend the Basin Plan and incorporate less stringent maximum-benefit water quality objectives for TDS and nitrogen in the San Jacinto Upper Pressure groundwater management zone. The application of the maximum-benefit objectives allows the Eastern Municipal Water District to reuse recycled water in the San Jacinto Upper Pressure groundwater management zone and thereby achieve its water supply management goals for the Hemet/San Jacinto Water Management Area. To support the maximum-benefit TDS and nitrogen objectives the Regional Board requires the Eastern Municipal Water District implement specific salinity monitoring and management programs termed the maximum-benefit commitments. One of the maximum-benefit commitments is to develop a salinity management plan to control TDS concentrations of source water and recycled water in the Eastern Municipal Water District’s service area to ensure that groundwater quality is protected from degradation, and report on the progress every three years. The initial maximum-benefit Salinity Management Plan was submitted to the Regional Board on April 23, 2013. The maximum-benefit Salinity Management Plan provides a comprehensive overview of the regulatory environment, the EMWD’s water and wastewater supply operations and associated water quality, the nexus of these source waters to groundwater quality, and the EMWD’s existing and planned salinity management activities. Veva assisted with the preparation of the 2015 triennial update report to maximum-benefit Salinity Management Plan and is the project manager for the preparation of the 2018 triennial update report.

Maximum Benefit Monitoring Program, Chino Basin Watermaster, Rancho Cucamonga, CA: Project manager of the Chino Basin Watermaster’s Maximum Benefit Monitoring Program. The objective of this program is to demonstrate that the management of the Chino Basin’s groundwater resources prevents poor quality groundwater with high TDS and nitrogen concentrations from impacting downstream beneficial uses. To receive the assimilative capacity afforded by the maximum-benefit objectives for TDS and nitrogen

in the Chino-North Groundwater Management Zone, the Regional Board requires that the Chino Basin Watermaster and Inland Empire Utilities Agency implement a set of projects and programs known as the Chino Basin Maximum Benefit Commitments. Veva is responsible for managing the surface and groundwater monitoring programs that produce the data required to demonstrate hydraulic control of Chino-North groundwater, managing the collection of all other data needed to demonstrate compliance with the Maximum Benefit Commitments, and writing an annual report that demonstrates compliance to the Regional Board.

Total Dissolved Solids and Nitrate-Nitrogen Projections for the Elsinore Groundwater Management Zone, Elsinore Valley Municipal Water District, Lake Elsinore, CA: Project scientist for the preparation of total dissolved solids (TDS) and nitrate-nitrogen concentration projections for the Elsinore Groundwater Management Zone to demonstrate the impact of recycled water reuse within the Elsinore Valley Municipal Water District's (the District) service area. The Regional Board required the District to develop and provide these projections prior to renewing its waste discharge permit to allow the use of high-TDS recycled water for irrigation. Veva served as the project scientist for this study and was responsible the collection and compilation of hydrogeologic and planning data, the presentation of information used to develop model scenarios, the design and implementation of a constantly stirred reactor model, and the preparation of a technical report, summarizing the results and recommendations of the analysis.

Phase I Salinity Management Program Study, Santa Ana Watershed Project Authority, Riverside County, CA: Project scientist on a study to perform a planning-level analysis of the salt budget of the Santa Ana Watershed region to develop recommendations for optimal salt removal strategies that maximize the efficiency of the region's salt removal needs. Veva was responsible for the collection and compilation of hydrogeologic and planning data for the region, the development of 50-year water supply and demand projections for 30 regional water supply entities, and implementing a series of constantly stirred reactor models to project groundwater storage, wastewater disposal requirements, and the amount of salt in storage for each management zone in the watershed.

Maximum Benefit Monitoring Program, City of Beaumont, Beaumont, CA: Project scientist on the Maximum Benefit Monitoring Program of the City of Beaumont. She was responsible for implementing and managing the surface and groundwater monitoring requirements of the program, overseeing the collection of data from municipal water agencies and Publicly Owned Treatment Works, and preparing annual reports for the Regional Water Quality Control

Board. These monitoring programs are required as part of the commitments made to the Regional Board by the City to gain access to the assimilative capacity afforded by the maximum benefit-based objectives for total dissolved solids and nitrogen in the Beaumont and San Timoteo Management Zones.

