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Appendix 5.2E
Biological Staff Resumes

Melissa Fowler

Small Mammal Ecologist/Wildlife Biologist

Education

M.S., Environmental Studies, Emphasis: Environmental Science, California State University, Fullerton (2010)
B.S., Biological Science, California State University, Fullerton (2005)
A.A., Liberal Studies, Fullerton College, Fullerton (2001)

Relevant Experience

Ms. Fowler is a biologist specializing in small mammal ecology, particularly desert species, and wildlife biology. She has over 10 years of experience conducting a variety of wildlife studies in a range of California habitats, including aquatic (freshwater and marine) and terrestrial ecosystems, and has worked with a wide range of species that include large carnivores, small mammals, raptors and other avian species, reptiles, marine fishes and aquatic macroinvertebrates. Ms. Fowler has conducted a variety of surveys for commercial projects including botanical surveys, wildlife surveys, habitat assessments, vegetation mapping, biological monitoring, rare plant surveys (primarily in the Mojave Desert), re-vegetation monitoring and wetland delineations. She has a scientific collecting permit for mammals and reptiles in Kern, Los Angeles, Riverside and San Bernardino Counties and the coast horned lizard in Region 5 (SC-11611).

Representative Projects

Biologist, Confidential Client, Los Angeles County, California. Prepared the biological resources section for an Application for Certification (AFC), coordinated with resource agencies and conducted site reconnaissance survey.

Biologist, Confidential Client, Orange County, California. Assisted with the preparation of the biological resources section for an AFC, coordinated with resource agencies, conducted initial site visit and supplemental botanical and wildlife survey, and responded to California Energy Commission (CEC) comments.

Biologist, Confidential Client, Saudi Arabia. Prepared baseline sections for terrestrial biological resources and marine ecology, impact assessments, and mitigation sections for an Environmental Impact Assessment (EIA) for a chemical plant.

Biologist, Confidential Client, San Bernardino County, California and Mohave County, Arizona. Assisted with wetland delineations and vegetation mapping for the updated project boundary.

Biologist, Union Pacific Railroad, Imperial County, California. Conducted preconstruction clearance surveys for burrowing owls, habitat assessments and construction monitoring for desert pupfish.

Biologist, San Timoteo Canyon Derailment, Union Pacific Railroad, Riverside County, California. Conducted re-vegetation monitoring of site restoration activities for derailment affected areas, replanting of native vegetation and establishment of weed management areas were conducted in accordance with U.S. Army Corps of Engineers (USACE) (USACE #2006-01654-JPL) and State Water Resources Control Board (State Water Board) (WDID #836C343929) requirements. Prepared annual re-vegetation monitoring report.

Biologist, Confidential Solar Energy Client, Kern County, California. Conducted raptor migration and raptor landscape use surveys throughout the proposed wind energy site.

Biologist, Confidential Client, Saudi Arabia. Prepared baseline sections for terrestrial ecology and marine ecology, impact assessments, and mitigation sections for an Environmental Impact Assessment (EIA) for an expansion project for an existing refinery.

Biologist, Confidential Client. Iraq. Prepared baseline ecology, impact assessment, and mitigation sections for an Environmental and Social Impact Assessment (ESIA) for a water treatment plant. Ecology baseline included terrestrial and wetland habitats.

Biologist, Confidential Solar Energy Client, Inyo County, California. Prepared the Clean Water Act (CWA) Section 401 Water Quality Certification (WQC) for the Colorado River Basin Regional Water Quality Control Board (RWQCB).

Biologist, Confidential Wind Energy Client, Riverside County, California. Prepared application packages for a proposed wind energy project for a Lake and Streambed Alteration (LSA) Notification for California Department of Fish and Game (CDFG) and the CWA Section 401 WQC for the Colorado River Basin RWQCB.

Biologist, Confidential Wind Energy Client, San Bernardino County, California. Conducted delineation surveys of ephemeral washes for a potential mitigation site in the Mojave Desert. Prepared report for delineation surveys and analyzed the suitability of confidential location as a mitigation site for a solar project.

Biologist and Task Manager, Los Angeles World Airports (LAWA). Los Angeles, California. Prepared cost estimate and met with client for the Riverside Fairy Shrimp relocation project to help determine the cost effectiveness of mitigation site alternatives. Coordinated with client and subcontractors, ensured tasks are within scope of work, finalized and distributed deliverables, prepared meeting agendas and summaries.

