APPENDIX N
Resumes

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Robert Battalio, PE

Chief Engineer

EDUCATION

M.E., Civil Engineering (Coastal Engineering), University of California, Berkeley

B.S., Civil Engineering, Virginia Polytechnic Institute and State University, Summa Cum Laude

33 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Civil Engineer, State of California, C41765

Professional Engineer, State of Washington, #42109;

State of Louisiana, #34927

State of Oregon, #83446

State of Florida, #80940

State of Alabama, #37035-E

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers

American Shore and Beach Preservation Association

The Surfrider Foundation

Appointed, Engineering Criteria Review Board, San Francisco Bay Conservation and Development Commission

A registered professional engineer with a Masters in Engineering from UC Berkeley, Bob Battalio has 30 years of experience with flood management, restoration design, coastal engineering, preparation of construction documents, and project management. His training and work experience is focused in the coastal and estuarine areas, wetland and creek restoration design, and waterfront civil engineering projects. Bob was also one of the study leaders in the development of FEMA's Pacific Coast Flood Hazard Mapping Guidelines, as well as Project Director for a study of coastal erosion response to climate change for Pacific Institute and the California Ocean Protection Council. He was the lead coastal engineer for managed retreat shore enhancement projects constructed at Surfers Point, Ventura, CA and Pacifica State Beach, Pacifica, CA.

Relevant Experience

Technical Methods Manual for Adjusting FEMA Coastal Flood Maps to Account for Future Sea Level Rise, 2016. Bob led development of a manual to assist planners and engineers with planning for sea level rise by extension of FEMA coastal flood hazard maps typically used by municipalities. This Manual was developed as part of a multi-agency effort funded by the NOAA Coastal and Ocean Climate Adaptation (COCA) Program, The California Department of Water Resources (DWR) with coordination support from the California Ocean Science Trust (OST), to develop guidance products to help local communities adapt and plan for sea level rise.

Ocean Beach Master Plan, San Francisco, CA. Bob was the senior, lead coastal engineer supporting development of a plan to adapt to rising sea levels on the Pacific Coast of San Francisco. Provided coastal processes and engineering to the San Francisco Urban Planning + Research (SPUR) in support of a Master Plan for San Francisco's Ocean Beach that resulted in a long-term shore management vision for the City / County of San Francisco and the National Park Service, Golden Gate National Recreation Area. ESA subsequently led a team of engineers which further developed the shore modifications, and assessed the vulnerability and identified a protective scheme for a $100M wastewater tunnel in the erosion hazard zone. ESA also contributed to a strategy to manage risks in the interim until the project can be implemented, including a monitoring program and sand placement.

National Park Service, Golden Gate Parks Conservancy, and Presidio Trust, Crissy Field Wetland Inlet Studies, San Francisco, CA. Led the coastal processes evaluation of the inlet and adjacent shore following construction of a new tidal lagoon in Crissy Field Park. One study resulted in a quantified conceptual model of inlet closure and natural breaching frequency to aid in the adaptive management of the system and evaluation of the benefits of expansion of the wetland.

Monterey Bay Sanctuary Foundation, Monterey Bay Sea Level Rise Vulnerability Assessment, California. *Project Director*. With funding from the California Coastal Conservancy, the Natural Capital Project, and the City of Capitola, ESA modeled future coastal erosion and flooding influenced by sea level rise and precipitation changes. The results are posted on TNC's Coastal Resilience website, and being used to inform local coastal program updates.

Elkhorn Slough Management Studies: Inlet Stability and Alternatives Engineering, Moss Landing, CA. Mr. Battalio led the analysis of tidal inlet morphology for two new inlets including evaluation of inlet cross section and associated tide range, and planform dynamics with and without stabilizing jetties. Mr. Battalio also directed the engineering estimates for the enhancement alternatives which included re-routing the main channel, new mouth locations, and large tidal damping structures and sand placement to halt and reverse sediment export and loss of intertidal wetlands.

Association of Monterey Bay Area Governments (AMBAG), Southern Monterey Bay Coastal Regional Sediment Management Plan and Erosion Mitigation Alternatives, CA. Bob help develop the first coastal regional sediment management plan in CA in 2008. This project also applied a cost- benefit analysis that included ecological and recreational values along with the more easily estimated land, development and shore protection values. The work was led by the Monterey Bay Marine Sanctuary Foundation, and included an advisory body called the Southern Monterey Bay Coastal Erosion Workgroup.

Monterey Regional Water Pollution Control Agency, Southern Monterey Bay Coastal Erosion Studies, Monterey County, CA. *Project Director*. Assessed the Risks to regional sanitary sewer facilities from coastal erosion over the next 50 years; prioritized facilities based on their vulnerability to future erosion and the severity of anticipated damages; and recommended a plan to minimize damages. The assessment included shore morphology and the response to sea level rise, shore recession due to a sand deficit, seasonal and storm-induced responses, and wave runup.

California Department of Parks and Recreation and California State Coastal Conservancy, Carmel River Lagoon Enhancement, Carmel, CA. The project recreated a historic lagoon to create valuable habitat for endangered steelhead trout. The project also enhanced river and floodplain connectivity by lowering an existing roadway and removing levees. Bob provided civil engineering during the preliminary and final design stages of the project. Project construction, completed in 2004, and included excavation of over 150,000 cubic yards to recreate the historic lagoon channel.

Elkhorn Slough Tidal Wetland Project, Elkhorn Slough Foundation, Moss Landing, Monterey Bay, CA. Mr. Battalio led the evaluation of a new inlet as one of the major alternatives. The evaluation involved the application of geomorphic tools and historic data to estimate the likely equilibrium dimensions of the inlet, using outputs from modeling of ocean waves and inlet tidal exchange, which force sand transport.

Publications

Brew, David S., Robert T. Battalio, Edward B. Thornton, Clifton Davenport, Brad Damitz, Coastal Regional Sediment Management Planning In Southern Monterey Bay, California, Littoral 2010, 05009 (2011).

Michael Burns, CHG, CEG, PG, QSD

Director Geo-Hydro-HazMat Technical Services Group

EDUCATION

B.S., Geology, San Jose State University, 1980

30+ YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Certified Hydrogeologist (CHG), No.280, CA, 1995

Certified Engineering Geologist (CEG), No.1846, CA, 1993

Professional Geologist (PG), No.4532, CA, 1989

Qualified SWPPP Developer (QSD) #PG4532

PROFESSIONAL AFFILIATIONS

National Groundwater Association - Association of Groundwater Scientists and Engineers

Groundwater Resources Association of California

Michael Burns is a highly skilled and effective project manager with more than 30 years of experience in the environmental and geological sciences. He provides expert services in CEQA and NEPA planning and permitting, site characterization, Superfund sites, Remedial Investigation/Feasibility Studies (RI/FS), waste management, litigation support, property assessments, development and redevelopment, soil and groundwater remediation, groundwater banking, and water rights. His projects include municipal and regional water supply, industrial and manufacturing facilities, airports, levees, landfills, refineries, research and development facilities, hazardous waste management, vineyards, and commercial properties.

Relevant Experience

Water Supply and Water Rights

Monterey Peninsula Water Supply Project Environmental Impact Report, Monterey, CA. *Hydrogeologist and Hazardous Materials Analyst.* Michael provided senior-level technical consultation and analysis for geology, seismicity, groundwater hydrology and water quality, and hazardous materials, and was responsible for evaluating the results of coastal hydrogeological investigations and groundwater modeling in support of the design of the seawater intake system, the geological and groundwater hydrology and water quality impacts, and project alternatives. Key issues included potential impacts to sensitive beach and dune habitat associated with construction and maintenance of the seawater intake system; minimizing effects on the Salinas Valley Groundwater Basin associated with the operation of the proposed subsurface slant wells; sustainably managing the storage of treated water in an aquifer storage and recovery system; and the effects of future coastal erosion and retreat due to anticipated sea level rise.

San Francisco Public Utilities Commission Groundwater Supply Project Environmental Impact Report, San Francisco, CA. *Hydrogeologist***.** Michael provided senior-level consultation, technical input, and review for the hydrology and hazardous materials portions of the Westside groundwater basin portion of the project. This included detailed evaluation of the potential impacts of changes in groundwater levels to Lake Merced, which is incised into the water table. The evaluation analyzed the relationship of water quality parameters relative to lake levels using historical data.

TRAINING

40-Hour OSHA Hazardous Materials & Waste Operations, Current

30-Hour OSHA Construction

CEQA Practice Forum, ongoing

Groundwater Resources Association of California -ongoing

Sustainable Groundwater Management Act Conferences, GRA, 2015

NBWA Climate Change Conference, 2012

Water Quality Goals Conference, State Water Board, 2012

Managed Aquifer Recharge Symposium, NWRI, 2011

Groundwater-Surface Water Interaction: California's Legal and Scientific Disconnect, GRA, 2011

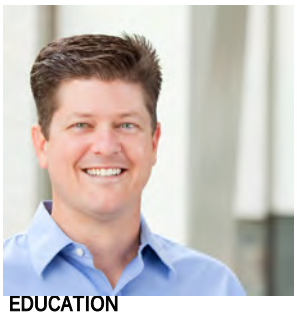
Development & Preservation of Water Rights, Sheppard Mullins et al, 2009

Cadiz Groundwater Conservation, Recovery, and Storage Project Environmental Impact Report, Cadiz, CA. *Analyst for Geology, Hydrology, Mineral Resources, and Hazardous Materials.* Michael provided senior-level technical consultation and analysis of the geologic, hydrologic, hazardous materials, and mineral resources impacts for the Environmental Impact Report for the proposed Cadiz Groundwater Conservation, Recovery, and Storage Project. The Storage and Recovery component would actively manage the groundwater basin as a conjunctive use project. Up to 1 million acre feet of water originating from the Colorado River, directly or by exchange, would be conveyed to the watershed from the Colorado River Aqueduct through the pipeline constructed under the Conservation and Recovery Component of the project. This water would be recharged into the aquifer system via spreading basins and recovered when needed.

City of Daly City Vista Grande Drainage Basin Tunnel Analysis, Daly City. *Hydrogeologist.* Michael provided senior-level consultation and technical input for the hydrology portion of the project. This included providing technical input to develop the monitoring program in the existing canal to evaluate existing hydrological and chemical conditions. The project will examine alternatives for a pipeline and outfall construction for stormwater management in Daly City.

San José/Santa Clara Water Pollution Control Plant Master Plan Program Environmental Impact Report, San José, CA. *Hydrogeologist.* Michael provided senior-level consultation, technical input, and review for the hydrology and hazardous materials portions of the project. This included technical input and senior-level review of the sites historical uses that may have resulted in residual chemical concentration in soil and/or groundwater that could exceed action levels. The Program/Project Environmental Impact Report was prepared for the City of San José's master plan to rebuild the San José/Santa Clara wastewater facility and convert land uses on the plant's 2,700-acre site on the South Bay's shoreline.

West Basin Desalination Project, El Segundo, CA. *Geologist and Hazardous Materials Analyst.* Michael provided senior-level technical consultation and analysis for geology, seismicity, and hazardous materials, and was responsible for evaluating the results of sea level rise modeling. The project would construct and operate a seawater desalination plant on an existing ocean-front power plant facility to replace imported public water supplies. Key issues included potential impacts of sea level rise on the existing sea wall and the construction of pipelines through areas with known hazardous materials sites.



Erick Cooke

Program Manager

EDUCATION

M.S. Environmental Science, University of Massachusetts, Boston

B.A. Biology, University of Hawaii, Manoa

19 YEARS EXPERIENCE

Erick Cooke is a project manager with 19 years of diverse industry experience and focused areas of technical expertise. His technical expertise is in water resources, flooding, hydrology and water quality, groundwater resources, and hazardous materials regulations. He has prepared and managed NEPA and CEQA documents, and has been a part of project management teams for levee projects, flood control projects, water supply projects, and other water resources related projects. Erick is currently the deputy project manager on the California Department of Water Resources (DWR) Water Supply Contract Extension Project CEQA Services Team. Erick was a key team member on the U.S. Army Corps of Engineers (USACE), Sacramento District CALFED Levee Stability Program (LSP) by providing project management services and managing the preparation of project management plans (PMPs), Feasibility Cost Sharing Agreements (FCSAs), and other plan formulation documents for over 28 levee stability projects within the CALFED LSP. Erick has monitored and reported on specialized projects for water quality, dredge material disposal, groundwater remediation, watershed modeling, and superfund sites. He has managed projects for DWR, water agencies, reclamation districts, and other local and state agencies.

Relevant Experience

Monterey Peninsula Water Supply Project (MPWSP) EIR/EIS, California Public Utilities Commission (CPUC). Monterey County, CA. *CEQA/NEPA Technical Expert*. The project includes construction of a desalination plant, seawater intake system, source water conveyance pipelines, desalinated water conveyance pipelines and associated facilities, and expansion of an existing aquifer storage and recovery system, to replace part of CalAm's existing water supplies, which have been constrained by legal decisions affecting CalAm's diversions from the Carmel River and pumping from the Seaside Groundwater Basin. Erick prepared the Alternatives Analysis chapter of the April 2015 Draft EIR. Upon further project refinements and application for development within Monterey Bay National Marine Sanctuary, Erick prepared a more extensive analysis of alternatives to meet both CEQA and NEPA standards. The Draft EIR/EIS alternatives analysis covers a broad range of alternative components to the proposed MPWSP, including different technologies and/or locations of ocean water intakes, desalination plants, brine discharge outfalls, and associated pipeline locations in Monterey Bay. In addition, Erick helped review other sections of the Draft EIR/EIS prior to publication. Erick assisted with the preparation of responses to comments and the Final EIR/EIS.

Montague Water Conservation District (MWCD) Conservation and Habitat Enhancement and Restoration Project (CHERP), Montague, CA. *Project Manager.* Erick is providing expert advice to MWCD on environmental obligations (e.g., CEQA), regulations (e.g., Section 404 permitting), grant writing assistance, and associated schedule constraints for the proposed implementation of the to improve water conservation by lining sections of its Main Canal to increase delivery efficiency, and

allow more water to be available for increased instream flows to provide salmonid habitat enhancement and restoration. Associated modifications to other facilities that will be constructed under the CHERP and include construction of a fish screen and fish passage facility, modifications to existing facilities located at Dwinnell Dam's outlet to the Shasta River, and the restoration and enhancement of wetland habitat associated below Dwinnell Dam and the Shasta River. The CHERP will allow MWCD to continue delivery of water to its customers in its service area while meeting salmonid habitat restoration goals in the Shasta River watershed. ESA was hired to provide MWCD expertise in the planning, design, permitting, and CEQA services to construct and operate the CHERP. ESA services include engineering designs for infrastructure (including pipelines), preparation of a Section 404 permit package (including a Biological Assessment and Compensatory Mitigation Plan), grant writing to help fund planning and design efforts, and CEQA documentation.

DWR NBA Alternate Intake Project EIR. Sacramento, Yolo, Solano and Napa Counties, CA. *Deputy Project Manager.* Erick is managing the preparation of a comprehensive EIR on the construction and operation of the proposed project. DWR proposes to construct and operate an alternate intake on the Sacramento River and connect it via an underground pipeline to the existing NBA to provide NBA State Water Project Contractors with more reliable deliveries. The proposed intake would be operated in combination with the existing NBA intake at Barker Slough. ESA worked with DWR on project development including identification of a pipeline route that minimizes impacts to wetland resources and existing land use conflicts. ESA also assisted DWR with locating the alternate intake facility based on environmental and engineering factors. In addition, as part of the project development process, ESA is providing technical support for the DWR land owner outreach process. ESA will also be supporting DWR with coordinating permitting efforts with the USACE, USFWS, CDFW and NMFS.

Monterey Amendment to the State Water Project (SWP) Contracts Including Kern Water Bank Transfer and Associated Systems as part of a Settlement Agreement (Monterey Plus) Environmental Impact Report, California Department of Water Resources. *Deputy Project Manager.* Erick, prior to joining ESA, served as deputy project manager providing key technical expertise and services for the preparation of the EIR. She continued in her role as project manager for this project as a consultant to DWR. His primary responsibilities included: coordinating public meetings and hearings; working with DWR staff to develop the strategy for the Draft and Final EIRs; preparing and reviewing chapters and technical sections in the Draft and Final EIRs; and, managing the CEQA process. The EIR evaluated the potential environmental effects of implementing the Monterey Amendment to the SWP water contracts and the potential environmental effects of additional actions that may be implemented through the proposed settlement agreement. The proposed project was determined to have the potential to increase supplies for certain SWP contractors. As a result, the analysis focused on the potential impacts to Delta aquatic resources and the potential for the water to support population in some contractor service areas. The analysis also evaluated potential impacts associated prolonged draw-down of SWP reservoirs and construction and operation of groundwater storage that could be attributed to project implementation.

Elijah A. Davidian, AICP, LEED AP

Senior Managing Associate

EDUCATION

M.S., Natural Resource Policy, University of Michigan, Ann Arbor

M.U.P, University of Michigan, Ann Arbor

B.A., Environmental Studies, University of California, Santa Cruz

12 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

American Institute of Certified Planners (AICP)

LEED Accredited Professional, US Green Building Council

Elijah has 12 years of experience working on environmental planning projects with a focus on coastal resource planning and regulatory compliance. Elijah's responsibilities primarily include managing and drafting technical sections of NEPA and CEQA compliance documents, as well as preparing regulatory permit applications and supporting agency consultations. Elijah has technical expertise in the areas of land use policy and planning, water resources management, and negotiation and dispute resolution. Prior to joining ESA, Elijah served as staff to the California Coastal Commission, the agency charged with regulating land use planning and development along the State's 1,100-mile Pacific coastline.

Relevant Experience

California Public Utilities Commission, Monterey Peninsula Water Supply Project EIR/EIS, Monterey Peninsula, California. *Technical Analyst; Land Use and Recreation, and Aesthetics*. Elijah assisted with the preparation of CEQA and NEPA compliance for the MPWSP. The project traverses six coastal local government jurisdictions on the Monterey Peninsula. In addition to assisting with project team coordination, Elijah drafted the Land Use and Recreation, and Aesthetic resources sections and provides senior review of other sections. Elijah is also advising on compliance with applicable coastal laws and regulations (e.g., CZMA, Coastal Act, and LCPs).

Elkhorn Slough Foundation/Elkhorn Slough National Estuarine Research Reserve, Elkhorn Slough Tidal Marsh Restoration IS/MND and Permitting. *Regulatory Compliance Manager*. Elijah is managing the regulatory compliance component of a multifaceted effort to restore 140 acres of eroding tidal marsh within the Elkhorn Slough National Estuarine Research Reserve. Elijah managed the CEQA compliance process for this initiative, along with preparation of regulatory permit applications. Agencies with jurisdiction include the California Coastal Commission, Regional Water Quality Control Board, Department of Fish and Wildlife, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, among others. Elijah continues to support the Reserve with regulatory agency consultations in support of project approvals.