Maximum Benefit Monitoring Program, Yucaipa Valley Water District, Yucaipa, CA: Project scientist on the Maximum Benefit Monitoring Program of the Yucaipa Valley Water District (YVWD). She was responsible for overseeing the collection of data from municipal water agencies and Publicly Owned Treatment Works and preparing annual reports for the Regional Water Quality Control Board. These monitoring programs are required as part of the commitments made to the Regional Board by the YVWD to gain access to the assimilative capacity afforded by the maximum benefit-based objectives for total dissolved solids and nitrate in the Yucaipa and San Timoteo Management Zones.

Sodavy Ou, MESM

Data Analyst

Sodavy Ou is an environmental scientist with 4 years of experience in water resources industry. Her areas of expertise include implementation and management of field groundwater and surface water monitoring programs, analysis of water quality data, implementation of salt and nutrient management plans, analysis of salt offset requirement and compliance, utilization of visual tools to analyze the interactions between surface water quality and groundwater quality, regulatory support and compliance reporting, and database management. As a project scientist and manager, Sodavy works with the regional and local governments to ensure that the science-based approach employed in technical reports prepared for her clients meet the strict criteria of the regional government in order to ensure regulatory compliance. Sodavy is an advanced user of geographical information system (GIS), Grapher, and HydroDaVE.

EXPERIENCE

Upper Temescal Valley Salt and Nutrient Management Plan (UTV SNMP) Monitoring and Reporting Program, Elsinore Valley Municipal Water District and Eastern Municipal Water District, Upper Temescal Valley Watershed, CA: Project manager and scientist for UTV SNMP. The Santa Ana Regional Water Quality Board (Regional Board) requires Elsinore Valley and Eastern MWDs to prepare the SNMP to support their recycled water discharge and reuse plans in the Upper Temescal Valley. The SNMP establishes water quality objectives for total dissolved solids (TDS) and nitrate-nitrogen (nitrate) and management actions for the Upper Temescal Valley groundwater management zone (GMZ). The UTV SNMP was adopted by the Regional Board on December 4, 2020 for incorporation into the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). As the project manager and scientist, Sodavy plays a key role in the implementation and adoption of the UTV SNMP.

FY 2021 / 22 Basin Planning Priorities to Update the Santa Ana River Watershed SNMP, Basin Monitoring Program Task Force (administered by the Santa Ana Watershed Project Authority), Riverside County, CA: Associate Scientist for regulatory and technical support in assessing the Santa Ana River Basin Plan SNMP for compliance with the 2019 Recycled Water Policy. For this project, West Yost is preparing an updated watershed-wide groundwater monitoring program, a surface water monitoring program, and recommendations for updated technical methods to assess assimilative capacity through periodic computation of ambient water quality.

Salt and Nutrient Management Plan Update, Chino Basin Watermaster, Chino Basin, CA: Project scientist responsible for the analysis of historical land uses and development of visual tools to analyze groundwater quality data in the Chino Basin to assist the update of the SNMP for the Chino Basin Watermaster. This project is an effort to amend the monitoring requirements in the Basin Plan for Chino Basin Watermaster which can result in an annual saving of approximately \$250,000. The project requires the technical study to obtain amendments to recycled water reuse/discharge permits



STAFF TITLE: Associate Scientist I

YEARS OF EXPERIENCE: 5

EDUCATION

- Master of Environmental Science and Management (MESM), Bren School of Environmental Science & Management, University of California, Santa Barbara, 2017.
- BA, Environmental Studies, emphasis in Biology, University of California, Santa Cruz, 2013.

AFFILIATIONS

- Groundwater Resources Association of California

and the Basin Plan to change the averaging period used to determine compliance with TDS discharge limitations. Due to conditions outside the control of the dischargers, the TDS concentration of recycled water is expected to increase above the current discharge limitation for short periods of time during dry periods. The objective of the study is to: demonstrate the long-term impacts on the TDS concentration of the Chino Basin with and without the change to the objective; develop a regulatory compliance strategy; and update the Watermaster's SNMP, incorporated in the Basin Plan. This study includes the development of fate-and-transport surface and groundwater quality models that mimic historical, current, and future TDS and nitrate loading associated with land use management for agriculture and dairy operations in Chino Basin. Sodavy played a key role in creating comprehensive visual tools to analyze groundwater quality trends and the change in land uses in the Chino Basin.