Biologist, Confidential Solar Energy Client, Riverside County, California. Prepared the Evaporation Pond Plan and assisted with preparing the Biological Resources Mitigation Implementation and Monitoring Plan.

Biologist, TID Almond 2 Power Plant, Turlock Irrigation District, Stanislaus County, California. Conducted construction and dewatering monitoring for the giant garter snake within areas of suitable habitat.

Biologist, Oakdale Irrigation District, Stanislaus County, California. Prepared a jurisdictional delineation of wetlands and Waters of the United States report.

Biologist, Terra-Gen Power, LLC, Kern County, California. Supported multiple projects by conducting wetland delineations, habitat assessments, vegetation mapping, condor monitoring and multiple wildlife surveys, desert tortoise and Mohave ground squirrel monitoring, geotechnical escorting, potholing monitoring, assisted with protocol southwestern willow flycatcher surveys, supported project permitting, including multiple LSAs and Section 401 Waste Discharge Requirements (WDR), and prepared technical memos.

Biologist, North Sky River Wind Energy Project, NextEra, Kern County, California. Conducted rare plants surveys along a transmission line corridor. Attended county planning meeting and participated in the renewable energy forum, which included multiple stakeholders. Assisted with biological monitoring during the construction phase.

Biologist, Confidential Solar Energy Client, Imperial County, California. Prepared and revised avian and bat protection plans for two proposed solar farms in Imperial County, California.

Biologist, Chiquita Canyon Landfill Master Plan Revision, Waste Management, Inc., Los Angeles County, California. Revised and updated the biological resources section of the Draft Environmental Impact Report. Conducted vegetation surveys, oak tree surveys, re-vegetation monitoring and updated all vegetation mapping in accordance with the expanded project boundary.

Biologist, Alpine Solar Project, NRG Solar Alpine, LLC, Los Angeles County, California. Conducted preconstruction surveys for coast horned lizards, burrowing owls and badgers, rare plants surveys and assisted with preparing the biological technical report for an additional 35-acre project.

Biologist, Beaver to Junction, Central Federal Lands Highway Division, Fishlake National Forest, Utah. Performed acoustic goshawk surveys in summer of 2010.

Biologist and Field Lead, Tehachapi Renewable Transmission Project (TRTP) – Segments 4-11 Compliance Monitoring, Southern California Edison (SCE), California. CH2M HILL is providing environmental compliance support to SCE during construction of the TRTP in accordance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). The TRTP includes construction of new and upgrade of 173 miles of transmission lines, construction of one new substation, major upgrade of one existing substation and upgrade of other ancillary facilities. When complete the TRTP will deliver up to 4300 MW of renewable energy to the Los Angeles Basin and the western Inland Empire. Provided general project support including preparing mitigation plans, conducting historical research on oil fields and obtaining abandonment details when applicable for the entire project. Field lead for preconstruction photographic documentation, coordinated with subcontractors, quality assurance/quality control of fieldwork and data, developed field protocols to streamline and standardize fieldwork and prepared task-related deliverables.

Biologist, Devers-Palo Verde No. 2 Transmission Line Project (DPV2) - Compliance Monitoring, SCE, California. CH2M HILL is providing environmental compliance support to SCE during construction of the DPV2 in accordance with the NEPA and CEQA. The DPV2 includes construction of 153 miles of new transmission lines, construction of one new substation, major upgrades of two existing substations and upgrade of other ancillary facilities. Data entry of environmental data sheets, compiled all environmental data entry into a single database, prepared summaries of surveys needed and tasks completed at a proposed substation, and reviewed project-related mitigation plans.

Experience Prior to CH2M HILL

Research Assistant, California State University, Fullerton. Vertebrate Ecology and Conservation Laboratory of Dr. Paul Stapp (2009). Assisted with the completion of a long-term research project in the Mojave National Preserve. Monitoring the abundance of small mammals, and the effects of large and small herbivores and granivores on post-fire vegetation recovery.

Research Associate, Irvine Ranch Conservancy, Irvine, California (2007-2009). Established and managed the wildlife and human access monitoring project with remote cameras, supervised and directed project volunteers, trained project interns, maintained and created the project database, quality control of database, compiled data entry from various project interns, edited and contributed with preparing project-related documents, collaborated with other organizations, and coordinated and facilitated small mammal monitoring projects with consultants. Assisted with other department projects as needed, such as restoration projects.