Soquel Creek Water District Advanced Purified Groundwater Replenishment Project. *Deputy Project Manager.* Elijah is supporting ESA's project manager and technical team in the development of CEQA compliance, regulatory permitting, and public outreach efforts for this indirect potable reuse project. The project involves development of an advanced water purification system for treating wastewater to indirect potable reuse standards, and injecting the treated water into the District's groundwater aquifers to supplement its limited supply and combat overdraft and sea water intrusion in the groundwater basin.

Sonoma County, Local Coastal Plan Update, Sonoma County, CA. Elijah is supporting the County with its first comprehensive Local Coastal Plan update in

more than 15 years. His work involves preparing background documentation and drafting land use policies and programs for each of the Local Coastal Plan's nine elements. Elijah is also advising County staff on matters of Coastal Act compliance, representing the County in policy negotiations with the California Coastal Commission, and assisting with public engagement. The LCP governs all major land use and planning decisions within Sonoma County's coastal communities. The plan area spans the length of Sonoma's 55-mile coastline and includes the communities of Jenner, Bodega Bay, and Sea Ranch among others.

Daly City, Vista Grande Drainage Basin Improvement Project EIR/EIS. *Regulatory Task Leader.* Elijah is supporting Daly City's efforts to complete CEQA and NEPA compliance documentation and obtain authorization from the State Lands Commission, California Coastal Commission, and coastal local governments, for improvements to its stormwater system. The project involves improvements to Daly City's stormwater conveyance canal adjacent to Lake Merced, enlargement of the drainage tunnel beneath Fort Funston, and replacement of the beach outfall structure. As part of the CEQA/NEPA and permitting effort, Elijah is working with ESA technical staff and the affected agencies to ensure the project conforms to applicable coastal laws, regulations, and policies, including the CCC's sea level rise policy guidance.

National Park Service, Merced River Comprehensive Management Plan and EIS, Yosemite National Park. *Project Manager*. Elijah managed and provided technical support for the preparation of the Merced River Wild and Scenic River Management Plan and Environmental Impact Statement. Under strict deadlines imposed by a judicial settlement agreement, Elijah worked closely with Yosemite National Park staff and ESA's team of technical experts to ensure the Merced River Plan complied with the terms of the settlement agreement, as well as applicable federal laws, regulations, and agency guidelines. The ESA team also prepared a biological assessment, wetlands and floodplain statements of findings, a general conformity determination, and extensive graphics and maps, several planning workbooks for the public, analysis and responses to public comment, and the administrative record.

San Francisco Planning and Urban Research Association (SPUR), Ocean Beach Master Plan Implementation Project. *Regulatory Task Leader*. Elijah is spearheading the development of a regulatory strategy for implementing portions of SPUR's Ocean Beach Master Plan. This project focuses on the shoreline management and sea level rise adaptation aspects of the Ocean Beach Master Plan, and issues of erosion at the south end in particular. The project area is subject to the jurisdiction of numerous state and federal agencies, including the California Coastal Commission (CCC), National Park Service, and Army Corps of Engineers. ESA is providing technical coastal engineering services and Coastal Commission permitting support. The ESA team recently worked with SFPUC to obtain a CCC coastal development permit for interim shoreline protection measures at South Ocean Beach.

STEVEN JOHN DEVEREL, Ph.D., P.G.
Principal Hydrologist

Education
- Ph.D., Soil Science, University of California, Davis, CA (1983)
- BS, Agricultural Science and Management, University of California, Davis, CA (1979)
- BA, Zoology, University of California, Berkeley, CA (1974)

Licenses/Registrations
- Professional Geologist, California, #8690
- Professional Geoscientist, Texas, #10856
- Registered Professional Hydrologist, American Institute of Hydrology

Areas of Expertise
- Geochemical, hydrologic and biogeochemical analysis and modeling
- Use of environmental tracers to understand hydrologic systems
- Interdisciplinary scientific integration for development of creative solutions

Years of Experience
- Founding Principal Hydrologist, *HydroFocus, Inc.*: 20 yrs
- Senior Hydrologist, *Hydrologic Consultants, Inc., Davis, CA.*: 1.5 yrs
- Supervisory Hydrologist and Research Geochemist, *U.S. Geological Survey, Sacramento CA*: 10 yrs
- Lecturer and Associate in the Experiment Station, *UC Davis:* 3 years
- Research Associate, *UC Davis*: 4 yrs

Professional Affiliations
- American Geophysical Union
- American Institute of Hydrology
- California Groundwater Resources Association
- International Association of Hydrogeologists

QUALIFICATIONS

Steven John Deverel is a founding principal of HydroFocus, Inc. He has over 33 years of hydrologic and hydrogeologic problem-solving experience in California and throughout the western United States. Dr. Deverel analyzes groundwater systems, quantifies chemical and physical processes in soils, and evaluates groundwater- and surface-water quality and interactions. Additionally, Dr. Deverel develops models to evaluate water movement and solute transport, applies statistical techniques to analyze land and water resources, and evaluates subsidence and subsidence mitigation. His career has included conduct and direction of many hydrogeologic and hydrologic field investigations. Dr. Deverel is a registered Professional Geologist in California, a registered Professional Geoscientist in Texas and a registered Professional Hydrologist certified by the American Institute of Hydrology. The results of his work are documented in over 40 peer-reviewed publications.

RELEVANT PROJECT EXPERIENCE

Groundwater quality evaluation and monitoring (2013-present): Under Dr. Deverel's direction, HydroFocus gathered and analyzed available groundwater quality and hydrologic data for the project area which includes 600,000 acres of irrigated agricultural land in Contra Costa, San Joaquin and Stanislaus County to meet the requirements of the State Irrigated Lands Regulatory Program. The HydroFocus team: 1) developed an extensive Access database and Geographic Information System that included over 300,000 lines of hydrologic, land use, well and water quality data, 2) analyzed groundwater, soils and land-use data with respect to a variety of associated variables, such as land use, soil types, depth of water table, 3) utilized geostatistics, the EPA DRASTIC model and groundwater flow and solute transport modeling to delineate areas of varying vulnerability to groundwater quality degradation related to irrigated agriculture and 4) produced a Groundwater Quality Assessment Report (GAR) that identified factors contributing to groundwater quality degradation, especially by nitrate and delineated areas of varying vulnerability. A key issue was the assessment of current and future vulnerability of municipal supply wells to nitrate movement from irrigated agriculture. The team also developed, based on the results of the GAR, a long-term groundwater monitoring plan which will provide information

about the effectiveness of implementing management practices to reduce agricultural contributions to groundwater quality degradation.

Evaluate processes affecting water quality, Sacramento-San Joaquin Delta (2012-2016): Dr. Deverel oversaw an extensive field data collection including well installation and chemical and physical data collection (lithology, water quality, aquifer tests, water levels, isotopic data) to estimate organic carbon and salt loads for different wetland and agricultural water management practices. He employed MODFLOW groundwater models to simulate changes in groundwater conditions, drain flow volumes, and groundwater-surface water interactions and employed the solute transport model MTD3D to simulate constituent transport in groundwater and seasonal water quality changes. Additionally, he evaluated methyl mercury loads and processes affecting loads from farmed islands throughout the Delta.

Dr. Deverel's additional relevant project experience includes:

- Groundwater modeling to evaluate potential subsurface extraction for desalination, Huntington Beach, CA. Dr. Deverel oversaw the HydroFocus team which reviewed the model structure, verified model inputs and outputs, assessed groundwater flow patterns, and evaluated the sensitivity of the model. HydroFocus used particle tracking to determine the source of groundwater flowing to the proposed slant wells and to evaluate groundwater travel times for various scenarios. (2016)
- Groundwater quality evaluation and data collection related to irrigated agriculture in Monterey, San Luis Obispo, San Benito and Santa Barbara Counties. Work included extensive water-quality and hydrologic analysis and groundwater flow modeling. (2013–2015)
- Evaluated factors affecting the spatial distribution of water quality, water use, and well yields for a California Energy Commission Project (Hydrogen Energy California). He reviewed regional groundwater-flow models employed to calculate basin water balances and assessed potential impacts from increased pumping on groundwater storage and quality. (2010-2011)
- Led the Willow Slough Watershed Study, which assessed how carbon, nutrients, sediments, and salts are produced and transported in agricultural landscapes. He oversaw development of a quantitative understanding of processes affecting groundwater-surface water interactions and groundwater quality; employed innovative data collection and modeling such as isotopes and groundwater age dating; worked with the local water agency and growers to implement collection of chemical and physical data for surface water, groundwater, and soils; and developed the technical basis for management practices for reducing nitrate loading to groundwater and movement to surface water. (2006-2011)
- Assessment, data collection and modeling of groundwater and surface water interactions in Coastal Lagoon watershed slated for development in Del Norte County. (2014–2016)
- Field data collection and modeling to quantify subsidence and greenhouse gas emissions from Delta organic soils and evaluate different wetland management strategies for stopping and reversing the effects of subsidence and reducing greenhouse gas emissions. (2012-present)
- Geochemical analysis, extensive field data collection, groundwater flow and solute transport modeling related to chromium contamination, Texas. (2009–2012)
- Evaluate subsurface flow and canal leakage, Nevada and Tuolumne counties. Used water isotopes and modeling to determine effects, rates and nature of leakage to wells and surface-water features. (2010–present)
- Provides technical guidance to the Frontier Fertilizer Superfund Oversight Group to ensure that the Superfund site will be effectively remediated. (1996-present)

CHRISTINE DOUGHTY
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esd.lbl.gov/profiles/christine-doughty/

EDUCATION

B.Sc. 1978, (Engineering Physics), University of California, Berkeley.
M.Sc. 1991, (Material Science and Mineral Engineering), University of California, Berkeley, advisor P.A. Witherspoon
Ph.D. 1995, (Material Science and Mineral Engineering), University of California, Berkeley, advisor P.A. Witherspoon

EXPERIENCE

Staff Scientist, Earth Sciences Division, Lawrence Berkeley Natl. Lab., Berkeley, CA, 10/78 - Present.
Consultant, Ormat Technologies, Reno, NV, 6/14.
Consultant, BP Exploration, Houston, TX, 8/97-10/97, 6/02-9/02.
Consultant, Oxbow Geothermal, Reno, NV, 2/86 – 3/94.
Technical Assistant, Energy and Environment Division, Lawrence Berkeley Natl. Lab., Berkeley, CA, 7/77 - 9/77.

SELECTED PUBLICATIONS

Doughty, C., G. Hellstrom, C.-F. Tsang, and J. Claesson, A dimensionless parameter approach to the thermal behavior of an aquifer thermal energy storage system, Water Resour. Res., 18(3), 571-587, 1982.

Doughty, C. and K. Pruess, A similarity solution for two-phase water, air, and heat flow near a linear heat source in a porous medium, Journal of Geophysical Res., 97(B2), 1821-1838, 1992.

Doughty, C., J.C.S. Long, K. Hestir, and S.M. Benson, Hydrologic characterization of heterogeneous geologic media with an inverse method based on iterated function systems, Water Resour. Res., 30(6), 1721-1745, 1994.

Doughty, C., Investigation of conceptual and numerical approaches for evaluating moisture, gas, chemical, and heat transport in fractured unsaturated rock, Journal of Contaminant Hydrology, 38(1-3), 69-106, 1999.

Doughty, C. and K. Karasaki, Flow and transport in hierarchically fractured rock, Journal of Hydrology, 263(1-4), 1-22, 2002.

Doughty, C. and K. Pruess, Modeling supercritical carbon dioxide injection in heterogeneous porous media, Vadose Zone Journal, 3(3), 837-847, 2004.

Doughty, C. and C.-F. Tsang, Signatures in flowing fluid electric conductivity logs, Journal of Hydrology, 310(1-4), 157-180, 2005.

Doughty, C., Modeling geologic storage of carbon dioxide: comparison of hysteretic and non-hysteretic curves, Energy Conversion and Management, 48(6), 1768-1781, doi:10.1016/j.enconman.2007.01.022, 2007.

Doughty, C. and B.M. Freifeld, Modeling CO_2 injection at Cranfield, Mississippi: Investigation of methane and temperature effects, Greenhouse Gas Science and Technology, doi:10.1002/ghg.1363, 2013.

Salve, R. C. Doughty, M. Kelly and T. Tokunaga, Water availability assessment framework for solar energy production in deserts, 13th IWA Specialized Conference on Watershed and River Basin Management, San Francisco, September 9th-12th, 2014.

Pan, L., B. Freifeld, C. Doughty, S. Zakem, M. Sheu, B. Cutright, and T. Terrall, Fully coupled wellbore-reservoir modeling of geothermal heat extraction using CO_2 as the working fluid, Geothermics, 53, 100-113, 2015.

CURRENT RESEARCH INTERESTS

Mathematical modeling of multi-component, multi-phase fluid flow and transport in heterogeneous geologic media; development and application of techniques for analyzing well-log, well-test, and tracer data to infer the distribution of hydrologic properties in heterogeneous geologic settings, including fractured rock; analysis of watershed and groundwater-basin hydrologic cycles; coordination of modeling studies with laboratory and field work; collaboration with geophysicists, geochemists, and geologists in interdisciplinary studies.

SYNERGISTIC ACTIVITIES

- Teacher, TOUGH short course
- Member, TOUGH steering committee, 2015 TOUGH Symposium organizing committee
- Guest Editor, Computers and Geosciences
- Session Convener, AGU Fall Meeting
- WESTCARB representative to the Simulation and Risk Assessment Working Group of the Regional Carbon Sequestration Partnership Initiative
- Community service: Math and science tutor for middle- and high-school students

COLLABORATORS

Diana Bacon, Pacific Northwest National Laboratory
Goran Hellstrom, Lund University, Sweden
Susan Hovorka, Texas Bureau of Economic Geology
Tom Johnson, University of Illinois
Yousif Kharaka, U.S. Geological Survey
Jane C.S. Long, University of California, Berkeley
Steve Martel, University of Hawaii
Larry Myer, Leonardo Technologies
Auli Niemi, Uppsala University, Sweden
Catherine Peters, Princeton University
Christine Shoemaker, Cornell University
Chin-Fu Tsang, Uppsala University, Sweden
Masahiro Uchida, Japan Atomic Energy Agency
Tianfu Xu, Jilin University, China
Hajime Yamamoto, Taisei Corporation, Japan
Steve Zakem, Echogen Power Systems, Inc.

STUDENT AND POSTDOCTORAL ADVISOR

Francois Cotte, Institut National Des Sciences Appliquees, Lyon, France
Andre Espinet, Cornell University
Martin Larsson, Uppsala University, Sweden
Clifford Ndiweni, University of Witwatersrand, South Africa
Magnus Oden, Uppsala University, Sweden
Chris Patterson, Clemson University
Prabhakar Sharma, Uppsala University, Sweden
Tien Dung Tran Ngoc, Institut National de la Recherche Scientifique, Canada

EDUCATION

B.S., Environmental Studies (emphasis in Water Technology and Hazardous Materials Management), Sonoma State University

20 YEARS EXPERIENCE

TRAINING

Mitigation Measure Implementation & Monitoring, UC Davis Extension, March 2005

The Air Pollution Model, San Francisco State University (SFSU), Spring 2004

Climatology Masters Seminar, SFSU, Fall 2003

Matt Fagundes

Air Quality and Noise Analyst

Matt is an environmental scientist with more than 20 years of experience evaluating potential impacts to the physical environment, particularly with regard to air quality, greenhouse gases, hazards, noise, and transportation for compliance with the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). Matt has vast experience with the review of energy infrastructure and other industrial projects and has experience serving as project manager and deputy project manager for such clients as the California Public Utilities Commission (CPUC), California State Lands Commission (CSLC), the Los Angeles Unified School District (LAUSD), Sonoma County Waste Management Agency (SCWMA), and Contra Costa County.

Relevant Experience

CPUC, California American Coastal Water Project, Monterey County. *Air Quality and Noise Analyst*. Under contract to the CPUC, Matt was responsible for the preparation of the air quality and noise EIR analyses for this extremely controversial project, which included the construction and operation of a desalination plant and associated water supply facilities in coastal Monterey County. The Coastal Water Project would consist of several distinct components, including a seawater intake system, a desalination plant, a brine discharge system, product water conveyance pipelines and storage facilities, and an aquifer storage and recovery system. The final EIR was certified in November 2009.

CPUC, Monterey Peninsula Water Supply Project EIR and EIR/EIS, Monterey, CA. *Air Quality and GHG Emissions Analyst.* Under contract with the CPUC, Matt was responsible for the preparation of the air quality, GHG emissions, and energy analyses for the CalAm-proposed Monterey Peninsula Water Supply Project (MPWSP) Draft EIR, published in May 2015. Subsequent to the release of the Draft EIR, the applicant made changes to the project and Monterey Bay National Marine Sanctuary determined that NEPA compliance was required. Matt prepared the EIR/EIS sections with the MBNMS as the NEPA lead agency.

California Public Utilities Commissions (CPUC), Presidential Substation Project, Ventura County, CA. *Air Quality, Greenhouse Gases, Noise, and Hazards and Hazardous Materials Analyst.* Under contract with the CPUC, Matt was responsible for the preparation of the air quality, greenhouse gas emissions, noise, and hazards and hazardous materials analyses for the completion of the Environmental Impact Report (EIR) for Southern California Edison's proposed Presidential Substation Project, which would have included the development of a new substation and controversial subtransmission line alignment in the Thousand Oaks area of Ventura County. Based on ESA's alternatives evaluation, the CPUC ended up approving a system alternative that avoided the need for the construction the Presidential Substation.

CPUC, Artesian Substation Project, San Diego, CA. *Air Quality and GHG Emissions Analyst:* Under contract to the CPUC, Matt is the lead analyst for the air quality and GHG emissions sections for the Initial Study/Mitigated Negative

Declaration (IS/MND) for this substation expansion project proposed by San Diego Gas and Electric (SDG&E), who are seeking a Permit to Construct for the Project. The Draft IS/MND is expected to be released first quarter of 2018.

CPUC, Moorpark-Newbury Subtransmission Line Project. Ventura County. Project Manage*r, Air Quality, Greenhouse Gases, and Noise Senior Reviewer.* Under contract with the CPUC, Matt is serving as the Team's Project Manager for the completion of an EIR. The project includes a new 66 kV subtransmission line between Moorpark and Newbury Park. The project has gained much attention from local agencies and the public because CPUC authorized SCE to begin construction of the project in 2010 under an exemption, but later ruled that all construction had to cease immediately. SCE submitted its application in October 2013 to finish construction of the project. The Draft EIR was released in June 2015, and the Final EIR was published in October 2015. Construction of the project began in October 2016, and was completed in December 2018.

CPUC Missouri Flat-Gold Hill Reconductoring Project IS/MND, El Dorado County. *Air Quality, Greenhouse Gases, and Noise Senior Reviewer.* Matt served as the Team's air quality, GHG emissions, and noise senior technical reviewer for this IS/MND for PG&E's reconductoring project located in El Dorado County and the City of Folsom. The proposed project involves the replacement of existing conductor, pole replacement, and steel tower modifications to an existing 115 kV power line between the City of Folsom in Sacramento County and Shingle Springs in El Dorado County. The project would also modify and upgrade existing substations and temporarily convert a 60 kV line to 115 kV during project construction.