Basin Plan Amendment (BPA) to Incorporate the Maximum-Benefit SNMP for the Elsinore GMZ, Elsinore Valley

Municipal Water District, Elsinore GMZ, CA: Project manager and scientist leading the effort for the Regional Board to approve a BPA to incorporate the maximum-benefit SNMP for the Elsinore GMZ. The proposed maximum-benefit SNMP composes of maximum-benefit TDS and nitrate objectives and management commitments that would provide flexibility to the Elsinore Valley MWD to develop and invest in a water resources plan that optimizes the management and use of all its water supply assets to achieve a reliable water supply in an environmentally sound manner. The proposed maximum-benefit SNMP will maximize recycled water reuse, protect the beneficial uses of the Elsinore GMZ and downstream GMZs, and will be consistent with Executive Order 68-16, Water Code section 13241, and State Board orders and policies that promote recycled water reuse. Sodavy manages the process to amend the Basin Plan with the Regional Board including drafting regulatory and technical reports to meet all compliance requirements for Basin Plan amendments.

Antidegradation Demonstration to Support the Brine Management Alternative for the Groundwater Reliability Plus Project, Eastern Municipal Water District, San Jacinto Watershed, CA:

Project manager and lead scientist responsible for data collection and management, and numerical projections of salt offset requirements and mitigations by the Eastern MWD. The Groundwater Reliability Plus Project is Eastern MWD's effort to improve water supply reliability, increase regional groundwater levels, improve local groundwater quality, and decrease its dependence on imported water. Part of this effort includes the Purified Water Replenishment (PWR) and groundwater banking projects to increase groundwater recharge in the Hemet San Jacinto Groundwater Management Area. Part of the recharge sources includes advanced-treated recycled water through reverse osmosis process which

produces brine waste. The Eastern MWD is proposing to convey the brine solution to the Perris Valley Regional Water Reclamation Facility (RWRF) where it will be treated with existing wastewater inflows to the RWRF and will be distributed for recycled water use across the San Jacinto Watershed. The objective of this project is to evaluate the impacts of the proposed brine management plan on the TDS concentrations of recycled water served across the watershed.

Triennial Salinity Management Plan Reporting, Eastern Municipal Water District, San Jacinto Upper Pressure GMZ, CA:

Project scientist responsible for corresponding with EMWD to collect and compile salinity management project-related information and data to assist with the preparation of the 2018 triennial update report to the maximum-benefit salinity management plan (SMP). The Regional Board approved a Basin Plan amendment to incorporate maximum-benefit SMP for the San Jacinto Upper Pressure GMZ. The SMP consists of maximum-benefit TDS and nitrate objectives and management commitments. The maximum-benefit objectives allow EMWD to reuse recycled water in the San Jacinto Upper Pressure GMZ and achieve its water supply management goals for the Hemet/San Jacinto Water Management Area. One of the commitments requires a development of a salinity management plan to control TDS concentrations of source water and recycled water in EMWD's service area to ensure that groundwater quality is protected from degradation, and to report on this salinity management progress every three years. The triennial maximum-benefit SMP provides a comprehensive overview of the regulatory environment, the EMWD's water and wastewater supply operations and associated water quality, the nexus of these source waters to groundwater quality, and the EMWD's existing and planned salinity management activities. Sodavy plays a key role in compilation of data and analysis tools required to update the triennial report.

Municipal Separate Storm Sewer System (MS4) Data Collection and Database Management, Chino Basin

Watermaster, Chino Basin, CA: Project Scientist responsible for corresponding with water appropriators in Chino Basin to collect, compile, and review MS4 project information. In 2014, the Court ordered Watermaster to provide MS4 project-related information to help determine the amount of net new stormwater recharge created by MS4 projects or other local storm water management projects within the Chino Basin. Since July 2014, Watermaster annually requests MS4-related data. Sodavy analyzed MS4 documents and compiled MS4-related information (i.e. stormwater infiltration drainage areas, etc.) in a database. The database is used to check the data sets for completeness, to analyze the data, and to prepare reconnaissance-level estimates of the potential new recharge of these projects.