Research Assistant, California State University, Fullerton. Vertebrate Ecology and Conservation Laboratory of Dr. Paul Stapp (2003-2006). Researched the foraging behaviors of desert rodents (*Chaetodipus penicillatus* and *C. formosus*) in response to moonlight effects and rattlesnake olfactory cues in the Mojave National Preserve, CA. Prepared and published project manuscript. Received an Undergraduate Student Research Award from the American Society of Mammalogists for this work. Assisted with developing the experimental design and site selection of a long-term monitoring project in the Mojave National Preserve investigating the effects of small and large herbivores and granivores on post-fire vegetation recovery. In addition, conducted live-trapping for field demonstrations and lab activities for Dr. Stapp's courses.

Teaching Assistant, California State University, Fullerton (2005-2006). Developed weekly lesson plans, quizzes, tests, instructional materials, presented 30- 60 minute lectures for 2 laboratory sections/week, and graded all course-related materials.

Student Assistant, Tucker Wildlife Sanctuary, Modjeska Canyon, California (2004-2005). Assisted with restoration of woodland, chaparral and riparian habitats. Cared for museum

animals, such as captive desert tortoises other reptiles, amphibians, mammals and invertebrates, maintained facilities, and led educational tours. Monitored local avian species.

Student Research Scholar. California State University, Fullerton. Southern California Ecosystems Research Program (SCERP) (2002-2005). Worked in the Mojave National Preserve researching the road effects on desert perennials, monitored water quality and measured biodiversity of macroinvertebrates in two creeks located in the Starr Ranch Sanctuary in southern Orange County, and compared the nursery function of two different habitats in the Upper Newport Bay.

Professional Affiliations and Memberships

- American Society of Mammalogists
- California Native Plant Society
- Ecological Society of America

Publications and Presentations

"Small mammal community structure in response to post-fire vegetation changes in the Mojave National Preserve." California State University, Fullerton (2010).

"Foraging behaviors of *Chaetodipus* spp. (pocket mice) in response to predation risk." Published in *Dimensions* (2006).

"Foraging of *Chaetodipus* pocket mice in response to rattlesnake odors" (poster). Presented at the American Society of Mammalogists in Springfield, Missouri. Co-authored with Dr. Paul Stapp (2005).

"Foraging behavior of desert rodents in response to rattlesnake olfactory cues and predation risk" (poster). Presented at the Southern California Animal Behavior annual meeting in Riverside, California. Co-authored with Dr. Paul Stapp (2005).

"Road effects on desert perennials, *Larrea tridentata* and *Ambrosia dumosa*, across a bajada in the eastern Mojave Desert" (poster). Presented at the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Anaheim, California. Co-authored with Robert Rodarte, Victor Galvan, Susana Espino-Hernandez, and Maria Vega-Velez (2002).

"Anthropogenic effects on water quality and the potential impact on diversity of macroinvertebrates in southern California creeks" (poster). Presented at the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) in Anaheim, California. Co-authored with Robert Rodarte, Victor Galvan, Susana Espino-Hernandez, and Maria Vega-Velez (2002).

"Differential Habitat Use by Fishes in Upper Newport Bay: Evidence for Nursery Function." A presentation to the local community of the Upper Newport Bay at the Marine Studies Center in

Newport, California. Co-authored with Victor Galvan, Susana Espino-Hernandez, Robert Rodarte, Maria Vega-Velez, and Dr. Michael Horn (2002).

Specialized Training

- Certified Ecologist, Ecological Society of America (2013-2018)
- Wetland Training Institute: Basic Wetland Delineation 40-hour Training (2012)
- Desert Tortoise Council: Introduction to Surveying, Monitoring, and Handling Techniques Workshop (2011)
- Legends of the Fall: Exploring the Clandestine Flora of Early Fall in the Eastern Mojave Desert Workshop (2011)
- Occupational Safety and Health Administration 10-hour Construction Safety and Health certified
- Safety Coordinator - Construction
- CPR, AED, and First Aid certified
- Unites States Fish and Wildlife Service, Pacific Pocket Mouse Monitoring Workshop for Marine Corps Base Camp Pendleton Pacific Pocket Mouse Working Group (2007)

References

References are available upon request.

Sharook P. Madon

Senior Principal Technologist & Global Technology Leader
Ecosystem Planning and Restoration, CH2M HILL, Inc.