CPUC, Circle City Substation and Mira Loma Subtransmission Line Project. Riverside and San Bernardino counties, CA. *Project Manager, Air Quality, Greenhouse gases, and Noise Senior Reviewer.* Under contract with the CPUC, Matt is serving as the Team's Project Manager for the completion of an EIR. The project includes replacing existing conductors and support structures on two segments of SCE's system, and construction of a new 66/12 kV substation. Matt is also leading the project alternatives screening process that includes evaluation of several innovative alternatives, including battery storage, which was shown to be a viable alternative based on the flow analysis conducted for the project. The Draft EIR is expected to be released first quarter of 2018.

CPUC, Klamath Rural Broadband Joint CEQA/NEPA Document, Humboldt County, CA. *Air Quality, GHG Emissions, and Noise Analyst.* Matt is the senior technical analyst for a joint CEQA and NEPA document assessing the potential impacts of installing approximately 90 miles of broadband fiber optic cable in rural Humboldt County. The project will provide high speed internet service to several remote communities along the Klamath River.

CPUC, Hollister 115 kV Power Line Reconductoring Project. San Benito and Monterey Counties, CA. *Project Manager, Air Quality, Greenhouse Gases, and Noise Senior Reviewer and Hazards and Hazardous Materials and Transportation and Traffic Analyst.* Under contract with the CPUC, Matt served as the Team's Project Manager for the completion of an Initial Study/Mitigated Negative Declaration (IS/MND). The project includes replacing existing conductors and support structures on two segments of PG&E's system, including the Hollister Tower Segment, which is approximately seven miles long; and the Hollister Pole Segment, which is approximately nine miles long. The project was approved in January 2011, and construction began in October 2011. The Project was completed in Fall 2013.

Hilary Finck

Associate III

EDUCATION

M.A., Geography and Environment, San Francisco State University

B.A., Environmental Studies, San Francisco State University

5 YEARS EXPERIENCE

As a part of the Northern California Water and Energy Group, Hilary prepares environmental documents pursuant to CEQA/NEPA for water infrastructure projects. She acts as deputy project manager and technical analyst for a range of projects, from desalination plants and reservoir expansion to local watershed improvements and municipal groundwater wells. Hilary has experience drafting environmental impact analyses for agriculture, mineral resources, utilities, geology and soils, population and housing, recreation, and land use and planning. Prior to ESA, Hilary was an Environmental Specialist with Recology's environmental compliance team, where she assisted with compliance and permitting for Recology's landfills, composting operations, and transfer stations.

Relevant Experience

California Public Utilities Commission and Monterey Bay National Marine Sanctuary, Monterey Peninsula Water Supply Project EIR/EIS, Monterey County, CA. *Deputy Project Manager and Technical Analyst.* Hilary assisted the project management team with publication of the Draft EIR/EIS, compilation of the administrative record, the public review process, responses to comments organization, and publication of the Final EIR/EIS. Hilary conducted environmental analyses of the effects of the project on utilities, agriculture, and mineral resources. The project would replace existing CalAm water supplies that have been constrained by legal decisions affecting diversions from the Carmel River and pumping from the Seaside Groundwater Basin. The primary project elements include a seawater intake system comprised of subsurface slant wells along the coast, a desalination plant, aquifer storage and recovery facilities, and over 20 miles of conveyance pipelines and associated infrastructure.

City of Antioch, Brackish Water Desalination Project, Environmental Impact Report, Antioch, CA. *Deputy Project Manager.* Hilary assisted the Project Manager with project kick-off and project set-up tasks. Hilary authored several resource sections, including population and housing, land use and planning, recreation, and public services and utilities. The proposed project would pump brackish water from the Bay Delta, construct a new desalination facility at the City of Antioch's existing water treatment plant, and dispose of treated brine and wastewater effluent through the Delta Diablo outfall into the Delta.

Soquel Creek Water District, Advance Purified Groundwater Replenishment Project. Santa Cruz County, CA. *Project Analyst.* Hilary assisted the Project Management team with the public scoping process and the preparation of Initial Study resource impact analyses. The Advance Purified Groundwater Replenishment Project would develop an advanced water purification system for treating wastewater to indirect potable reuse standards, and inject the treated water into the District's groundwater aquifers to supplement its limited supply and combat overdraft and sea water intrusion in the groundwater basin.

Erler & Kalinowski, Inc., Pad D Groundwater Well Focused EIR, East Palo Alto, CA. *Project Analyst*. Hilary assisted the Project Manager with the public scoping process and with the preparation of the Initial Study and Draft Focused EIR by conducting research, draft review, and publication tasks. The project includes a new 500 gallon-per-minute municipal groundwater production well at the City of East Palo Alto-owned Pad D site.

Santa Clara Valley Water District, Almaden Lake Project EIR, San Jose, CA. *Deputy Project Manager and Project Analyst*. Hilary conducted research for hazards and hydrology and water quality technical sections, and the cumulative impact scenario. Hilary assisted the Project Manager with section review and coordination of analysts. The Almaden Lake Project would reduce impacts to anadromous fish from mercury containing sediment and high water temperatures in Almaden Lake. The EIR addresses the technical methylmercury issue, as well as potential impacts to adjacent recreational resources, and residential areas, including a proposed change in park design.

Sonoma County, Local Coastal Plan Update, Sonoma County, CA. *Project Analyst*. Hilary assisted with Sonoma County's first Local Coastal Plan Update in more than 15 years by comparing current plans and policies with proposed draft plans and policies to ensure that the LCP Update provides a comprehensive plan for all nine elements of the Local Coastal Plan. The LCP governs all major land use and planning decisions within Sonoma County's coastal communities. The plan area spans the length of Sonoma's 55-mile coastline and includes the communities of Jenner, Bodega Bay, and Sea Ranch among others.

McMillen Jacobs Associates, Vista Grande Drainage Basin Improvement Project, Daly City and San Francisco, CA. *Project Analyst.* Hilary assisted with the preparation of a joint EIR/EIS on behalf of the City of Daly City and the National Park Service – Golden Gate National Recreation Area. Hilary helped with public outreach and other CEQA/NEPA administrative requirements, including the Responses to Comments and Mitigation Monitoring and Reporting Program. In addition, Hilary assisted with the application for grant funding with the California State Water Resources Control Board's Stormwater Grant Program, for which Daly City was awarded $10 million in grant funding for the implementation of the project. The project would replace a portion of Daly City's stormwater drainage canal with a debris screening structure, box culvert, and treatment wetland, with some storm and authorized non-storm flows diverted to Lake Merced, and would enlarge the existing drainage tunnel beneath Fort Funston to mitigate flooding in the Vista Grande watershed resulting from large storms.

Publications

Stormwater Fees: An Equitable Path to a Sustainable Wastewater System. *SPUR Report*, San Francisco Planning and Urban Research Association, 2012.

Green Water Infrastructure: The Road to a Healthy Watershed. *Urban Action – A Journal of Urban Affairs*, San Francisco State University, 2011.

Water Conservation: The Unsung Hero of California's Water Woes. *Urban Action – A Journal of Urban Affairs*, San Francisco State University, 2010.

JOHN L. FIO
Principal Hydrologist

Education
MS, Civil Engineering, University of California, Davis, CA (1987)

BS, Soil and Water Science, University of California, Davis, CA (1984)

Areas of Expertise
- Groundwater-Flow Hydraulics and Modeling (MODFLOW)
- Chemical Fate and Transport Modeling (MT3D)
- Geochemical Modeling (PHREEQC)
- Water Quality

Years of Experience
Founding Principal, Principal Hydrologist, *HydroFocus, Inc.*: 20 yrs

Senior Project Hydrologist, *Hydrologic Consultants, Inc.*: 2 yrs

Hydraulic Engineer, Civil Engineer, and Hydrologist, *U.S. Geological Survey*: 10 yrs

Professional Affiliations
- American Society of Civil Engineers
- Association of Groundwater Scientists and Engineers
- California Groundwater Resources Association

QUALIFICATIONS

John L. Fio is a founding principal of HydroFocus, Inc. He has more than 30 years of hydrologic problem-solving experience. Mr. Fio analyzes groundwater systems, quantifies chemical transport in the subsurface, and evaluates groundwater surface-water interactions. Mr. Fio develops and employs numerical MODFLOW models for site, water district, and basin-wide investigations; calculates extraction effects on groundwater levels, stream flow, and lake levels; establishes water quality monitoring programs; conducts and analyzes aquifer tests; designs water management plans; evaluates groundwater quality effects of wastewater and recycled water disposal to land; develops and implements Geographic Information System (GIS) databases; and determines water sources using chemical and age-dating techniques. Mr. Fio's professional experience includes ten years of research and project leadership with the U.S. Geological Survey, and more than 20 years of experience in private consulting. His work is published in 16 peer-reviewed journal articles and government reports.

RELEVANT PROJECT EXPERIENCE

Hydraulic Continuity of San Francisco Bay Area Aquifers for Groundwater Management Decision Making (2011-present): Mr. Fio developed a regional MODFLOW groundwater-flow model to quantify groundwater extraction from aquifers in San Mateo County and its effects on groundwater conditions beneath San Francisco Bay and adjacent basins located in San Francisco, Alameda, and Santa Clara counties. The groundwater-flow model was developed using reports, maps, digital databases, computer models, and paper records compiled and archived in a Geographic Information System (GIS) data base developed under his supervision. The model was calibrated to represent average hydrologic conditions and verified by reliably reproducing measured water level changes during a historical pumping test conducted in the 1960s by the California Department of Water Resources. The favorable comparison between simulated and observed water levels indicated that the model reliably represents the hydraulic connection between wells extracting groundwater located on either side of San Francisco Bay. The calibrated model was then utilized to estimate expected yields from hypothetical shallow wells located in areas adjacent to San Francisco Bay, and to simulate the hydraulic effects of shallow aquifer pumping on other existing groundwater users in the region. Model sensitivity analyses identified data gaps and model uncertainty to direct the prioritization of future data collection and aquifer testing activities. Starting in 2016, the model grid was

refined and pumpage and recharge input updated using detailed information from existing local models. The model capability was expanded to calculate groundwater level and storage changes during the period 1991-2015 for applications to support groundwater management efforts in San Mateo County.

Westside Groundwater Basin, San Francisco and San Mateo Counties (1998-present): Since 1998, as a consultant to Daly City, Mr. Fio has provided key technical analyses and consensus building efforts toward improved management of the Westside Groundwater Basin located in San Francisco and San Mateo Counties. The basin is a source of drinking water for the City of San Francisco, City of Daly City, Town of Colma, City of South San Francisco, and City of San Bruno. John was a key contributor toward development of the basin management plan and oversaw development and technical acceptance of the groundwater-flow model utilized to quantify basin hydrogeology. The effort to achieve model consensus required extensive coordination and effective communication with multiple basin stakeholders and their technical representatives. The model has since been employed to design and analyze proposed groundwater development projects in the City of San Francisco and an in-lieu conjunctive use project in San Mateo County to increase drinking water supply reliability for the greater San Francisco Bay area.

Model Review, update, and implementation for estimating future response to project pumping (2015-2016): In the Monterey area, a water supply project is proposed that would employ subsurface ocean water intake system using slant wells near the coast. Mr. Fio reviewed and updated a MODFLOW groundwater flow model using new information to better represent the conceptual hydrogeologic groundwater-flow system. He then evaluated the model's ability to match historical water levels and a recent pumping test. Mr. Fio employed the theory of superposition to isolate the drawdown cone-of-depression for various future scenarios effectively mapping which areas would be affected by project pumping. He characterized the sensitivity of the model results to both model assumptions and parameter values. Finally, using MODPATH particle tracking, he determined both the areal extent of ocean water that would be captured from the slant pumping wells and areas where seawater intrusion would be affected due to future project pumping.

Mr. Fio's additional relevant data and modeling analyses includes:

- Assisted Energy Commission Staff in ten power plant permitting reviews and one compliance project. In most of these projects, Mr. Fio was relied upon to review, critique, and implement the various groundwater-flow and well hydraulic models that simulated water budget and groundwater level changes in response to the proposed pumping and power plant water use (2008-2016).
- Developed the conceptualized understanding of subsurface hydrogeologic and water quality conditions, and then employed MODFLOW to construct a numerical model to quantitatively represent groundwater hydraulics beneath the Ironhouse Sanitary District wastewater treatment facility and its surrounding area, MODPATH to simulate groundwater-flow paths and conduct time-of-travel calculations, and PHREEQC to assess chemical reactions that may occur from mixing recycled water and native groundwater and the likelihood for chemical clogging of the well screen and surrounding aquifer. A variety of scenarios were run to assess injection well hydraulic and water quality effects, and the results helped the client determine preliminary feasibility of recycled water injection.
- Groundwater recharge and age dating groundwater study, South Westside Basin. Incorporated stable water isotopes, nitrogen isotopes, and age dating well-water samples with an existing soil moisture accounting model and groundwater-flow model to assess groundwater recharge and its relationships to land used and dissolved constituents (2014-2015).
- Groundwater-flow, solute-transport, and water-quality impacts from wastewater disposal to land: San Joaquin and Contra Costa Counties, California (2000-present).

Michelle Giolli

Senior Associate Biologist and Regulatory Permitting Specialist

EDUCATION

B.S., Ecology and Systematic Biology / Cal Poly State University, San Luis Obispo

13 YEARS OF EXPERIENCE

CERTIFICATIONS

Federal Recovery Permit for listed vernal pool Branchiopods (#TE09389A-0)

California Scientific Collecting Permit # 10215 (801169-04)

TRAINING

Advanced Wetland Delineation (2017)

CRAM – Estuarine and Riverine Models (2016)

Wetland Delineation 40-Hour Training Course (2011)

California Tiger Salamander Biology and Larval Techniques Workshops (2006 and 2009)

Biology and Management of the California Red-Legged Frog (2006)

Western Pond Turtle Workshop (2008)

California Anostracan and Notostracan Identification Course (2005)

Michelle is a Senior Associate in ESA's Bay Area Biological Resources and Land Management Group who specializes in permitting, preparing applications for federal, state and local permits for infrastructure improvements, maintenance projects, restoration projects, and land development projects affecting regulated habitats and special-status species. She is adept with CEQA compliance and preparing mitigation and monitoring plans, and also performs wildlife habitat assessment and jurisdictional wetland delineations. She has direct permitting experience with the U.S. Army Corps of Engineers (404 permits), U.S. Fish and Wildlife Service (Biological Assessments), California Department of Fish and Wildlife (Incidental Take Permit Applications and Lake and Streambed Alteration Agreements), San Francisco Bay Conservation and Development Commission (Major and Minor Permit), Regional Water Quality Control Board (401 Water Quality Certification and Waste Discharge Requirements), and State Lands Commission (Land Use Lease). Michelle has broad experience with special-status plant and wildlife species including listed fairy shrimp, California red-legged frog, California tiger salamander, western pond turtle, California clapper rail, and western burrowing owl.

Relevant Experience

California Public Utilities Commission CalAm Monterey Peninsula Water Supply Project, Monterey County, CA. *Biologist.* Michelle prepared the biological resources section of the CEQA/NEPA document for the California America Water Company's (CalAm) Monterey Peninsula Water Supply Project and responded to public comments on the document. She also conducted presence/absence surveys for special status plant species within the project boundary. The proposed project is a desalination project to provide water supply to CalAm's Monterey service area.

Elkhorn Slough National Estuarine Research Reserve, Elkhorn Slough Tidal Wetland Restoration Project. Moss Landing, CA. *Permitting Specialist.* Michelle prepared several permit applications (including the Request for Incidental Harassment Authorization, USFWS and NMFS Biological Assessment, and the CDFW Notification of Lake or Streambed Alteration) for Phase 1 of the Elkhorn Slough Tidal Wetland Restoration Project. The proposed project would restore vegetated tidal marsh, upland ecotone, and native grasslands in and around Elkhorn Slough. The marshes of Elkhorn Slough have been subjected to human-induced and natural stressors that have resulted in extensive marsh loss through "ecological drowning."

San Francisco Public Utilities Commission, San Antonio Backup Pipeline Project, Sunol, CA. *Biologist and Permitting Specialist.* Michelle prepared the federal and state permit applications for this San Francisco Public Utilities District (SFPUC) water supply infrastructure improvement project in the Alameda Creek

watershed. The project, which involves improvements to existing water supply facilities along sensitive riparian habitat, will improve the overall reliability of the regional water system with respect to water quality and seismic reliability. Permit applications for the project include U.S. Army Corps Pre-Construction Notification/Nationwide Permit, USFWS Biological Assessment, CDFG Incidental Take Permit Application, RWQCB 401 Water Quality Certification, and CDFG Lake and Streambed Alteration Agreement.

Contra Costa Water District, Los Vaqueros Watershed Biological Services CA. *Biologist.* Michelle coordinated and conducted two years of California red-legged frog and California tiger salamander egg mass, larval, metamorph, and adult surveys within 89 ponds on the Los Vaqueros Watershed. Following the surveys she prepared reports on the findings. She also compiled oak woodland mitigation monitoring data and prepared a report on the findings. Annual surveys and reporting are required as part of mitigation and monitoring requirements for the development of the Los Vaqueros Reservoir.

San Francisco Public Utilities Commission, Alameda Creek Recapture Project, Sunol, CA. *Biologist and Regulatory Permitting Specialist.* Michelle prepared a terrestrial habitat assessment and wetland delineation for the original Filter Gallery Project. She mapped and described all habitats within the project boundary and discussed the potential for special-status terrestrial wildlife species, including California red-legged frog, California tiger salamander, and Alameda whipsnake to occur within the project area. Additionally, she prepared the biological resources section of the Draft Environmental Impact Report, CDFW Incidental Take Permit application, and amendment to an existing USFWS Biological Opinion for the Alameda Creek Recapture Project. The proposed Alameda Creek Recapture Project would recapture water released from Calaveras Reservoir and the water historically diverted at the Sunol Filter Galleries and would reintroduce the recaptured water into the SFPUC's water supply portfolio.

Harkin Slough Improvements (Pajaro Valley Water Management Agency). Watsonville, CA. *Biologist and Permitting Specialist.* Michelle conducted the jurisdictional wetland delineation and prepared the CDFG Lake and Streambed Alteration Agreement for the Harkins Slough Improvement project. The goal of the project was to remove non-native vegetation and accumulated sediment from the pump within Harkins Slough so the Pajaro Valley Water Management Agency could pump at full capacity.

Zone 7 Water Agency, Zone 7 Stream Maintenance Projects. Livermore-Amador Valley, CA. *Biologist.* Michelle conducted site assessments and protocol-level surveys for California red-legged frogs at nine locations in the Livermore-Amador Valley. Zone 7 performs channel maintenance in these areas and California red-legged frog surveys are required under Zone 7's permits for channel maintenance. Surveys were conducted under the direction of a 10(a)1(A) California red-legged frog permit holder.