Erik Cadaret, PG

Geologist

Erik's professional experience includes a mix of technical and project management roles related to environmental and water resources. His project management experience includes managing large regional and complex projects involving regional water quality evaluations, water resources planning and engineering, and the Sustainable Groundwater Management Act (SGMA). His technical experience includes construction management and oversight of monitoring wells, municipal supply wells, and injection wells; field management of groundwater and surface water monitoring programs; development of ambient water quality reports, salt nutrient management plans, groundwater sustainability plans, and watershed scale models using PRMS and GSFLOW; and performing water quality evaluations, aquifer testing, and groundwater basin analysis using GIS. He provides innovative solutions to clients and colleagues by leveraging knowledge of and accessibility to readily available technology. Outside of work, he sits on the Board of Directors as a Board Member of the Groundwater Resources Association of California, where he regularly works with a wide variety of leaders in the water industry to engage GRA's membership to help achieve sustainable groundwater for all.

EXPERIENCE

Salt and Nutrient Management Plan for the Upper Santa Ana River Watershed Groundwater Basins, San Bernardino Valley Water District, San Bernardino, CA: Project Geologist and Assistant Project Manager. While at another firm under prior employment, managed and supported the development of a Salt and Nutrient Management Plan that is required to permit and implement various water resource management projects in the San Bernardino Basin Area (SBBA). An additional objective of this Project was to determine if the development of a maximum benefit study is needed. Work included developing water quality objectives, estimating ambient water quality, evaluating trends in water quality and quantifying assimilative capacity, identify areas of significant water impairment for TDS and nitrate, and developing develop site-specific nitrogen-loss coefficients for SBBA and characterize source loading for groundwaters impaired by TDS or nitrate.

Recomputation of Ambient Water Quality for the Period 1999 to 2018, Basin Monitoring Program Task Force, Santa Ana Watershed Project Authority, Santa Ana River Watershed, CA: Project Geologist. While at another firm under prior employment, completed the recomputation of ambient water quality for the Santa Ana River Watershed. The Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin requires the implementation of a watershed-wide total dissolved solids (TDS) and nitrogen groundwater monitoring program to determine ambient water quality in groundwater, assess compliance with groundwater quality objectives, and determine if assimilative capacity exists in groundwater management zones. The Basin Plan requires that the ambient water quality (AWQ) be computed every three years. Work included ambient water quality determinations, preparation of groundwater quality and groundwater elevation contour maps in the management zones with



STAFF TITLE: Associate Geologist II

YEARS OF EXPERIENCE: 7

PROFESSIONAL REGISTRATIONS

- Professional Geologist, California No. 9965

CERTIFICATIONS

- OSHA 40-hour HAZWOPER

EDUCATION

- MS, Hydrogeology & MBA Minor, University of Nevada, Reno, NV
- BS, Geology, California State University, Fullerton, CA

PROFESSIONAL AFFILIATIONS

- Groundwater Resources Association of California
- National Groundwater Association
- American Water Resources Association

requisite data, computing the volume-weighted ambient TDS and nitrate-nitrogen concentrations using the data generated from the contour maps, development of the interpretive tools which included a spatial analysis of groundwater quality change and a web-based tool, perform temporal analysis of groundwater change comparing basin-scale trends to trends observed in key well locations, and forward looking well attrition analysis.

PCE Plume Characterization and Water Supply Impacts Project, Proposition 1 Groundwater Grant Program, City of San Luis Obispo, San Luis Obispo, CA: Project Geologist and Project Manager. While at another firm under prior employment, managed, directed, and supported the development of the Prop 1 Grant funded PCE Plume Characterization and Water Supply Impacts Project. The objectives of this project were to characterize the current extent of the PCE contamination that impacts the San Luis Valley Basin aquifer, identify the most appropriate wellhead treatment method, model the fate and transport of the PCE contamination given and optimize placement of extraction wells equipped with wellhead treatment, and equip existing wells and install additional monitoring wells to measure progress of the PCE plume migration. Work included: obtained Prop 1 Grant funding, characterized the current PCE contamination, prepared a Remedial Investigation and Feasibility Study (RI/FS) Work Plan, developed a field data collection program and oversaw data collection, developed monitoring and reporting plan, and prepared bidding and technical specification documents.