Education

Ph.D., Aquatic Ecology/Zoology, Ohio State University, 1993
M.S., Environmental Sciences, State University of New York, College of Environmental Science and Forestry, 1988
M.S., Biotechnology, St. Xavier's College, Bombay University, 1984
B.S., Life Sciences, St. Xavier's College, Bombay University, 1982

Distinguishing Qualifications

- Expertise in coastal and freshwater wetlands and ecosystems restoration; large-scale research on wetland restoration designs and methods for both treatment and habitat-based wetlands
- Broad experience in physical, chemical and biological processes in freshwater, estuarine, and marine ecosystems, including large floodplain rivers, and restoration of these ecosystems.
- Expertise in wetlands ecology
- Expertise in invasive species dynamics, impacts and controls
- Expertise in environmental assessments and impact analysis for terrestrial and aquatic systems
- Expertise in biological and ecological modeling, especially bioenergetics models to evaluate species responses to environmental stressors

Relevant Experience

Dr. Sharook Madon is a Senior Principal Technologist in the Water Business Group at CH2M HILL, San Diego, California, U.S.A, and also serves as the firm-wide Global Technology Leader for the Ecosystem Planning and Restoration technology area in the Water Resources & Environmental Management Services at CH2M HILL. He comes to CH2M HILL from the Pacific Estuarine Research Laboratory at San Diego State University, where he served as the Associate Director of the laboratory. His research on physical, chemical and biological processes in coastal and freshwater wetlands, estuarine, marine and large river ecosystems impacted by environmental stressors is nationally recognized and widely published in the peer-reviewed literature. Dr. Madon has led several ecosystem restoration, monitoring and assessment projects for both natural treatment and habitat-based wetlands and has conducted important NSF-supported research at the Model Marsh, an unique 20-acre experimental wetland at the Tijuana River National Estuarine Research Reserve, where various designs, restoration methods and techniques are being tested in replicated tidal creek systems at multiple habitat and trophic levels. Dr. Madon is an invited member of several Science Advisory Panels dedicated to the preservation and restoration of coastal habitats and ecosystems. He has experience working with local, state, and federal agencies and stakeholders on multiple wetland issues. Broadly trained as an ecologist, Dr. Madon has also conducted research in a variety of freshwater, estuarine and marine ecosystems in the U.S.A, Middle East and Asia. Before joining CH2M HILL in 2003, Dr. Madon served on the faculty of the University of Maryland, Pace University and San Diego State University, and continues to serve as adjunct professor at San Diego State University, California, USA.

Representative Projects

Coastal Restoration and Wetlands Design and Restoration Projects – Natural Treatment Systems and Habitat Wetlands

Senior Principal Ecologist, Remediation and Restoration of Coastal Ecosystems Impacted by 1991 Gulf War Oil Spill, Presidency of Meteorology and Environment, Kingdom of Saudi Arabia and United Nations Compensation Commission (June 2009 – present). The oil spills related to the 1991 Gulf War remain the largest in history. Over 11,000,000 barrels of oil (40 times the size of the *Exxon Valdez* spill) impacted approximately 800 km of Saudi Arabia's shoreline between the Kuwait Border and Abu Ali Island. Providing technical direction on the management of the coastal and marine restoration it has embarked upon during the 3-year period beginning in 2009. Specific key tasks include assessment of ecosystems impacts, the review/evaluation of the remediation and restoration designs, technical meetings with stakeholders, field validation surveys, development of remediation and restoration objectives, prioritization of coastal remediation and restoration projects, design of pilot, demonstration and large-scale remediation/restoration projects, overall implementation of these projects, and development and implementation of monitoring protocols, metrics and assessment framework including indices of biotic integrity and multi-metric indices to evaluate remediation and restoration success.

Senior Principal Ecologist, Biological and Ecological Characterization of Jeddah Sewage Lake, National Water Company, Kingdom of Saudi Arabia (June 2010 – January 2011). The purpose of this project was to develop the Jeddah Sewage Lake (Lake) Evacuation and Sediment Reuse/Disposal Plan, a component of which included surveys of wetlands habitat and wildlife around the lake. This planning project was initiated in July 2010 by the National Water Company (NWC) concurrent with a contract being approved for the evacuation of the lake water, removal of the dam, and cleanup or removal of organic sediment deposited in the Lake. This planning project was tasked to examine several specific issues related to the lake water evacuation performed by Huta Hegerfeld Saudi Ltd. (Lake Contractor), including the flooding potential associated with the removal of the dam; alternatives for sediment cleanup or disposal; potential impacts to water use, agricultural uses dependent on water, ecological features (wildlife and habitat) associated with the Lake; and regulatory issues and international best practices associated with the applicable lake water and sediment management issues.