San Francisco Public Utilities Commission, Bay Tunnel Project, Palo Alto, CA. *Biologist and Construction Monitor.* Michelle was a biologist and construction monitor for the Bay Tunnel Project site. The Bay Tunnel project intends to construct a tunnel underneath the San Francisco Bay connecting water pipelines in the East Bay to the Peninsula. She conducted pre-construction nesting bird surveys, including western burrowing owl, for several work sites and was a USFWS-approved biologist to monitor construction sites within the vicinity of California clapper rail and salt marsh harvest mouse habitat.

APPLIED marine SCIENCES

RESUME
Dane D. Hardin
Sr. Marine Biologist, Principal

EXPERTISE

Program Design and Management
Environmental Impact Assessments
Ecological Baseline and Monitoring Programs
Petroleum-related Environmental Issues

CREDENTIALS

Education: Ph.C 1976 Biology Department, University of California, Santa Cruz
B.A. 1967 Biology Department, University of California, Santa Cruz

Honors & Certifications: SCUBA certification from National Association of SCUBA Diving Schools, Reviewer for Marine Environmental Research, Scientific advisor to the State of California Water Resources Control Board in the design of a comprehensive monitoring program for San Francisco Bay

EMPLOYMENT HISTORY

1994-Present	Sr. Marine Biologist, Principal, Applied Marine Sciences Inc., Livermore, CA
1992-1993	Sr. Oceanographer and Vice-President, Marine Research Specialists, Soquel, CA
1975-1991	Sr. Oceanographer and Regional Manager, Kinnetic Laboratories, Inc., Santa Cruz, CA
1972-1973	Research Assistant, Department of Biology, University of California, Santa Cruz, CA

EXPERIENCE

Mr. Hardin has over 30 years experience in the study of aquatic ecology. He specializes in the application of statistically-sound sampling and analytical methods to the study of natural variations and anthropogenic influences on marine benthic communities. Mr. Hardin has conducted programs for both industry and various levels of government, over a broad geographic range. His work includes serving as Program Manager and Principal Investigator on several studies funded by the US Department of the Interior investigating natural and human-induced variation in intertidal and subtidal communities in the Pacific Outer Continental Shelf and Gulf of Mexico regions. He has also participated in nine studies of municipal wastewater discharges across the country, including work on the large consolidated discharge in Massachusetts Bay for the Massachusetts Water Resources Authority. Mr. Hardin supervised the first commercial application of periphyton communities and transplanted bivalves to measure water quality in central California and conducted five years of bivalve monitoring at the Selby slag disposal site near Carquinez Strait in San Francisco Bay. Mr. Hardin also has performed environmental evaluations of petroleum related activities in the Russian Arctic and nearshore regions of the Caspian Sea in Kazakhstan. He currently is Director of the Central Coast Long-term Environmental Assessment Network, a regional monitoring program being conducted for a consortium of municipal and industrial dischargers in the Monterey Bay area under the auspices of the Central Coast Regional Water Quality Control Board.

In the course of his experience, Mr. Hardin has contributed to the design and modification of photoquadrat sampling techniques, laser-aided quantitative sampling, and intertidal point-contact sampling methods. His contributions to laser-aided quantitative sampling have become the state-of-the-art technique in photographic sampling of benthic epifauna with remotely operated vehicles. Mr. Hardin has 21 publications in peer-reviewed scientific journals.

REPRESENTATIVE PUBLICATIONS

Scientific Journals

Nairn, R., J.A. Johnson, D. Hardin, J. Michel. 2004. A biological and physical monitoring program to evaluate long-term impacts from sand dredging operations in the United States outer continental shelf. *Journal of Coastal Research*. 20(1):126-137.

Gunther, A.J., J.A. Davis, D.D. Hardin, J. Gold, D. Bell, J.R. Crick, G.M. Scelfo, J. Sericano, M. Stephensen. 1999. Long-term Bioaccumulation Monitoring with Transplanted Bivalves in the San Francisco Estuary. *Marine Pollution Bulletin.* 38(3):170-181.

Hardin, D.D., J. Toal, T. Parr, P. Wilde, and K. Dorsey. 1994. Spatial variation in hard-bottom epifauna in the Santa Maria Basin: The importance of physical factors. Marine Environmental Research, **37**(2):165–193.

Hyland, J., D. Hardin, S. Steinhauer, D. Coats, R. Green, and J. Neff. 1994. Environmental impact of offshore oil development on the outer continental shelf and slope off Pt. Arguello, CA. Marine Environmental Research, **37**(2):194–229.

Hardin, D.D., D. Graves, and E. Imamura. 1992. Investigating seafloor disturbances with a small ROV. Marine Technology Society Journal, **26**(4):40–45.

Brewer, G., J. Hyland, and D. Hardin. 1991. Effects of oil drilling on deep-water reefs offshore California. American Fisheries Society Symposium, **11**:26–38.

Foster, M.S., C. Harrold, and D.D. Hardin. 1991. Point vs. photo quadrat estimates of the cover of sessile marine organisms. Journal of Experimental Marine Biology and Ecology, **146**:193–203.

Hyland, J., D. Hardin, E. Crecelius, D. Drake, P. Montagna, and M. Steinhauer. 1990. Monitoring long-term effects of offshore oil and gas development along the southern California outer continental shelf and slope: Background environmental conditions in the Santa Maria Basin. Oil & Chemical Pollution, **6**:195–240.

Spies, R., D. Hardin, and J. Toal. 1988. Organic enrichment or toxicity? A comparison of the effects of kelp and crude oil in sediments on the colonization and growth of benthic infauna. Journal of Experimental Marine Biology and Ecology, **124**:261–282.

Caimi, F.M., R.F. Tusting, and D. Hardin. 1987. Laser-aided quantitative sampling of the sea bed. Proceedings of Oceans ‘87, pp 1234–1238.

Reports

Hardin, D.D. 1996. Use of Sand Islands in Mertvyi Kultuk: Environmental Technical Review. Report submitted to Arctic GeoScience, Inc. and Oryx Kazakhstan Energy Company.

Hardin, D.D. 1996. Environmental Protection Plan for the Mangystau Exploration Area: Technical Review of issues Pertaining to the Caspian Sea and Mertvyi Kultuk. Report to Arctic GeoSciences, Inc. and Oryx Kazakhstan Energy Company.

Hardin, D.D. 1996. Effects of Nearshore Structures on Arctic Anadromous Fishes. Report to Conoco Inc.

Hardin, D. 1994. Bivalve Bioaccumulation. In 1993 Annual Report, San Francisco Estuary Regional Monitoring Program for Trace Contaminants. Report by the Aquatic Habitat Institute, 180 Richmond Field Station, 1301 South 46th Street, Richmond, CA 94804.

Hardin, D., D. Heilprin, G. Cailliet, and M. Love. 1992. A Pilot Study of Rockfish Feeding Habits in the Santa Maria Basin, California. In: Imamura, E. and J. Hyland (eds.), Effects of OCS Oil and Gas Production Platforms on Rocky Reef Fishes and Fisheries. Report to the U.S. Department of the Interior, Minerals Management Service, Pacific OCS Region, 770 Paseo Camarillo, Camarillo, CA 93010 under Contract No. 14-12-0001-304

PETER HUDSON PG, CEG

Principal/Senior Geologist

EDUCATION

BA, Geology, San Francisco State University.

Civil Engineering Coursework. San Francisco State University

28 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Professional Geologist, California Registration No. 6730.

Certified Engineering Geologist, California Registration No. 2368.

Qualified SWPPP Practitioner QSP Certificate No. 21673.

Peter Hudson has more than 28 years of broad-based experience in engineering geology, hydrogeology, environmental, geotechnical and surface water hydrology. He is a professional geologist and certified engineering geologist in the state of California and a registered geologist/engineering geologist in the state of Washington. His general role as a principal at Sutro Science includes providing geological, geotechnical, geophysical and hydrogeological technical support in water quality assessments, water resource and geological studies for planning, permit assistance, environmental impact assessments with emphasis on hydrological and geologic issues, soils investigations and erosion/geomorphic investigations, planning/policy assessments, and mitigation planning and monitoring. Peter has authored numerous geoscience and hydrology-related technical sections under CEQA and NEPA and provides technical input and senior review for completion of work products including EIRs and EISs, and EAs. Peter has contributed his technical expertise to resource management plans, reclamation/restoration plans, erosion control plans, draft permits, (e.g., NPDES), land development environmental feasibility analyses, and site selection/constraints studies. He is a Qualified SWPPP Practitioner (QSP) as required under California's Construction General Permit. Prior to co-founding Sutro Science LLC, Peter was a senior geologist/hydrogeologist in the Water Group staff at Environmental Science Associates, contributing to a wide range of water supply and infrastructure projects.

Relevant Experience

Monterey Peninsula Water Supply Project EIR/EIS, Monterey, CA. ***Lead Geologist/Hydrogeologist.***. Peter is providing geotechnical and hydrogeologic technical support for the analysis of local and regional groundwater impacts connected with this multi-dimensional and highly visible project. Peter authored the recent Groundwater Resources chapter and is providing technical review of geologic resources analyses.

CalAm Coastal Water Project EIR, Monterey County, CA. ***Lead Geologist/Hydrogeologist.*** Pete provided geotechnical and hydrogeologic technical support for the analysis of local and regional groundwater impacts connected with this multi-dimensional and highly visible project. Pete was involved with senior review, preparation of master responses, and provision of technical expertise to the team in the areas of groundwater, hydrology, and geology. Technical areas included beach bluff erosion protection, subsurface beach intake wells, water conveyance pipelines, and aquifer storage and recovery.

Roblar Road Quarry, Sonoma County, California ***Senior Geologist/ Hydrogeologist.*** This project was a proposed aggregate quarry in Sonoma County, adjacent to a closed, unlined landfill. As senior technical lead, Peter was responsible for managing efforts to analyze potential impacts associated with slope stability, groundwater migration (from the adjacent landfill), alteration of surface water flow, and impacts from reclamation. Peter authored relevant EIR chapters and participated in several public hearings.

Henry Cornell Winery, Sonoma County, California, *Senior Geologist/Hydrogeologist.* Peter contributed his expertise in hillslope geologic processes, surface water hydrology, and hydrogeology to this controversial proposed winery project. Peter was responsible for the CEQA analysis of slope stability, local groundwater balance, and surface water management. Contentious issues included neighboring groundwater effects and slope stability.

Dry Creek Rancheria, Geyserville, Sonoma County, California. *Senior Geologist/Hydrogeologist.* Peter provided technical consultation for geologic and hydrologic resources throughout the initial planning and permitting process for this project. He analyzed the geologic, hydrologic and hazardous materials issues and authored key chapters of the final constraints analysis. Peter provided ongoing technical consultation for associated projects.

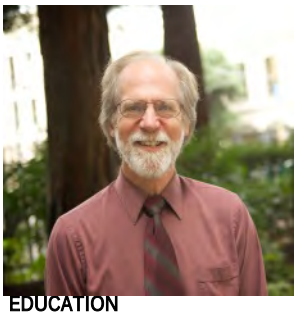
Cloverdale Rancheria Fee to Trust and Resort Casino Project, Cloverdale California, Sonoma County. Peter was involved in this proposed casino and resort project for several years. Work included assessment of offsite groundwater contamination, water supply assessment, surface water impacts to the Russian River, and groundwater withdrawal effect. Peter completed NEPA and CEQA level analyses and completed associated chapters for the draft documents.

Livermore-Amador Valley Water Management Agency Export Pipeline Facilities Project Program EIR. *Geologist/Hydrologeologist.* Peter completed technical review of key CEQA technical sections and remained involved in the project through its implementation. He provided technical assistance regarding surface water quality, waste discharge requirements, and NPDES during the construction phase. He also consulted with the client, contractor and other staff on mitigation monitoring for surface water quality.

Fairfield-Suisun Sewer District (FSSD) Outfall Study, System and Treatment Master Plan EIR. *Senior Geologist/Hydrologist.* Peter supervised completion of geology and hydrology analyses and preparation of chapters for the EIR. He provided senior review for key technical issues including the project proximity to active faults, structural integrity of levees, performance of outfall structures, and comPeternce of engineered fills. He also reviewed surface water modeling assumptions and provided input to EIR presentation of data.

San Francisco Public Utilities Commission (SFPUC) Niles Dam and Sunol Dam Removal Project. *Senior Geologist/Hydrogeologist.* Peter conducted preliminary analysis of groundwater, site geology, and potentially hazardous sediments in connection with the proposed removal of existing dams in Niles Canyon. Issues included impact of dam removal on groundwater levels and the impact of those lowered levels on riparian areas.

EBMUD Water Treatment and Transmission Improvements Program (WTTIP) EIR. *Senior Geologist and Hydrologist.* Peter was senior reviewer/technical contributor on the consulting joint venture team that prepared the EIR for EBMUD's WTTIP project. He provided technical expertise for the impact analysis and development of mitigation in the areas of slope stability, seismic reliability, effects to groundwater, construction impacts including erosion hazard, and potential flooding impacts.



Jack Hutchison, PE

Senior Transportation Engineer

EDUCATION

M.Eng., Transportation Engineering, Pennsylvania State University (as part of the Bureau of Highway Traffic program)

B.S., Civil Engineering, University of Connecticut

40 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Registered Traffic Engineer, State of California # 1411

PROFESSIONAL AFFILIATIONS

Institute of Transportation Engineers

Transportation Research Board

Jack is a registered Traffic Engineer in the State of California. He has 40 years of experience in a wide range of transportation analyses, from planning-level impact analyses to operations and design evaluations, as well as for a wide range of project types and locations. In addition to his role as primary technical analyst, he provides critical peer review of analyses conducted by other firms and third party analysis to ensure compliance with CEQA and NEPA requirements.

Relevant Experience

CalAm Coastal Water Project, Monterey County, CA. *Transportation Analyst.* Jack is providing transportation analysis for a combined environmental impact statement / environmental impact report (EIS/EIR) that analyzes the impacts associated with construction and operation of a desalination plant; conveyance pipelines; aquifer storage and recovery facilities; and related facilities. The EIS/EIR is a follow-up to a 2009 EIR for a previous version of the project. The analysis is focused primarily on construction-related traffic effects, because long-term operation and maintenance of the project would generate a limited number of vehicle trips. Therefore, identified mitigation measures focus on reducing the short-term project construction effects; long-term mitigation measures are not needed.

Fort Ord Dunes State Park General Plan and Environmental Impact Report, Marina, CA. *Transportation Analyst*. Prepared transportation analyses for CEQA documentation. The environmental analysis identified the impacts of the General Plan alternatives on key environmental resources, including historic buildings, biological resources, hydrological resources, cultural resources, and recreation.

Asilomar State Beach and Conference Grounds General Plan and Environmental Impact Report, Pacific Grove, CA. *Transportation Analyst*. Jack prepared transportation analyses for the General Plan and environmental impact report for Asilomar State Park, located in Monterey County. The primary concern for development of the General Plan was traffic, circulation and parking, both within the Park and along adjacent roadways. A traffic analysis and circulation study was required at the onset to assist in planning strategy and the development of alternative concepts.

San José/Santa Clara Water Pollution Control Plant Master Plan Program Environmental Impact Report. Santa Clara County, CA. *Peer Reviewer of Transportation Subconsultant.* Jack provided peer review of transportation analysis for the Program-Project Environmental Impact Report being prepared by ESA for the City of San José's master plan to rebuild the San José/Santa Clara Water Pollution Control Plant (WPCP) and plan uses on the plant's 2,700-acre site on the South Bay shoreline adjacent to the Don Edwards San Francisco Bay National Wildlife Refuge. The City's Environmental Services Department operates the Plant and prepared the Plant Master Plan (PMP); the City's Planning Division is the CEQA Lead Agency. The 30-year PMP was developed to address a number of

challenges such as aging infrastructure and sea level rise, and to advance City policies, and includes a wide range of projects – both near-term and long-term. Key issues investigated by ESA and joint venture partner ICF included effects on biological resources, transportation, aesthetics, cultural resources, surface hydrology, water quality, air quality, and alternatives.

DWR California Aqueduct East Branch Extension Environmental Impact Report, San Bernardino County, CA. *Transportation Analyst.* Jack prepared transportation analyses for the environmental impact report for an extension of the east branch of the California aqueduct, for the California Department of Water Resources. Issues of concern included the effect of haul trucks on area roadways as they passed through residential, school and commercial areas.

CALFED Los Vaqueros Reservoir Expansion Project Environmental Impact Statement/Environmental Impact Report, Contra Costa County, CA. *Transportation Analyst.* Jack provided transportation analysis for an environmental impact statement/environmental impact report for the proposed Los Vaqueros Reservoir expansion. Issues of concern were the effects of construction trucks and workers on local roads, including Vasco Road, which has a history of traffic safety problems.

DWR North Bay Aqueduct Alternate Intake Project Environmental Impact Report, Yolo and Solano Counties, CA. *Transportation Analyst.* Jack prepared the transportation analysis for the environmental impact report for construction and operation of a new intake and pumping plant on the Sacramento River, conveyance pipeline, and inline storage to divert and convey water from the Sacramento River connecting to the existing NBA pipeline near the North Bay Regional Water Treatment Plant. The analysis focused primarily on construction-related traffic effects, because long-term operation and maintenance of the project would generate a limited number of vehicle trips. Therefore, identified mitigation measures focus on reducing the short-term project construction effects; long-term mitigation measures are not needed.

DWR South Bay Aqueduct Improvement and Enlargement Project Environmental Impact Report, Alameda County, CA. *Transportation Analyst.* Jack was the author of the transportation section of this environmental impact report for construction of various water facility components (pumping plant, pipelines, surge tank, reservoir, and improvements to existing canals) in the Livermore area of Alameda County. Tasks included site visits, estimate of project-generated construction traffic (trucks and worker vehicles) on the basis of engineering estimates of the work, and evaluation of potential impacts to traffic flow, traffic safety, and roadway pavement conditions. Recommended mitigation measures focused on minimizing the temporary and intermittent effects during construction work periods.

EBMUD Water Treatment and Transmission Improvement Program (WTTIP) Environmental Impact Report, Contra Costa County, CA. *Transportation Analyst.* Jack provided transportation and traffic analysis for the environmental impact report for this project which provides water supply and treatment to the Cities of Moraga, Orinda, Lafayette and portions of Walnut Creek in the East-of-Hills service area. Upgrades to water treatment plants serving the area are needed in anticipation of future treatment capacity shortages. Key environmental issues are truck traffic; tree loss and effects on sensitive habitats; aesthetics; and potential for general community disruption (e.g., noise, light and glare, dust).