Water Supply Studies for Jensen-Alvarado Historic Ranch and Louis Robidoux Nature Center, San Bernardino Valley Municipal Water District, San Bernardino, CA: Project Geologist. While at another firm under prior employment, evaluated water supply and demand needs at the Jensen-Alvarado Historic Ranch and Louis Robidoux Nature Center. The current source of water for these two locations comes from the Jurupa Ditch. The Jurupa Ditch has been in use since the 1800s and has a diverse group of stakeholders. The objectives of this project were to work closely with stakeholders to assess the current water supplies at each location and facilitate teaming arrangements to develop onsite water supplies, evaluate current and future water demands, and assess the state of the Jurupa Ditch and provide recommendations. Work included engaging multiple stakeholders to gather water supply and demand data of the Jurupa Ditch, evaluating water supply and demands, assessing the state of the Jurupa Ditch and feasibility to provide water, and facilitating stakeholder negotiations to develop onsite water supplies.

Groundwater Sustainability Plan, San Luis Valley Basin, County of San Luis Obispo, San Luis Obispo, CA: Project Hydrogeologist and Assistant Project Manager.

While at another firm under prior employment, managed and supported the development of the Groundwater Sustainability Plan (GSP) for the San Luis Valley Basin and assisted in the development of the integrated groundwater-surface water model. The San Luis Valley Basin lies within a water stressed region of the state, contains a large variety of stakeholders, and has experienced declining water levels. The development of this GSP required engaging a diverse set of stakeholders and developing a large scale fully integrated groundwater-surface water model. Work included managing internal and subconsultant team, leading team meetings, preparing workshop materials, data collection, and development of the surface water model and integrated groundwater-surface water model.

Central Coast Blue – Regional Groundwater Sustainability Study, Multiple Agencies, Pismo Beach, CA: Project Geologist. While at another firm under prior employment, conducted well siting and preliminary engineering of an injection well network and water treatment plant facility. The Central Coast Blue project was envisioned to help solve drought-induced migration of salt water into the regional freshwater aquifer. A new advanced treatment facility will be constructed to treat the secondary wastewater effluent before injecting the treated effluent into the Santa Maria Groundwater Basin to supplement water supplies and protect the basin from seawater intrusion. Work included siting preliminary injection wells, creating injection well and monitoring technical specifications and construction layouts, identifying land ownership and piped water sources, preparing a monitoring and reporting plan, and overseeing the installation and construction of an injection and a dual-nested monitoring well.

Groundwater Sustainability Plan, Santa Maria River Valley - Arroyo Grande Subbasin, County of San Luis Obispo, Arroyo Grande, CA: Project Geologist and Project Manager. While at another firm under prior employment, managed, directed, and supported the development of the Groundwater Sustainability Plan (GSP) for the Arroyo Grande Subbasin and assisted in the development of the integrated groundwater-surface water model. The Arroyo Grande Subbasin lies within a water stressed region of the state, contains a variety of groundwater dependent ecosystems which are sensitive to water level changes, and is partly dependent on the downstream releases from Lopez Reservoir. The development of this GSP required engaging a diverse set of stakeholders, integrating water rights and reservoir operations, and developing a large scale fully integrated groundwater-surface water model. Work included managing internal and subconsultant team, leading team meetings, preparing workshop materials, data collection, and development of the surface water model and integrated groundwater-surface water model.

WE SUPPORT OUR COMMUNITIES

WE ARE WATER FOCUSED

WE TAKE PRIDE IN WHAT WE DO

WE STRIVE TO BECOME OUR BEST

WE DO WHAT'S RIGHT

WE BELIEVE IN QUALITY

WE LISTEN

WE SOLVE CHALLENGING PROBLEMS

WE SEE THE BIGGER PICTURE

WE TAKE OWNERSHIP

WE COLLABORATE

WE HAVE FUN

WE ARE WEST YOST