APPLIED marine SCIENCES

RESUME
Jay A. Johnson
Sr. Oceanographer, Managing Principal

EXPERTISE

Environmental Permitting, Compliance and Agency Liaison
Project Management, Development & Coordination
Ecological Baseline and Monitoring Programs
Environmental Evaluation and Impact Assessment
Third-Party Independent Environmental Compliance Monitoring

CREDENTIALS

Education:

M.S.	1986	Biology (Marine Ecology), San Diego State University, San Diego, CA
B.S.	1976	Oceanography, Humboldt State University, Arcata, CA
B.A.	1976	Biology (Marine Emphasis), Humboldt State University, Arcata, CA

Professional Affiliations: Deep Submersible Pilots Association and American Association of Underwater Scientists

Honors & Certifications: Eagle Scout, Basic Open Water and Advanced SCUBA, certifications through Scuba Schools International and National Association of Underwater Instructors, Member National Natural Resources Honor Society - Xi Sigma Phi

EMPLOYMENT HISTORY

1997-Present	Senior Oceanographer, Managing Principal, Applied Marine Sciences Inc., Livermore, CA.
1993-1996	Senior Environmental & Safety Coordinator, Conoco International Petroleum Co – Russia Exploration & Production, Houston, TX
1991-1993	Environmental Director, Conoco Inc. Exploration Production International, Houston, TX
1988-1991	Supervisor of Environmental & Regulatory Affairs, Conoco Inc. Exploration & Production-Gulf of Mexico Operations, New Orleans, LA.
1986-1988	Environmental Coordinator, Conoco Inc. Exploration & Production, Western States Division, Ventura, CA
1981-1986	President and Senior Oceanographer, Johnson & Associates, Oceanside, CA
1983-1984	Manager, Special Projects and Submersible Operations, Nekton, Inc., San Diego, CA
1978-1981	Biological Oceanographer, Lockheed Environmental Services, Carlsbad, CA

EXPERIENCE

Mr. Johnson has over 40 years experience assessing marine and aquatic ecosystems and the impacts of industrial activities, discharges and accidental releases into aquatic environments. His wealth of scientific knowledge and expertise has been gained through more than 29 years employment as an oceanographer and marine ecology consultant and eleven years working for a major international oil and gas company as an Environmental Director and Manager. He has worked on projects throughout San Francisco Bay and Estuary, throughout California, along both the Pacific and Atlantic coasts of the United States, offshore Alaska, the Gulf of Mexico, the Gulf of Arabia, and the North Sea, Mediterranean, Barents, Bering, and Caspian Seas.

He has extensive experience working on National Environmental Protection Act (NEPA) and California Environmental Quality Act (CEQA) documents and Clean Water Act, NPDES permits both as a consultant and a permittee. He has worked closely with the RWQCB, EPA, BAAQMD, California Coastal Commission, California Dept. of Fish and Wildlife and the California State Lands Commission, as well as the National Marine Fisheries Service, Army Corps of Engineers, National Park Service, and Bureau of Ocean Energy Management on various projects throughout California. He is intimately familiar with current California Ocean Plan water quality objectives as they relate to stormwater, desalination, and point source discharges. He has worked on major baseline and marine monitoring programs involving nuclear power plant, thermal effluent and POTW discharges along the southern and central California coast. He has extensive experience in dealing with complex scientific, regulatory and environmental issues, and effectively interacting with local, state, and federal agencies. He recently served as the lead scientist and Project Manager for a five-year project responsible for the development of marine monitoring programs for the Department of the Interior, Bureau of Ocean Energy Management to assess long-term effects of Pacific OCS operations and ocean energy on marine associated ecosystems, as well as to assess long-term changes to seafloor ecology resulting from offshore sand mining.

Mr. Johnson has worked on major baseline and marine monitoring programs involving nuclear power plant, thermal effluent and POTW discharges along the southern and central California coast. He has been involved in assessing the environmental impacts of establishing new marinas in San Francisco Estuary, the 34th America's Cup races in 2012 and 2013 in San Francisco, the redevelopment of Treasure Island and Pier 70 in San Francisco, aggregate sand mining, a new break-bulk marine

terminal on the Vallejo River, multiple coastal seawater desalinization projects in Central and Southern California, and establishing marine sanctuaries along California's central coast. He has designed and conducted Essential Fish Habitat investigations, invasive species assessments, and prepared Biological Assessments for special status species, including marine mammals. He has extensive experience in dealing with complex scientific, regulatory and environmental issues, and effectively interacting with local, state, and federal agencies. Mr. Johnson routinely performs third-party independent environmental mitigation and permit compliance monitoring for California state agencies on projects throughout California's coastal waters.

REPRESENTATIVE PUBLICATIONS & REPORTS

Mr. Johnson has authored and co-authored more than 125 technical reports, environmental impact assessments and professional presentations and publications. The following are a few select publications.

Environmental Science Associates (ESA). 2017. CalAm Monterey Peninsula Water Supply Project, Draft Environmental Impact Report, Environmental Impact Statement. Section 4.5 Marine Resources. Prepared for the California Public Utilities Commission and the Monterey Bay National Marine Sanctuary. January 2017.

Applied Marine Sciences, Inc. (AMS) 2016. Seafloor Habitat & Biological Characterization Assessment of the SEA-US Fiber Optic Cable Route Offshore Hermosa Beach, California by Remotely Operated Vehicle (ROV). Prepared for ICF International. February.

Applied Marine Sciences (AMS). 2015. Subtidal Habitats and Associated Macrobenthic and Fish Communities Observed Offshore Coastal California Along Fiber Optic Cable Routes. Prepared for ICF International. May.

Applied Marine Sciences, Inc., 2009. Benthic Survey of Commercial Aggregate Sand Mining Leases in San Francisco Bay and Western Delta, August 2008. Prepared for ESA and the California State Lands Commission. March 2009.

Applied Marine Sciences, Inc. (AMS) 2008. Survey Report: Remotely Operated Vehicle (ROV) Biological Characterization Survey of the Asia America Gateway (AAG) S-5 Project Fiber Optic Cable Route Offshore Morro Bay, California. Prepared for AT&T and the California State Lands Commission. May 2008. 52 pp

Applied Marine Sciences, Inc., Mariposa Environmental, and Reese-Chambers System Consultants, Inc. 2005. Draft International Environmental Impact Assessment for the Full Field Development of The Kashagan Oil and Gas Field Located in the North Caspian Sea, Kazakhstan. Prepared for AGIP Kazakstan and North Caspian Operating Company N.V. 250pp.

Applied Marine Sciences, Inc. (AMS) 2003. Tyco Global Network (TGN) Fiber Optic Cable Project; Environmental Mitigation and Permit Compliance Monitoring Report for Onshore Cable Landing and Installation Activities at Hermosa Beach, CA. Prepared for California Coastal Commission. January 2003.

Nairn, R., Johnson, J.A., Hardin, D., and Michel, J. 2002. Development and Design of a Biological and Physical Monitoring Program for the Evaluation of Long-term Impacts to the Marine Environment from Offshore Sand Dredging Operations in the U.S. Outer Continental Shelf. Journal of Coastal Research. 20:1 pp 126-137.

Boehm, P.D. Turton, A. Raval, D. Caudle, D. French, N. Rabalais, R. Spies, and J. Johnson. 2001. Deepwater Program: Literature Review, Environmental risks of Chemical Products Used in Gulf of Mexico Deepwater Oil and Gas Operations; Volume : Technical Report. OCS Study MMS 2001-011. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. 326 pp.

Arthur D. Little, Inc. & Boatman, M. 2000. Draft Report. Gulf of Mexico OCS Region. Deepwater Program: Literature review, environmental risks of chemical products used in Gulf of Mexico deepwater oil and gas operations.

Applied Marine Sciences, Inc. 1999. Estimate of Environmental Impact for Salkenskaya Exploration Well No. 1.; Exploration Activities. Prepared for Kerr-McGee and Oryx Kazakhstan Energy Company.

Conoco Inc. & Arkhangelskgeologia. 1996. Due Diligence/Environmental Baseline Assessment Northern Fields Area, Timan Pechora Region, Russia; Phase III.

E&P Forum. 1993. Exploration and Production (E&P) Waste Management Guidelines. E&P Forum Report No. 2.58/196.

Johnson, J.A., Hardin, D., Spies, R. 1985. An Investigation of the Effects of Discharged Drilling Fluids from Exploratory Drilling on Hard Bottom Communities in the Western Santa Barbara Channel. Symposium Proceedings, Oceans '85, Marine Technology Society.

Kinnetic Laboratories and Johnson & Associates. 1987. An Ecological Study of Discharged Drilling Fluids on a Hard Bottom Community in the Western Santa Barbara Channel. Final Report. Prepared for Texaco USA. Co-author.

Johnson, J.A. 1984. The Use of a Manned Submersible in a Deep Water Hard Bottom Monitoring Program. Paper Presented at the American Academy of Underwater Sciences Symposium. November, 1984. La Jolla, CA.

Preston D. Jordan
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Education: B.A., Geology, University of California, Berkeley, 1988
M.S. in Eng. Sci., Geotechnical Engineering, University of California, Berkeley, 1997

Research Interests: Risk analysis of geologic carbon storage, reservoir uncertainty for geologic carbon storage, fluid flow through heterogeneous porous rocks and fault zones.

License: California Professional Geologist No. 6942 (since 1998)
California Certified Hydrogeologist No. 880 (since 2007)

Career: Staff Research Associate, 2010-present, Earth Science Division, Lawrence Berkeley National Laboratory. Analyze risk of geologic carbon storage, characterize reservoir uncertainty for geologic carbon storage, characterize hydrogeology and subsurface contaminant distributions, develop conceptual models of subsurface gas and fluid flow, consult on the environmental and engineering geology of proposed building and infrastructure projects and conduct investigations, conduct environmental analysis related to environmental and engineering geology under NEPA and CEQA, manage research staff

Principal Research Associate, 1998-2010, Earth Science Division, Lawrence Berkeley National Laboratory. Analyze risk of geologic carbon storage, characterize reservoir uncertainty for geologic carbon storage, characterize hydrogeology and subsurface contaminant distributions, develop conceptual models of subsurface gas and fluid flow, consult on the environmental and engineering geology of proposed building and infrastructure projects and conduct investigations.

Senior Research Associate, 1995-1998, Earth Science Division, Lawrence Berkeley National Laboratory. Characterize environmental geology, manage geologic data gathering activities, manage excavation activities, collect geologic data, implement and manage geographic information systems for subsurface environmental data, supervise temporary personnel performing geologic data tasks, advise geologic database design teams.

Research Associate, 1994-1995, Earth Science Division, Lawrence Berkeley National Laboratory. Manage soil sampling, monitoring well installation, and field mapping activities, perform borehole logging and geologic field mapping, interpret geologic structure, participate in design of geologic visualization systems.

Research Technician, 1990-1994, Earth Science Division, Lawrence Berkeley National Laboratory. Assist in paleoseismic studies, perform geologic field mapping and collect subsurface geologic data, interpret geologic structure, manage soil sampling and monitoring well installation activities.

Selected Publications, Reports, and Conference Contributions:

Jordan, P.D., and J. Gillespie (2015). Produced water disposal injections in the southern San Joaquin Valley: no evidence of leakage. Environmental Geosciences. Accepted pending revision.

Long, J.C.S., L.C. Feinstein, J. Birkholzer, **P. Jordan**, J. Houseworth, P. Dobson, M. Heberger, D. Gautier (2015). An independent assessment of well stimulation technology in California, Volume I: well stimulation technologies and their past,

present, and potential future use in California. 406 pp.

Jordan, P., A. Brandt, K. Ferrar, L. Feinstein, and S. Phillips (2015). An independent assessment of well stimulation technology in California, Volume III: case studies of hydraulic fracturing and acid stimulation in select regions: offshore Monterey Formation, Los Angeles Basin and San Joaquin basin,, Chapter 5: a case study of the potential risks associated with hydraulic fracturing in existing oil fields in the San Joaquin basin. 79 pp.

Jordan, P., and J. Gillespie (2013). Potential impacts of future geological storage of CO_2 on the groundwater resources in California's central valley: southern San Joaquin basin oil and gas production analog for geologic carbon storage. Prepared for the California Energy Commission. CEC-500-2014-029. 122 pp.

Jordan, P.D., C.M. Oldenburg and J.-P. Nicot (2012). Measuring and modeling fault density for CO_2 storage plume-fault encounter probability estimation. *AAPG Bulletin,* 97:597-618.

Jordan, P.D., C.M. Oldenburg and J.-P. Nicot (2011). Estimating the probability of CO_2 plumes encountering faults. *Greenhouse Gases: Science and Technology*, 1:160-174.

Jordan, P.D., and Doughty, C. (2009). Sensitivity of CO_2 migration estimation on reservoir temperature and pressure uncertainty. *In*: Gale, J., Herzog, H., and Braitsch, J. (eds), *Greenhouse Gas Control Technologies 9, Proceedings of the 9th International Conference on Greenhouse Gas Control Technologies (GHGT-9), 16–20 November 2008, Washington DC, US*, Energy Procedia, February 2009, 1: 2587-2594.

Jordan, P.D., and Javandel, I., 2007. Hydrogeology and tritium transport in Chicken Creek Canyon, Lawrence Berkeley National Laboratory, LBNL-63557.

Jordan, P.D., Oldenburg, C.M. and Su, G.W., 2005. Analysis of aquifer response, groundwater flow, and plume evolution at Site OU 1, Former Fort Ord, California, LBNL, Berkeley, CA, LBNL-57251.

Su, G.W., Freifeld, B.M., Oldenburg, C.M., **Jordan, P.D.** and Daley, P.F., 2005. Simulation of In-Situ Permeable Flow Sensors for Measuring Groundwater Velocity. Ground Water, 44 (3): pp. 386-393, LBNL-57084.

Zhou, Q., Birkholzer, J.T., Javandel, I. and **Jordan, P.D.**, 2004. Modeling Three-Dimensional Groundwater Flow and Advective Contaminant Transport at a Heterogeneous Mountainous Site in Support of Remediation Strategy. Vadose Zone Journal, 3 (3): pp. 884-900, LBNL-54318.

Oldenburg, C.M., Daley, P.F., Freifeld, B.M., Hinds, J. and **Jordan, P.D.**, 2002. Three-dimensional groundwater flow, aquifer response and treatment system monitoring at Site OU 1, former Fort Ord, California, LBNL Report, pp. LBNL-49586.

Lawrence Berkeley National Laboratory, 2000. Draft Final RCRA Facility Investigation Report, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California, September, 2000.

Heidi Koenig, M.A. RPA

Senior Archaeologist

EDUCATION

M.A., Cultural Resources Management, Sonoma State University

B.A., Anthropology, San Francisco State University

17 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Register of Professional Archaeologists (RPA), 15140

Hazardous Waste Operations and Emergency Response 40 hour course completion and active renewal

PROFESSIONAL AFFILIATIONS

Society for California Archaeology

Society for Historical Archaeology

Heidi is a Registered Professional Archaeologist specializing in California archaeology. She has prepared numerous cultural resources studies in compliance with the California Enviornmental Quality Act and Section 106 of the National Historic Preservation Act, including surface surveys, subsurface surveys, site significance evaluation, mitigation recommendations, and consultation with the State Historic Preservation Officer. Heidi has developed several interactive GIS databases to assist regulatory agencies with cultural resources management and preservation decisions. Heidi has conducted numerous records searches at the California Historical Resources Information System and has assisted with consultation efforts with several Native American tribes.

Relevant Experience

Monterey Peninsula Water Supply Project, Monterey County. *Archaeologist*. Heidi prepared the Cultural Resources Survey Report for this CalAm-proposed desalination project in Monterey County. As the NEPA Lead Agency on the EIR/EIS, MBNMS is required to comply with Section 106 of the National Historic Preservation Act. Heidi completed the background research, contacted Native Americans, and conducted a surface survey in the Area of Potential Effects. The State Historic Preservation Officer concurred with the findings.

Elkhorn Slough Tidal Slough Wetland Restoration Project, Monterey County. *Archaeologist*. In support of the Elkhorn Slough Foundation, ESA conducted planning, design and regulatory compliance tasks to restore tidal marsh in Elkhorn Slough. Heidi completed a cultural resources assessment for the project that included development of an Archaeological Survey Report. She worked closely with the Elkhorn Slough National Estuarine Research Reserve and the U.S. Army Corps of Engineers to ensure archaeological site avoidance and appropriate mitigation during construction activities.

EBMUD West of Hills Project, Contra Costa County. *Archaeologist*. Heidi prepared the Cultural Resources Survey Report and EIR section for pipeline replacement/improvement of approximately 10 miles of the Wildcat Aqueduct and Central Pressure Zone Pipelines, in Richmond, San Pablo, El Cerrito, and Berkeley. The project was completed to comply with both Section 106 of the National Historic Preservation Act and the California Environmental Quality Act. Heidi completed background research, contacted Native Americans, and conducted a surface survey in the project Area of Potential Effects. Heidi worked with EBMUD staff to identify appropriate and timely recommendations for additional subsurface study to be completed following EIR approval.

West County Wastewater District State Revolving Fund Application Projects, Alameda County. *Archaeologist.* Heidi prepared the cultural resources analysis for the West County Wastewater District Master Plan and resulting projects for the State Water Resources Control Board (SWRCB) application process. SWRCB is

required to comply with Section 106 and concur with the State Historic Preservation Officer (SHPO). Heidi created an interactive GIS-based database that provides cultural resources site location information within the District operation area so specific projects could be compared and effects determined. Heidi has provided SHPO documentation for SWRCB to use in their consultation efforts on two separate applications with additional applications forthcoming.

North San Pablo Bay Restoration and Reuse Project, Sonoma, Marin, and Napa Counties. *Archaeologist*. Heidi prepared the cultural resources section for four wastewater utilities and one water agency in the North San Pablo Bay region of California who have joined forces to plan a project that would considerably expand the use of recycled water region wide. The study area includes pipeline segments throughout Marin, Sonoma, and Napa counties. A records search and several updates were conducted at the Northwest Information Center of the California Historical Resources Information System. Approximately 250 archaeological sites and historic structures have been previously recorded within the study area. Surface surveys and extended subsurface surveys were conducted to assess previously known archaeological resources and determine whether additional resources may be affected by the project. A finding of No Adverse Effect to Historic Properties was determined by the lead agency, the Bureau of Reclamation.

San José/Santa Clara Water Pollution Control Plant Master Plan, San José, Santa Clara County. *Archaeologist*. Heidi is the archaeologist for the City of San José's master plan to rebuild the San José/Santa Clara Water Pollution Control Plant and convert land uses on the plant's 2,700-acre site on the South Bay's shoreline. ESA completed a cultural resources assessment for the Project, which included a records search at the Northwest Information Center, a surface survey, and an analysis for the sensitivity of cultural resources. Numerous archaeological sites have been uncovered in the Santa Clara Valley that are buried beneath feet of alluvial fill, naturally deposited by the San Francisco Bay environment. While no cultural resources were identified during the investigation for the WPCP Project, mitigation measures for Program-level additional research and accidental discovery were recommended.

Lower Berryessa Creek Project, San José, Santa Clara County. *Archaeologist*. To facilitate compliance with the U.S. Army Corps of Engineers Section 106 requirements, Heidi completed a cultural resources assessment for the Santa Clara Valley Water District's Lower Berryessa Creek project, including a records search at the Northwest Information Center and a survey of the unsurveyed alignments. The project includes flood control improvements in three creek alignments (Berryessa, Calera, and Tularcitos) that would result in the containment of the channels' design flow. The assessment included both project-level (near term) and program-level (long-term) components. Heidi updated the Lower Berryessa and Lower Calera Creek components of the project with a revised records search, survey, and analysis.

Wes McCullough

Senior GIS Analyst

EDUCATION

BA, Geography with GIS emphasis, University of California, Santa Barbara

10 YEARS EXPERIENCE

Wes is a Senior Geographic Information Systems (GIS) Analyst based out of ESA's Petaluma office. He has an academic background in geography and urban planning, and has experience in GIS in both the public and private sectors. His accomplishments include developing GIS models, enterprise-level data management, Geodatabase design, GPS-GIS applications, large scale habitat mapping, and advanced spatial analysis. Wes routinely provides technical input for Environmental Impact Reports (EIRs) pursuant to California Environmental Quality Act (CEQA).

Relevant Experience

California Public Utilities Commission, CalAm Coastal Water Project and Monterey Peninsula Water Supply Project, Monterey, CA. *GIS Analyst.* Wes provided GIS support in the form of maps and analysis for the preparation of an EIR/EIS that evaluated the potential environmental effects of a project proposed by California American Water Company (CalAm) to provide a new water supply for the Monterey Peninsula. The proposed project would produce desalinated water, convey it to the existing California American Water (CalAm) distribution system, and increase the system's use of storage capacity in the Seaside Groundwater Basin. The project would consist of several distinct components: a seawater intake system; a desalination plant; a brine discharge system; product water conveyance pipelines and storage facilities; and an aquifer storage and recovery (ASR) system.

California Department of Water Resources, Enlargement to the California Aqueduct East Branch. Southern, CA. *GIS Analyst.* Wes managed a mapping application that used multiple GIS datasets from many sources to weave a comprehensive GIS of Southern California, incorporating GIS, Global Positioning Systems (GPS), and GPS-linked photographs taken on site; all housed in an interactive, on-line project library. The East Branch Extension project will increase aqueduct capacity and extend the aqueduct's already 400 plus mile reach over an additional 100-miles through the Tehachapi pass and into the Antelope Valley. Wes's development of the spatial database streamlines data inflow and outflow to the client, creating an accurate GIS resource available for the use anytime.

North Bay Water Reuse Authority, North San Pablo Bay Restoration and Reuse Program EIR/EIS, North Bay Area, CA. *GIS Analyst.* Wes was responsible for managing information and producing maps used for decision making purposes by the North Bay Water Reuse Authority and the Sonoma County Water Agency. The Reuse Program is a product of several local recycled water project planning efforts to create a regional recycling program, with the hopes of diverting recycled waste water for local agricultural and habitat restoration uses. Wes's alternatives analyses were mapped to provide solutions for the decision-making process Wes' mapping was used to detail possible nearby water users that could implement local reclaimed water supplies in their current operations.

California Public Utilities Commission, San Joaquin Cross Valley Loop, Tulare County, CA. *GIS Analyst.* Wes provided mapping and analysis support to the California Public Utilities Commission (CPUC) for the preparation of CEQA and related environmental documentation for proposed new and upgraded electric transmission line, substation, and gas pipeline projects throughout California. Current projects ESA is performing under this contract include preparation of an Environmental Impact Report (EIR) for a proposed 20-mile 220 kV new transmission line in southern Tulare County, and 3rd party review of a joint NEPA/CEQA document for a transmission line and substation upgrade on the 29 Palms Marine Corps Base.

Zone 7 Water Agency, Stream Management Master Plan, Alameda County, CA. *GIS Analyst.* Wes created a series of maps and graphics that assisted Zone 7 in the preparation of a Stream Management Master Plan (SMMP), designed to identify and implement a series of projects within the upper Alameda Creek Watershed to meet multiple objectives, including: flood protection, water supply, sediment management, habitat corridors, water quality and recreational corridors. The SMMP was developed through a series of stakeholder meetings to identify projects that meet these multiple objectives on a subwatershed basis. The SMMP identifies 45 projects within 10 subwatershed areas. These projects range in project type, scale, engineering detail, and level of potential environmental effect. As such, ESA led the CEQA process and prepared a Master EIR to examine the project set as a whole and identify potential impacts on a watershed, subwatershed, and flood control channel reach basis as appropriate.

San Francisco Public Utility Commission, WSIP Habitat Reserve Program Technical Studies, Alameda, San Francisco and San Joaquin Counties, CA. *GIS Analyst.* Wes developed a GIS that for the preparation of a Habitat Restoration Program. ESA is providing environmental analysis services for the Water System Improvement Program (WSIP) Habitat Reserve Program. The Program will provide a coordinated and consolidated approach to compensate for habitat impacts that would result from implementation of WSIP facility improvement projects. ESA provided comprehensive technical studies in support of the Habitat Reserve Program for thousands of acres of habitat improvements located in San Joaquin Valley, Sunol Valley, Bay Division, and Peninsula regions of the SFPUC water system.

San Francisco Public Utility Commission, Lower Crystal Springs Dam Improvement EIR, San Mateo County, CA. *GIS Analyst.* Wes conducted GIS analysis and produced maps for the Biological Assessment portion of the Lower Crystal Springs Dam Improvement project. The SFPUC is proposing to implement the Lower Crystal Springs Dam Improvements project to lift the DSOD-imposed restriction and to restore lost water storage in Crystal Springs Reservoir. The proposed improvements would enable safe passage of very large and infrequent floods over Lower Crystal Springs Dam. The dam spillway would be widened, its crest would be reshaped and raised, and a new stilling basin would be built at the toe of the dam to replace the existing stilling basin. After completion of the proposed project, the SFPUC would operate Crystal Springs Reservoir in much the same way as it does under existing conditions except that the maximum normal water surface elevation would be four feet above its current level. Through elevation analysis Wes played a key role in determining impact to native species do to water level inundation.

Christine Mueller

Technical Associate II

EDUCATION

M.C.P., Environmental Policy and Planning, Massachusetts Institute of Technology

B.A., Earth Sciences and Environmental Studies, University of California, Santa Cruz

18 YEARS EXPERIENCE

PROFESSIONAL AFFILIATIONS

Association of Environmental Professionals

Chris has more than 18 years of experience preparing and managing CEQA documents primarily for water and solid waste management projects. She conducts research and technical analysis for a range of planning and environmental projects, including water and wastewater infrastructure projects, solid waste facilities, and public land management projects. Over the past few years, Chris's emphasis has been on providing technical analysis of growth inducement, and water supply and demand.

Relevant Experience

California Public Utilities Commission, Monterey Peninsula Water Supply Project Environmental Impact Report/Statement, Monterey County, CA. *Technical Analyst.* The project includes construction of a desalination plant, seawater intake system, source water conveyance pipelines, desalinated water conveyance pipelines and associated facilities, expansion of an existing aquifer storage and recovery system, and brine discharge via an existing wastewater treatment plant effluent outfall. Chris prepared the Draft EIR/EIS's Growth Inducement section and a chapter describing the water demand and supply assumptions for the project, assisted in the preparation of chapters on project alternatives and the project variant, and provided technical review of other EIR/EIS sections.

City of Sunnyvale, Sunnyvale Water Pollution Control Plant Master Plan Program Environmental Impact Report, Santa Clara County, CA. *Technical Analyst.* Chris prepared the Environmental Impact Report's growth inducement analysis and provided senior technical review for other Environmental Impact Report sections. The Master Plan would guide improvements to the City's existing water pollution control plant over the next 20 years to meet current and foreseeable water quality, biosolids, and air quality requirements, among other objectives. The Master Plan includes rehabilitation of existing facilities; construction of new secondary and tertiary treatment, solids processing, and support facilities; decommissioning of the existing oxidation ponds; construction of a flood wall; and relocation of an access point to the San Francisco Bay Trail, which borders the treatment plant. The Environmental Impact Report also evaluated a variation of the Master Plan that involves a partnership between the City and the Santa Clara Valley Water District; the project variation includes construction of water purification facilities to increase the production and distribution of potable recycled water in Sunnyvale and other parts of Santa Clara County.

City of San Jose, San Jose/Santa Clara Water Pollution Control Plant(WPCP) Master Plan Environmental Impact Report, San Jose, CA. *Technical analyst.* Chris prepared the growth inducement section for the Environmental Impact Report and assisted with preparation and senior level review of responses to comments on the Draft Environmental Impact Report. The Plant Master Plan

identifies Plant improvement projects needed to address aging infrastructure, reduce odors, accommodate projected service area population growth, and comply with changing regulations that affect the WPCP; it also includes a comprehensive land use plan for the entire project site, including the development of various environmental, social, and economic uses on areas of the project site no longer needed for Plant operations or as bufferlands. The analysis of growth inducing impacts considered the growth inducement potential of changes in Plant capacity and the proposed development of new economic uses at the site, including potential impacts of nitrogen deposition on serpentine habitat as a consequence of growth resulting from project implementation.

Department of Water Resources, Bay Delta Conservation Plan Environmental Impact Report/Environmental Impact Statement, Sacramento/San Joaquin River Delta region, CA. *Technical Analyst*. Chris assisted in the preparation of the growth inducement analysis for the Environmental Impact Report/Environmental Impact Statement. The Environmental Impact Report/Environmental Impact Statement includes nine action alternatives that propose different combinations of conveyance facilities and associated changes to routing, timing and amount of flow through the Delta with actions to restore and manage physical habitats and reduce stressors on covered species. The amount of water delivered to State Water Project and Central Valley Project contractors would vary by alternative and thus the project could affect water supply in much of the State. Given that water is used to support urban growth, changes in water deliveries, particularly but not exclusively deliveries to municipal and industrial contractors, have growth-inducement implications. The analysis included an overview of the relationship between land use planning and water supply, land and water use profiles of the affected hydrologic regions, evaluation of the project alternatives' direct and indirect growth inducement potential, and a summary of the secondary effects of induced growth of the project alternatives.

City and County of San Francisco, San Francisco Public Utilities Commission (SFPUC) Water System Improvement Program Environmental Impact Report. *Technical Analyst*. The project included improvements to the San Francisco regional water system to address issues concerning water quality, seismic response, water delivery, and water supply to meet water delivery needs through the year 2030. The system provides water to 2.4 million people in San Francisco and the 30 Bay Areas cities, towns, and unincorporated areas served by the City's 27 wholesale water customers. Chris examined key factors used in estimating future demand that relate to growth, and compared assumptions regarding population and employment growth used to develop water demand projections with the growth forecasted by regional and local planning agencies (i.e., ABAG and the cities and counties in the water service area). The secondary effects of growth, which largely had already been identified and addressed by mitigation in the Environmental Impact Reports prepared for the adopted General Plans of the jurisdictions in the service area, also were summarized.

TWO-PAGE CURRICULUM VITAE

CURTIS M. OLDENBURG

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Lawrence Berkeley National Laboratory
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EDUCATION

1979-1983 University of California, Berkeley. A.B. in geology, Dec. 1983.
1985-1989 University of California, Santa Barbara. Ph.D. in geology, Sep. 1989.

RESEARCH INTERESTS

- Geologic Carbon Sequestration
  - Injection of CO_2 for carbon sequestration and enhanced gas recovery (CSEGR)
  - Near-surface leakage and seepage of CO_2
  - Risk assessment of geologic carbon sequestration sites
- Porous media compressed air energy storage (PM-CAES)
- Heat and mass transfer in geologic systems
- Dynamic behavior of subsurface systems where convection or gravity-driven flow processes occur (e.g., geothermal systems, gas reservoirs, magmatic systems, saturated and vadose zone hydrology, ferrofluid flow)
- Code development and applications

  http://esd1.lbl.gov/TOUGH2

  http://esd1.lbl.gov/FILES/research/projects/tough/licensing/TOUGH_EOS7C_flyer.pdf

  http://lnx.lbl.gov/GasEOS

PROFESSIONAL EXPERIENCE

Geological Senior Scientist, LBNL, September 2013–present.
Geologic Carbon Sequestration Program Lead, June 2008–present.
Staff Geological Scientist, LBNL, October 1994–August 2013.
Geologic Carbon Sequestration Program Deputy Lead, April 2007–May 2008.
Hydrogeology Department Head, LBNL, May 2002–January 2006.
Geological Scientist, LBNL, July 1992–September 1994.
Post-doctoral Fellow, LBNL, October 1990–June 1992.

SELECTED PROFESSIONAL ACTIVITIES

Editor in Chief, *Greenhouse Gases: Science and Technology*, Wiley, January 2010 to present.

SELECTED AWARDS

DOE Secretary's Achievement Award 2011 for Deepwater Horizon Oil Spill Flow Rate Technical Group work, October 2011.

USGS Director's Award for Exemplary Service to the Nation, 2010 Deepwater Horizon Oil Spill Response.

SELECTED PEER-REVIEWED JOURNAL ARTICLES

1. Oldenburg, C.M., S. Mukhopadhyay, and A. Cihan, On the use of Darcy's law and invasion percolation approaches for modeling large-scale geologic carbon sequestration, *Greenhouse Gases Science and Technology*, in press, 2015.
2. Birkholzer, J., C.M. Oldenburg, and Q. Zhou, CO_2 Migration and Pressure Evolution in Deep Saline Aquifers, *Int. J. Greenhouse Gas Control, 40*, 203-220, 2015.
3. Oldenburg, C.M., and N. Spycher, Will mercury impurities impact CO_2 injectivity in deep sedimentary formations? I. Condensation and net porosity reduction, *Greenhouse Gases: Sci. Tech.*, 2015.
4. Pan, L., and C.M. Oldenburg. "T2Well—An integrated wellbore–reservoir simulator." *Computers & Geosciences* 65 (2014), 46-55.
5. Jordan, P.D., C.M. Oldenburg, and JP Nicot, Measuring and modeling fault density for CO_2 storage plume-fault encounter probability estimation, *AAPG Bulletin*, 97(4), 597-618, 2013.
6. Su, G.W., B.M. Freifeld, C.M. Oldenburg, P.D. Jordan, and P.F. Daley, Interpreting Velocities from Heat-Based Flow Sensors by Numerical Simulation, *Ground Water, 44*(3), 386-393, 2005. *LBNL-57975.*
7. Oldenburg, C.M. and K. Pruess, Dispersive transport dynamics in a strongly coupled groundwater brine flow system, *Water Resour. Res., 31*(2), 289–302, 1995. *LBL-34487*.
8. Oldenburg, C.M. and K. Pruess, On numerical modeling of capillary barriers, *Water Resour. Res., 29*(4), 1045–1056, 1993. *LBL-32229*.

BOOKS

1. Smit, B., J.A. Reimer, C.M. Oldenburg, and I.C. Bourg (2014), *Introduction to Carbon Capture and Sequestration*, Imperial College Press, London, 580 pp.

SELECTED COMPUTER USER GUIDES

1. Pruess, K., C.M. Oldenburg, and G.J. Moridis. TOUGH2 User's Guide Version 2. E. O. Lawrence Berkeley National Laboratory Report *LBNL-43134*, 1999; and *LBNL-43134* (revised), 2012.
2. Oldenburg, Curtis M. and K. Pruess. A Two-Dimensional Dispersion Module for the TOUGH2 Simulator, Lawrence Berkeley Laboratory Report *LBL-32505*, 1993.

SELECTED REPORTS

1. Oldenburg, C.M., P.F. Daley, B.M. Freifeld, J. Hinds, and P.D. Jordan, Three-dimensional groundwater flow, aquifer response, and treatment system monitoring at site OU 1, Former Fort Ord, California, Lawrence Berkeley National Laboratory Report *LBNL-49586*, February 2002.

PUBLICATION METRICS FROM WEB OF SCIENCE

Total of 95 results, 1956 citations, h-index = 27 as of December 23, 2015.

Curriculum Vitae

Philip J. Roberts

Professor
Environmental Fluid Mechanics and Water Resources

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Biography
Dr. Roberts' professional interests are in environmental fluid mechanics, particularly its application to the engineering design of water intakes and ocean outfalls for disposal of wastewaters and desalination brine, and density-stratified flows in lakes, estuaries, and coastal waters. This includes mixing and dynamics of natural water bodies, mathematical modeling of water quality, field studies, and laboratory studies of turbulent mixing.

He is an authority on the fluid mechanics of outfall diffuser mixing and the development and application of mathematical models of wastewater fate and transport. He has extensive international experience in marine wastewater disposal including the design of ocean outfalls, review of disposal schemes, numerical modeling, and the design and analysis of oceanographic field study programs. Dr. Roberts has lectured widely on outfall design and is presently Co-Chairman of the IAHR/IWA Committee on Marine Outfall Systems.

Dr. Roberts' mathematical models and methods have been adopted by the U.S. EPA and are widely used around the world. He is a regular lecturer at workshops for the U.S. EPA on mixing zone analyses and on the use of mathematical models and outfall design for the Pan American Health Organization. He has developed innovative experimental techniques for research on diffuser mixing processes using three-dimensional laser-induced fluorescence and has published extensively in this area. For this research he was awarded the Collingwood Prize of ASCE in 1980 and was UPS Foundation Visiting Professor at Stanford University in 1993-94. He is presently one of only two Distinguished Scholars in the National Ocean and Atmospheric Administration (NOAA) Oceans and Human Health Initiative (OHHI) in which he is conducting research on the hydrodynamic aspects of bacterial and pathogen transport in coastal waters.

Dr. Roberts holds a professional engineering (PE) license.

Education
- Ph.D., Environmental Engineering Science, California Institute of Technology, 1977.
- M.S., Environmental Engineering Science, California Institute of Technology, 1972.
- S.M., Mechanical Engineering, Massachusetts Institute of Technology, 1970.
- B.Sc. (Eng), Mechanical Engineering, First Class Honors, Imperial College of Science and Technology, 1968.

Research Interests

- Environmental fluid mechanics, mixing and dynamics of rivers, lakes, coastal waters, and estuaries
- Outfalls for wastewater discharge
- Mathematical models of wastewater fate and transport
- Oceanographic field programs and data interpretation

Honors

- Appointed to and Chairman of "Expert Panel on Fate and Effects of Brine Discharge" State of California Water Resources Control Board, October 2011 -
- Distinguished Scholar, NOAA Oceans and Human Health Initiative, 2006-2008
- UPS Foundation Visiting Professor, Stanford University, 1993-94
- Member of the Hydrologic Transport and Dispersion Committee, ASCE, 1988 to present.
- Fellow, American Society of Civil Engineers
- Adjunct Professor of Oceanography, Skidaway Institute of Oceanography, Georgia
- Associate Editor, Journal of Hydraulic Engineering, 1987 to 1992
- Chairman of the ASCE Hydraulics Division Research Committee, 1986-1987
- Co-Chairman, IAHR/IWA Committee on Marine Outfall Systems
- Registered Professional Engineer number GA 12476, Georgia, United States
- 1980 Collingwood Prize of ASCE for paper: "Line Plume and Ocean Outfall Dispersion"

Awards

- 1999-2000 Outstanding Interdisciplinary Activity Award, School of CEE (with Don Webster).

Articles

1. Gandhi, V. N., Roberts, P. J. W., and Kim, J.-H. (2013). "Visualizing and Quantifying Dose Distribution in a UV Reactor Using Three-Dimensional Laser-Induced Fluorescence." ES&T, 46(24), 13220-13226.

2. Nekouee, N., Roberts, P. J. W., Schwab, D. J., and McCormick, M. J. (2013). "Classification of Buoyant River Plumes from Large Aspect Ratio Channels." J. Hydraul. Eng., 139(3), 296-309.

3. Tian, X., and Roberts, P. J. W. (2011). "Experiments on Marine Wastewater Diffusers with Multiport Rosettes." J. Hydraul. Eng., 137(10), 1148-1159.

4. Roberts, P. J. W., Hunt, C. D., Mickelson, M. J., and Tian, X. (2011). "Field and Model Studies of the Boston Outfall." J. Hydraul. Eng., 137(11), 1415-1425.

5. Tian, X., and Roberts, P. J. W. (2011). "Experiments on Marine Wastewater Diffusers with Multiport Rosettes." J. Hydraul. Eng., 137(10), 1148-1159.

6. Roberts, P. J. W., Tian, X., and Jung, Y. (2011). "Physical Model Study of an Alternating Diffuser for Thermal Discharge." J. Hydraul. Eng., 137(9), 1027-1036.

7. Kim, D., Nemlioglu, S., Roberts, P.J.W., and Kim, J.-H. (2010). "Ozone Contactor Flow Visualization and Quantification Using Three-Dimensional Laser-Induced Fluorescence (3DLIF)." Journal AWWA, 102(1), 90-99.

8. Kim, D.-i., Elovitz, M., Roberts, P. J. W., and Kim, J.-H. (2010). "Using 3D LIF to investigate and improve performance of a multichamber ozone contactor " Journal of the American Water Works Association, 102(10), 61-70.

Chris Rogers

Senior Ecologist / Botany and Wetlands Program Director

EDUCATION

B.S., Biology, emphasis in Botany, San Francisco State University

Graduate Studies, Ecology and Systematics, San Francisco State University

27 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

California Endangered, Threatened and Rare Plant Collecting Permit #09026

TRAINING

Arid West Wetland Delineation Workshop, USACOE, 2007

Property Analysis Record, Center for Natural Lands Management, 2004

Hydrology of Constructed Wetlands, Wetland Training Institute, 2001

California Wetlands, CLE International, 2000, 2007, 2015

Federal Endangered Species Act, CLE International, 1995

Wetlands Delineation Certification Training, 1995

Wetland Impacts and Mitigation, U.C. Davis Extension, 1992

Wetlands Delineation Training, 1991

Chris serves in both managerial and technical roles in ESA's Bay Area Biological Resources and Land Management Group. He specializes in permitting and regulatory compliance for water supply and wasetwater management clients. He oversees large-scale and fast-track biological resource analyses and jurisdictional wetland delineations in support of multi-agency permits, construction compliance monitoring and reporting, preparation of accurate and defensible environmental documentation, habitat assessments and mapping and analysis, endangered species evaluations, restoration and mitigation planning, peer review, and public meeting presentations. Chris frequently acts as a technical liaison between project design and engineering clients and ESA's environmental planning and permitting specialists.

Relevant Experience

EBMUD Moraga Pipeline Project, Contra Costa County, CA. *Permitting and Restoration Specialist.* Chris designed and supervised construction of a seasonal wetland at Lafayette Reservoir Recreation Area to mitigate construction impacts of this new water delivery pipeline. He identified the appropriate site based on soils, hydrology, and consideration of potential conflicts with pipeline maintenance and recreational use. Chris worked with ESA's hydrologist to develop the water balance model to optimize size and depth of the pond to achieve the desired wetland plant community, and specified the planting palette. Chris continues to oversee long term monitoring and compliance reporting on behalf of EBMUD.

California Department of Water Resources (DWR) South Bay Aqueduct Improvement and Enlargement Project EIR, Alameda County, CA. *Biologist and Wetland Permit Specialist.* Chris assessed wetland and sensitive species habitat along 44-mile South Bay Aqueduct, and obtained multiple permits. Chris was integrally involved in review of preliminary engineering designs to identify environmental constraints, working with DWR design engineers to refine final plans and specifications to avoid or minimize environmental issues, in particular to reduce regulatory requirements. He coordinated permit applications and negotiated permit conditions with ACOE (Sacramento and San Francisco Districts), USFWS, CDFG, and the San Francisco Bay RWQCB. Chris assisted to identify suitable and available land for mitigation and developed conservation easement strategies, and continues to supervise the maintenance and monitoring of the conservation lands.

Crystal Springs Trunk Sewer Improvement Project, Town of Hillsborough. *Biologist and Wetland Permit Specialist.* Chris supervised environmental compliance monitoring for replacement a failing and undersized sewer line for the Town of Hillsborough, located in a highly constrained utility corridor owned by the San Francisco Public Utilities Commission (SFPUC) and parallel with San

Mateo Creek. The project relied on an innovative pipe-bursting method to minimize construction impacts to high quality riparian habitat, but experienced substantial difficulties with implementation. Chris coordinated with SFPUC on the preparation of a restoration plan to replace high quality riparian habitat and provide erosion control, and oversaw implementation of the plan, as well as annual monitoring and reporting.

Fairfield-Suisun Sewer District, FSSD Treatment Plant Expansion & Outfall Project EIR. *Lead Biologist and Wetland Permit Specialist.* Prior to completion of improvements to this wastewater treatment facility, and according to the Mitigation and Monitoring Plan and permits he obtained for the project, Chris supervised an assessment of a population of a special status plant, Suisun marsh aster that was to be impacted by the construction of an outfall structure on a tidal creek. Chris's team identified appropriate local transplanting sites, monitored construction to minimize the impacts, harvested and transplanted them to comparable habitat nearby, and collected baseline data. Following construction, Chris supervised restoration of the outfall construction footprint with native plant material. Chris continues to supervise annual monitoring and reporting to the regulatory agencies on the successful transplant and restoration effort.

Livermore-Amador Valley Water Management Agency (LAVWMA), Export Pipeline Facilities EIR. *Biologist and Wetland Permit Specialist.* Chris prepared assessments of riparian and wetland habitats along a 16-mile wastewater export pipeline for LAVWMA in Alameda County, which terminates at a major discharge collector pipeline in the San Leandro Marsh. He prepared applications and negotiated wetland permits for multiple federal, state and local regulatory agencies, and developed the construction monitoring compliance program, wetland mitigation plans and bid specifications for mitigation of impacts to biological resources. Chris also assisted in preparation of detailed plans and specifications for restoration of saltmarsh and upland habitats as part of the project's mitigation program.

San Jose/Santa Clara Recycled Water Facility Master Plan Projects, San Jose, CA. *Lead Biologist.* Chris has conducted wetland delineations, rare plant surveys, wildlife surveys (including for burrowing owl), and prepare permitting strategies and biological resource sections of CEQA Addenda and Initial Study/Mitigated Negative Declarations for individual capital projects as part of the overall Plant Master Plan. He also developed and presented regulatory training module for City and Facility staff, and prepared a narrated PowerPoint for the City's training program.

Napa Sanitation District, MST Service Area RWP Project, Napa County, CA. *Wetland Permit Specialist*. Chris performed a preliminary delineation of waters and subsequent environmental permitting documents submitted to the U.S. Army Corps of Engineers, California Department of Fish and Wildlife, and the Regional Water Quality Control Board for 19 in-road culvert trenching projects and 2 creek crossings of perennial streams. Sensitive species in the area include steelhead, California red-legged frog, and nesting birds.

Publications and Presentations – available on request

Chris Sanchez

Senior Technical Associate

EDUCATION

B.S., Environmental Science, University of California, Berkeley

U.C. Berkeley Extension; Toxic Air Contaminants

24 YEARS EXPERIENCE

Chris Sanchez has more than 24 years of experience managing, conducting and monitoring air quality, greenhouse gas, noise and energy investigations and surveys for urban development, transportation, and infrastructure projects. He has prepared greenhouse gas emission inventories for nine years since the passing of Assembly Bill 32. His professional training and experience have augmented an academic background in air quality, physics, chemistry, meteorology, and energy. Chris has a bachelor's degree from U.C. Berkeley in Environmental Science with additional studies from U.C.B. in toxic air contaminants. He is trained and proficient in the CalEEMod air quality emissions model as well as in air dispersion modeling using the AERMOD dispersion model. He is proficient in use of the traffic noise model of the Federal Highway Administration (FHWA) and the Roadway Construction Noise Model. He has been involved in dozens of major projects including major commercial airport master plans, divestiture of the State of California's power plants, mining projects and reclamation plans, rail transit extension projects and arena construction projects.

Relevant Experience

Monterey Peninsula Water Supply Project Environmental Impact Report, Monterey, CA. *Noise Analyst.* Under contract with the California Public Utilities Commission (CPUC), Chris prepared the noise impact analysis of an EIR/EIS for the California American Water Company (CalAm) Monterey Peninsula Water Supply Project (MPWSP). The primary project elements include a seawater intake system, a desalination plant, aquifer storage and recovery facilities, and over 20 miles of conveyance pipelines and associated infrastructure. Key issues include potential impacts from 24-hour drilling and operation of slant wells and aquifer storage and recovery wells open trench pipeline installation and construction and operation of a desalination plant. Much of the construction work was assumed to occur 24-hours a day and analysis of noise impacts to adjacent sensitive receptors had to account for this possibility.

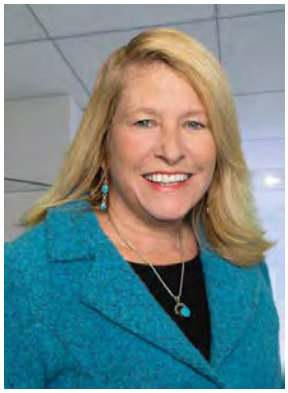
Contra Costa Water District, Los Vaqueros Reservoir Phase 2 Expansion, Draft Supplemental EIR/EIS, Contra Costa County, CA. *Air Quality, Greenhouse Gas and Noise Analyst***.** Chris conducted the air quality, GHG and noise analysis for the proposed expansion of Los Vaqueros reservoir. The Phase 2 Expansion project would expand Los Vaqueros Reservoir from the existing 160 thousand acre feet (TAF) to a proposed 275 TAF storage capacity as well as upgrade existing conveyance facilities, and construct new conveyance facilities. Analysis included an estimate of construction-related emissions from excavation and off-haul of materials a, a comparison of emissions with project revisions and an estimated change in GHG emissions associated with energy demand from conveyance. Construction noise impacts and operational noise impacts of new facilities were also estimated.

Energize Eastside Power Transmission Project Draft Environmental Impact Statement. *Greenhouse Gas and Noise Analyst.* Chris prepared technical analysis for a new 18 mile long transmission line for Puget Sound Electric on the eastside of its service area beginning in Bellevue and crossing through multiple local jurisdictions. Impacts were considered for multiple transmission options including overhead transmission lines, underground transmission lines, and underwater transmission lines as well as a host of alternatives to the project including installation and operation of natural gas fired peaker plants. Greenhouse gas emissions were estimated from construction and operation including life-cycle emissions from concrete to be used in transmission tower footings, and underground line encasement. Potential noise from peaker plant operations was also assessed.

San José/Santa Clara Water Pollution Control Plant Master Plan Program Environmental Impact Report, San José, CA. *Air Quality Analysis.* Chris used CalEEMod to estimate emissions associated with long-term development in a proposed Clean Tech Center. Master Plan would designate areas of the project site for light industrial, institute, and office/R&D, as well as retail uses and these future development scenarios would result in both operational and construction-related emissions that were quantified and assessed for impacts related to CEQA thresholds.

The 34th Americas Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza Environmental Impact Report, Environmental Assessment (NEPA) and General Conformity Determination, San Francisco, CA. *Air Quality, Greenhouse Gas and Noise Analyst.* Chris prepared fast-track CEQA and NEPA documentation as well as a federal General Conformity Determination and technical and logistical support for complex multi-agency regulatory compliance. For the environmental impact report, relative to CEQA, an emissions inventory was assembled for a variety of unique sources including race support vessels, race-sponsored spectator vessels, spectator vessels, helicopter operations and cruise ship hoteling emissions resulting from the temporary decommissioning of shore side power. For the NEPA documentation, a greenhouse gas emission inventory was developed to account for AC34 impacts to existing federal GHG inventories. The noise analysis for both the CEQA and NEPA documentation examined noise impacts associates with construction, generators supplying temporary power, amplified music at event venues, helicopter noise, fireworks and noise from increased traffic volumes. A General Conformity Determination was conducted to verify compliance with the 1993 Amendments to the Clean Air Act and the State Implementation Plan, which included dispersion modeling to demonstrate that federal air quality standards would not be exceeded.

Pilarcitos Rock Quarry Expansion Environmental Impact Report, San Mateo County. *Air Quality/Noise Analyst.* Chris prepared the criteria air pollutant analysis and noise impact analysis for the proposed long-term expansion that would result in this facility excavating an additional 256 acres of new areas. Issue areas included operational emissions of on-site excavation equipment on-site processing equipment and heavy duty-diesel truck transfer of mined materials. Noise analysis included the impacts of rock blasting practices and impacts.



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Practice Groups

Environmental, Land Use, and Natural Resources

Real Estate & Business Law

Education

J.D., Cornell Law School, 1986

B.A., Urban Studies, University of California, Davis, 1983

Admissions

California State Bar

Anna C. Shimko

Anna Shimko is Chair of Burke's Real Estate and Business Practice Group. She focuses her practice on all areas of land use, real estate development, and environmental law, representing both public agencies and private landowners and developers in administrative and court proceedings. Ms. Shimko has particular expertise in compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). She works closely with project proponents, public agencies, and environmental consultants on preparing and defending CEQA and NEPA documents such as negative declarations, environmental impact reports (EIRs), and environmental impact statements (EISs), including for complex projects such as water rights transfers, desalination plants and alterations to nuclear plants. Ms. Shimko helps private clients through all stages of the land use approval process, obtaining entitlements to build or expand large shopping centers, stand-alone retail stores, mixed-use projects, hospitals, hotels and resorts, golf courses, residential developments, and quarries, among others. She also assists cities, counties, special districts, and state agencies in regulating land and development, negotiating real estate transactional documents and development agreements, and updating general plans, specific plans, and zoning codes. Ms. Shimko represents clients in matters involving the Subdivision Map Act, annexation, historic resources, public-private partnership transactions and financing mechanisms, the Coastal Act, air quality regulations, water supply, climate change regulations, transportation planning, eminent domain, and inverse condemnation. Ms. Shimko litigates land use, CEQA, and NEPA matters for public and private clients at trial court and appellate court levels, and serves as an expert witness throughout California in cases involving land use issues.

Affiliations

President, Harbor Equity Group, Waldo Point Harbor, April 2015 – present

Advisory Council and Board of Directors, San Francisco Planning and Urban Research Association, 2003-2014

California Building Industry Association/California Business Properties Association, CEQA Reform Task Force, 1992-present

Treasure Island/Yerba Buena Island Citizens Advisory Board, 2001-2004

San Francisco Juvenile Probation Commission, 1996-2000

Marin Montessori School Campus Planning Committee, 2015-present

Publications & Presentations

"California Environmental Quality Act: Key Developments Affecting Water Projects," Annual California Water Law Conference, San Francisco, November 2016

"Current Developments in CEQA Law and Practice," The Administrative and Public Environmental Law Conference, June 2015

Speaker, "Current Issues in Land Use Regulation and Development," California Environmental Quality Act Update Cases Late 2011 to Present, California Continuing Education of the Bar, September 2012

"Aetna Springs Resort," California Building Industry Association Select Conference on Industry Litigation, April 2012

"Hydraulic Fracturing: Permitting and Environmental Reviews," The Seminar Group, November 2011

"Americans with Disabilities Act Primer," 2011 for insurance company

"Cumulative Impacts," Climate Change, Cumulative Impacts and Compliance: 6th Annual National Environmental Policy Act (NEPA) CLE International Conference, January 2010

"Coming Soon to Your State or Federal Government: the Climate Change Regulation Experience in California," ICSC U.S. Shopping Center Law Conference, October 2009

"The Benefits of Development Agreements," League of California Cities Planners Institute, March 2009

"Land Use in Northern California," Law Seminars International, March 2009

"AB 32 Session Climate Change: Science, Law & Policy," California Business Properties Association, Fall 2008

"The Changing Climate of California Real Property Law," California Continuing Education of the Bar, Fall 2008

"Green Building Conference," CLE International, February 2008

"The Challenges of Urban Development: Trends and Legal Issues for Real Property Practitioners," California Continuing Education of the Bar, Fall 2007

"Land Use Regulation and Development," California Continuing Education of the Bar, Fall 2006

"Regulatory Takings Conference," CLE International, 2003

Recognitions

American College of Real Estate Lawyers, Elected Member

Lambda Alpha International (global land economics society), Elected Member

California's Top 50 Development Lawyers, Daily Journal, 2014

Super Lawyers – The Top 50 Women Attorneys in Northern California, 2004-2005

Northern California Super Lawyers, 2004-2017

Best Lawyers in America (Land Use and Zoning), 2012 - 2016

JUSTIN TAPLIN, MS

Principal/Senior Environmental Scientist

EDUCATION

M.S. Environmental Management. University of San Francisco, California.

B.S. (Hons) Biological Sciences. University of Westminster, UK

14 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Certified Fisheries Professional (#3146), American Fisheries Society

Association of Environmental Professionals (AEP)

TRAINING

Advanced CEQA Workshop. AEP, 2015.

CEQA Case Law Updates, Issues, Trends. Sohagi Law Group, 2010.

Stormwater Regulations in CA. NWET, September, 2009.

Management of Water in CA. UC Berkeley Extension, 2008.

A skilled and effective scientist, technical manager, and strategic thinker, Justin brings more than 14 years of California based consulting experience to the environmental review and compliance process. He applies expertise in the arenas hydrology, water quality, and water resource regulation/policy with a discerning eye to produce comprehensive and defensible environmental assessments and mitigation strategies. He acts as technical manager, senior reviewer, and lead author for large-scale, often contentious, complex program- and project-level Environmental Impact Reports, Environmental Impact Statements, and other documents pursuant to the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). As technical manager he routinely coordinates with engineering and technical sub-consultants with expertise in a variety of fields such as discharge structure design, dilution modeling, and water quality. Prior to co-founding Sutro Science LLC, Justin worked at Environmental Science Associates as a technical manager contributing to a wide range of water supply and infrastructure projects.

Relevant Experience

Monterey Peninsula Water Supply Project (MPWSP) EIR/EIS, Monterey, CA. ***Technical Lead: Hydrology and Water Quality.*** Justin is technical manager and lead author supporting preparation of the EIR/EIS section addressing water quality impacts related to the discharge of desalination brine into Monterey Bay and subsequent impacts to water quality and marine organisms, including from salinity and shear stress. His responsibilities include evaluating all water quality impacts related to construction and operation, with a focus on the discharge of desalination brine, and the development of feasible and defensible mitigation strategies. Additionally, analyses have covered a wide range of alternatives that include open ocean intakes, new discharge structures, and a reduced capacity desal plant paired with additional supplies from reversis osmosis treatment of agricultural return water. As part of the project, Justin has collaborated closely with Professor Phil Roberts of Georgia Tech., a leading expert in desalination regulation and discharge plume model analysis, and also coordinated with experts in marine resources, water quality model analysis, and discharge structure design. The impact analyses will also assess compliance with the recently amended California Ocean Plan regarding numeric salinity limits and impacts from shear stress on marine organisms.

CalAm Coastal Water Project, Monterey, CA. ***CEQA Lead Technical Analyst.*** Justin was responsible for evaluating geologic and hydrologic impacts for the various project components for the EIR, including consideration of potential liquefaction hazards for new facilities resulting from temporary groundwater storage. As part of the team assembling a complex EIR that considered a range of potential facilities, alternatives, and project- and program level analyses, Justin was responsible for developing an impact assessment template that was adopted for the EIR to simplify and standardize

disclosure of environmental impacts for all facilities and phases of the project throughout all resource sections. Justin also participated in public meetings and answered queries on project alternatives, and technical topics including potential liquefaction hazards, groundwater storage, water quality, regulatory requirements. The alternatives considered in the EIR included a desalination plant at one of several locations; various methods of water intake and outfall; conveyance pipelines; aquifer storage and recovery facilities; and other treatment, storage and conveyance facilities.

West Basin Municipal Water District Ocean Water Desalination Project. ***Technical Lead: Hydrology and Water Quality.***
The Ocean Water Desalination Project proposed by the West Basin Municipal Water District is a desalination facility that would produce 20 million gallons per day (MGD) of potable water supply, with potential expansion of the facility to a future capacity of up to 60 MGD. The project will allow West Basin to develop a locally-sourced supply that will reduce the dependence of imported water, increase drought resiliency and water security while further diversifying West Basin's water supply mix by. Justin, in collaboration with Phil Roberts, and Applied Marine Science, will bring technical expertise to the environmental review and planning process for this project under the CEQA and NEPA leadership of ESA. Justin is technical manager and lead author supporting preparation of the EIR/EIS in accordance with NEPA and CEQA requirements and is responsible for the evaluation of all potential impacts relating to the offshore marine environment, the coastal zone interface, and inland surface water and groundwater from implementation of the both the 20 MGD and 60 MGD projects. Additionally, justin is responsible for the development of feasible and defensible mitigation strategies.

SFPUC Water System Improvement Program (WSIP) PEIR. ***Technical Lead: Fisheries / Hydrology.*** The WSIP PEIR included over 30 facility improvement projects along the regional water system for the purposes of improving water quality, seismic reliability, and reliability. Justin was lead author for impact assessments and mitigation development for the Alameda Creek watershed. Mitigation development needed to account for short, medium, and long term flow regimes and compliance criteria for a watershed that has the potential for restored listed salmonids prior to construction.

34th America's Cup and Cruise Terminal EIR, San Francisco, CA. ***Task Manager: Hydrology and Water Quality.*** Environmental review for two projects was completed through a single EIR: 1) the 34th America's Cup (AC34) sailing events; and 2) a new San Francisco Cruise Terminal.The America's Cup Event Authority proposed a variety of facilities. Justin managed all tasks related to the hydrologic and water quality impacts analysis for the EIR and was the section lead author. Technical management required coordination of engineering and technical sub-consultants as well as an internal team of hydrologists, coastal process engineers, and water quality specialists. Justin evaluated the various project components, which posed a number of unique hydrologic and water quality impacts. Key issues included use of various temporary project facilities, such as wave attenuators, in-water construction impacts, and temporary land use changes.

Alexandra Thompson

Managing Associate, Energy Group

EDUCATION

M.A., Urban Planning, UCLA Luskin School of Public Affairs

B.A., Peace and Conflict Studies, UC Berkeley

10 YEARS EXPERIENCE

PROFESSIONAL AFFILIATIONS

Association of Environmental Professionals

Alexandra (Al) coordinates the preparation of environmental compliance evaluations under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) for a variety of developers, agencies, and utility clients throughout California and the West. She has also assisted with the preparation of permitting compliance documents including under the Endangered Species Act and Clean Water Act and for hydroelectric relicensing. Along with a planning and regulatory background, Al has technical expertise in the areas of environmental justice, land use and zoning, utilities and infrastructure, social sciences, and energy conservation.

Relevant Experience

California Public Utilities Commission, Monterey Peninsula Water Supply Project, Monterey County, CA. *Project Manager*. Managed the preparation of the CEQA/NEPA analysis identifying potential impacts of California American Water Company's (CalAm) proposal to develop a new source of potable water for several coastal communities in Monterey County through the development of a coastal desalination plant. Al served as overall project manager for the EIR/EIS, as well as technical task lead for the cumulative impacts analyses in all environmental topic areas.

San Francisco Public Utilities Commission, Bayview-Hunters Point Environmental Justice Evaluation, San Francisco, CA. *Project Manager*. ESA prepared a report evaluating existing conditions in the Bayview-Hunters Point neighborhood relevant to environmental justice issues. Relying on input from community groups and on existing research from a number of local, regional, and state sources, the report evaluates over 50 "indicators" of environmental justice concern, such as poverty, air pollution, housing displacement, hazardous waste sites, and access to services, to determine what economic, social, and environmental burdens are experienced disproportionately in this neighborhood. Following this existing conditions assessment, Al prepared an analysis of the potential effects of the SFPUC Biosolids Digester Facilities Project on the various environmental justice indicators and an assessment of the SFPUC's Community Benefits Program's impact on improving these indicators, finishing with recommended actions the SFPUC could take to make improvements in both undertakings relative to environmental justice.

McMillen Jacobs Associates, Vista Grande Drainage Basin Improvement Project, Daly City and San Francisco, CA. *Deputy Project Manager*. Al is Deputy Project Manager for the preparation of a joint Environmental Impact Report/Environmental Impact Statement on behalf of the City of Daly City and the National Park Service – Golden Gate National Recreation Area. The project would replace a portion of Daly City's stormwater drainage canal with a debris screening structure, box culvert, and treatment wetland, with some storm and authorized non-storm flows diverted to Lake Merced, and would enlarge the existing

drainage tunnel beneath Fort Funston to mitigate flooding in the Vista Grande watershed resulting from large storms. Al also assisted with the preparation of a Water Quality Analysis based on ESA's water quality evaluation and monitoring program in Daly City's Vista Grande Canal and San Francisco's Lake Merced and prepared an alternatives analysis in support of the U.S. Army Corps of Engineers' Clean Water Act Section 404(b)(1) process.

San Francisco Public Utilities Commission, Lake Merced Water Quality and Biological Resources, San Francisco, CA. *Project Manager*. In connection with the proposed Vista Grande Drainage Basin Improvement Project that would provide a source of stormwater to improve and maintain water levels in Lake Merced, the SFPUC has offered to implement an aeration demonstration project to determine whether a full scale project could improve the lake's dissolved oxygen (DO) levels above 5 milligrams per liter (mg/L), while avoiding other undesireable effects. ESA is assisting in the areas of biological resources survey, wetland delineation, permitting support, and water quality sampling and analysis.

California State Coastal Conservancy, Ballona Wetlands Restoration Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Los Angeles, California. *Project Analyst*. Al prepared the socioeconomics and environmental justice NEPA analyses for the Draft EIR/EIS. Seeking to restore wetland habitat and function within the Ballona Reserve, the California Department of Fish and Wildlife (CDFW), which manages the Ballona Reserve, and Los Angeles Department of Public Works (LADPW), which operates and maintains the improved Ballona Creek channel and levees within the Ballona Reserve, are proposing a large-scale restoration that would restore, enhance, and establish native coastal wetland and upland habitats within the Ballona Reserve and require incidental work on adjacent properties.

California Public Utilities Commission, Lakeview Substation Project Environmental Impact Report (EIR), Riverside County, CA. *Project Analyst*. Al assisted with the preparation of an EIR on behalf of the California Public Utilities Commission by researching and preparing several sections of the EIR. The EIR evaluated a proposed electrical substation and associated subtransmission infrastructure in Lakeview and Moreno Valley, CA.

Erler & Kalinowski, Inc., Pad D Groundwater Well Project Focused EIR, East Palo Alto, CA. *Project Analyst*. ESA is preparing an initial study and focused EIR for a proposed new 500 gallon-per-minute municipal groundwater production well at the City of East Palo Alto-owned Pad D site. The well would be located in a commercial parking lot and bordered by the Home Depot on one side and residences on another. The focused EIR will evaluate the project's potential impacts on groundwater resources and water quality in detail. This site is also the potential location of the northeastern landing of a pedestrian bridge that will span Highway 101; the focused EIR addresses the potential cumulative impacts of these two projects.

Publications

Alexandra Kostalas. 2011. A Local Government Policy Guide to California Climate Change Laws. Master of Arts project prepared for ICLEI USA California. UCLA Luskin School of Public Affairs, Urban Planning Department.

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PRACTICE GROUPS

Environmental, Land Use, and Natural Resources

Public Law

Litigation

Education Law

EDUCATION

J.D., Vermont Law School, 1998

B.A., Ohio University, 1993

ADMISSIONS

California State Bar, 1999

Colorado State Bar

Stephen E. Velyvis

Mr. Velyvis is a well-respected land use and environmental law attorney with over 16 years of expertise advising and representing public agency and private clients in administrative proceedings and before state and federal trial and appellate courts.

Mr. Velyvis has extensive advisory and litigation experience with and works daily on projects addressing complex legal issues spanning the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), the Federal Power Act, and the California Coastal Act, as well as the state and federal legal and regulatory frameworks governing clean water, clean air, endangered species and electricity generation and transmission. He also routinely represents clients in land use-related matters including local and state planning and zoning laws, the Subdivision Map Act, timber harvests/timberland conversions, and vineyard expansions.

While Mr. Velyvis has extensive advisory and litigation experience with a multitude of environmental laws, he is most experienced with CEQA, having represented parties on all three “sides” of the CEQA equation. In other words, in addition to successfully representing Burke’s many municipal and public agency clients, Mr. Velyvis has also successfully represented numerous private clients (e.g., project applicants and project opponents.) In this regard, Mr. Velyvis distinguishes himself as a leading CEQA practitioner. This deep and varied experience gives him invaluable insight into what all three sides on a given CEQA project are thinking at every step along the way. This unique perspective also enables him to develop cutting-edge legal strategies aimed at resolving conflicts and prevailing in litigation, as opposed to simply posturing or falling back on routine, "cookie cutter" advice and litigation tools. In sum, Mr. Velyvis draws on his collective experience to help Burke’s clients think outside the box and routinely provides successful, cost-effective results on myriad land use and environmental projects.

In just the past few years alone, Mr. Velyvis has worked and continues to work with numerous cities and school districts to provide advice and actively guide the preparation of a host of CEQA documents (statutory and categorical exemptions, mitigated negative declarations and environmental impact reports and addenda) and successfully defend various legal challenges thereto.

Mr. Velyvis also has experience with renewable energy projects and recently represented parties in related proceedings before the Federal Energy Regulatory Commission, the U.S. Forest Service, the State Water Resources Control Board, and the

California Public Utilities Commission with respect to a pumped-storage hydroelectricity project and related transmission line involving complex CEQA/NEPA, Clean Water Act, and Endangered Species Act issues, among others.

Finally, Mr. Velyvis also has significant experience with the Administrative Procedures Act (APA) and Regulations of the Office of Administrative Law. Most notably, Mr. Velyvis was an integral part of the legal and scientific expert team involved in successful litigation to force and advocacy to influence the Department of Pesticide Regulation's preparation of regulations covering the controversial ozone-depleting soil fumigant methyl bromide.

Affiliations

California Bar Association, Environmental Law Section Legislation Committee (member) and Environmental Law Update publication (regular contributor)

Urban Land Institute

California Solar Energy Industries Association

USGBC Northern California Chapter (founding member, former steering committee member and emerging professionals chair of the Chapter's Diablo East Bay Branch)

California Special Districts Association: CEQA Expert Feedback Team

American Planning Association, Northern California Chapter (Board of Directors, Legislative Director)

Bay Area City Attorneys' Association

Contra Costa City Attorneys' Association

Presentations

- Featured Speaker, Planning Fun-da-mentals, League of California Cities Planning Commissioners Academy (March 2, 2016)
- Featured Speaker "CEQA Update" at City Attorneys Association of Los Angeles County Member Luncheon (February 2016)
- Featured Speaker AB 2188 Implementation Requirements for Rooftop Solar Systems at League of California Cities City Attorneys' Spring Conference (May 2015)
- Featured Speaker on CEQA issues at County Counsels' Association Spring Land Use Conference (May 2014) "Practical Advice for Minimizing CEQA Liability in Your City" (League of California Cities' Webinar, March 2014)

Publications

- "Identifying Baseline Conditions under CEQA – Back to the Future?" *Northern News,* March 2015
- "Big Changes on Horizon for Traffic Impact Analysis Under CEQA," *Northern News*, October 2014
- "Practical Advice for Minimizing CEQA Liability in Your City" (League of California Cities' *Western City* magazine, February 2014)

Eric Zigas

Principal Managing Associate, Northern California Water Group

EDUCATION

B.A., Geography, State University of New York at Buffalo

35+ YEARS EXPERIENCE

Eric has served as project director or project manager on numerous water resources planning assignments over the past 35+ years and he has prepared a considerable amount of environmental documentation to meet CEQA, NEPA and FERC requirements.

Relevant Experience

California American Water Company's Monterey Peninsula Water Supply Project (MPWSP) CEQA/NEPA Review. *Project Director*. Eric managed the preparation of CEQA documentation for the California Public Utilities Commission (CPUC) on the California American Water Company's (CalAm's) proposed Coastal Water Project (CWP). After the CPUC certified the CWP EIR in 2009 and approved the Regional Project Settlement Agreement in 2010, CalAm withdrew its support for that desalination project and submitted a new application to the CPUC in 2012; the MPWSP incorporated many of the same elements previously analyzed in the Coastal Water Project EIR.

Eric directed the preparation of the April 2015 MPWSP Draft EIR that included an extensive analysis of a smaller desalination project that would be paired with the Pure Water Monterey Groundwater Replenishment (GWR) Project. In late 2015, the CPUC Energy Division announced that the Draft EIR would be modified and recirculated as a joint EIR/EIS in coordination with Monterey Bay National Marine Sanctuary (MBNMS) as the NEPA Lead Agency. Eric directed the preparation of the 4-volume MPWSP Draft EIR/EIS; it underwent extensive review by the CPUC and NOAA, and was published on Friday January 13, 2017. The Final EIR/EIS was published in early 2018.

Uncommon Dialogue: Marine and Coastal Impacts of Ocean Desalination in California. *Invited Participant.* In January 2016, the Stanford Woods Institute for the Environment, through its Water in the West Program and the Center for Ocean Solutions, collaborated with The Nature Conservancy and the Monterey Bay Aquarium to organize and facilitate an "uncommon dialogue" on the coastal and marine impacts of ocean desalination among leading experts from non-governmental organizations, private industry, government agencies and academia. Eric was one of 30 people invited to participate in the dialogue that had two primary objectives: i) to promote information exchange and open discussion regarding the best available science, technology and policy related to marine and coastal impacts of desalination projects in California and beyond; and ii) to identify key issues and knowledge gaps for future research and policy development with respect to marine and coastal impacts of ocean desalination in California.

Technical Advisory Panel for the City of Santa Barbara's Subsurface Desalination Intake and Potable Reuse Feasibility Studies. In 2015, the National Water Research Institute (NWRI) appointed Eric and three other water industry

experts to a Technical Advisory Panel (Panel) to provide peer review of the technical and scientific aspects of both the Subsurface Desalination Intake Feasibility Study and the Potable Reuse Feasibility Study being undertaken by the Public Works Department of the City of Santa Barbara, California. Specifically, the Panel reviewed the work products (e.g., draft Work Plans, technical memoranda, and reports) for both feasibility studies and considered public comments on these proposed efforts. Findings and recommendations were documented in Panel reports.

Bay Area Regional Desalination Pilot Project (BARDPP). *Project Director.* The Bay Area's four largest water agencies -- Contra Costa Water District, East Bay Municipal Utility District, San Francisco Public Utilities Commission, and Santa Clara Valley Water District -- proposed to construct and operate a pilot desalination plant at CCWD's existing Mallard Slough Pump Station near Pittsburg, CA. The pilot plant study (PPS) was used to obtain additional data and help determine the optimal operations for a full-scale plant to be located in the SF Bay Area. Eric directed the preparation of the CEQA document and oversaw the preparation of the necessary permits for the intake and discharge systems.

Bay Area Regional Desalination Project CEQA and Permitting. *Project Director*. The Bay Area's six largest water agencies -- Contra Costa Water District, East Bay Municipal Utility District, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Alameda County Water Agency and Zone 7 Water Agency – wanted to explore scope, budget and schedule to complete environmental documentation and permitting for a full scale regional desalination project. Eric worked with the water agencies and AECOM (under separate contract to the Agencies) to define the project and reasonable alternatives, and then developed a draft scope of work, budget and schedule to prepare an Environmental Impact Report under CEQA and to secure all necessary permits including water rights. Staff presented the results to the agencies' general managers for consideration.

CPUC Monterey Peninsula Long-term Water Supply Contingency Plan (Plan B) as an Alternative to the Carmel River Dam. *Project Manager*. Prior to joining ESA, Eric was responsible for the development of a long-term water supply contingency strategy for the Monterey Peninsula, as directed by AB1182 (Keeley). He led the planning team through an alternatives development and evaluation process which included working with CPUC staff in: the development of objectives and screening criteria; the identification and evaluation of potential water supply components; and the development and evaluation of alternative water resource strategies to meet the intent of the SWRCB Order 95-10. The strategies ranged from desalination (at multiple sites including Moss Landing, Marina and Sand City) to reclamation to Aquifer Storage and Recovery within the Seaside basin. There was a comprehensive public participation element to the assignment, and Eric worked with water Division staff, the advisor to the assigned commissioner, and the ALJ in the planning and facilitation of the public sessions. The recommended alternative from the Plan B study became the Coastal Water Project.

Salinas River Basin Management Plan. *Project Manager.* Eric evaluated the alternative supply solutions, including the development of spillway modifications at Nacimiento Reservoir, river conveyance, a river diversion and north Valley storage/recharge, in addition to increased conservation and reclamation opportunities for the Monterey County Water Resources Agency. He compiled the Basin Management Plan alternatives and screened them against the screening criteria, leading to the selection of a preferred alternative. The study addressed the issue of saltwater intrusion as a result of groundwater overdraft.