Project Manager, Inventory and Study of Urban and Treatment Wetlands in Southern California, Southern California Coastal Water Research Project (December 2004 – September 2007). Developed an inventory and database consisting of preliminary design, operations, maintenance, and site history information on 40 urban and treatment wetland sites in southern California. This study is providing valuable insights into pollutant treatment effectiveness and habitat values provided by stormwater treatment wetlands and whether treatment effectiveness of these wetlands is compatible with habitat goals. Field studies on vegetation and habitat mapping at each of the 40 wetlands sites commenced in February 2006, and intense biological surveys of macroinvertebrates, fish and birds were completed by summer 2006 in addition to other physical and chemical constituents.

Wetland Design Task Leader, Conceptual Design of the Managed Marsh Ecosystem, Imperial Irrigation District (January 2005 – December 2006). Developing conceptual-level designs for approximately 650-1,200 acres of wetlands to be constructed as mitigation for impacts of IID's construction and seepage recovery activities on wetlands habitat. Follow-on phase is likely to involve the engineering design and construction of the wetlands area for habitat and incidental treatment of water quality.

Wetlands Design Task Leader, Conceptual Design of Treatment Wetlands for Control of Thermal and Nutrient Pollution: A Component of the City of Tracy Master Plan, City of Tracy (January 2006 – December 2006). Developing conceptual designs for up to 1,200 acres of treatment wetlands to be constructed as part of the City of Tracy's Masterplan to develop integrated natural treatment systems and passive recreational facilities. The wetlands will be designed with the goal of treating the effluent temperature and high nutrient loads from the City of Tracy's Wastewater Treatment plant before the effluent is discharged to the Old River. This phase of the study involves the development of conceptual plans for a 100 acre pilot treatment wetlands site as well as the larger 1,200 acre site.

Principal Wetlands Ecologist and Task Lead, Physical, Chemical and Ecological Characterization of Farmington Bay and the Great Salt Lake Wetlands and Development of a Bioassessment Framework for Impounded Wetlands, Utah Department of Water Quality (June 2004 –present). Conducted a detailed field study, including the development of extensive monitoring designs to characterize saline, brackish and freshwater wetlands around Farmington Bay and the Great Salt Lake, Utah. The project is identifying sensitive wetland indices and metrics and their responses to environmental gradients including salinity, nutrients, temperature and algal mats and other stressors, with the goal of defining beneficial uses of these wetlands. Analyzed data for development of multimetric indices.

Principal Wetlands Ecologist QA/QC Reviewer, Matagorda Bay Health Evaluation Project, Lower Colorado River Authority (LCRA) and San Antonio Water System (SAWS) (June 2004 – June 2009). Provided senior QA/QC reviews of all documents/data associated with the evaluation of the health of Matagorda Bay, Texas. Studies evaluated included Flow needs in tidal and freshwater sections of the Lower Colorado River and its tributaries, wetland characterization, water quality analysis, biostatistical analysis, habitat assessments, hydrological and salinity analysis and modeling, and bay food web analysis.

Science Advisory Panel Leader, Pond A4 Tidal Wetland Restoration Project, Santa Clara Valley Water District (July 2003 – December 2005). Provided senior science reviews of preliminary reports of opportunity and constraints analysis and draft environmental assessment reports (EARs) of biology and water quality sections, and guidance of the alternatives screening process of the 304-acre Pond A4, a former Cargill Salt evaporator pond located in the south San Francisco Bay area, set aside for restoration to tidal wetlands.

Task Leader, Design, Construction and Maintenance Guidance for the Maine-Yankee Forebay Wetland, Maine Yankee Atomic Energy Plant (July 2003 – December 2003). Developed and wrote a white paper describing various physical, chemical and biological processes in Maine coastal wetlands, and provided restoration methods and design guidance for 1.2 acres of the decommissioned forebay.

Principal Ecologist, Upper San Joaquin River Conceptual Restoration Plan – Phase II, San Joaquin River Management Coalition (September 2003 – October 2005). Developed scope of work and complex water needs, water supply options and alternatives for restoration of the Upper San Joaquin River to support riverine biota and riparian wetlands while adequately addressing the needs of the multiple water users in the region.

Principal Ecologist, Ecological Assessments of Impacted Coastal Wetlands, Earth Island Institute & Coastal Environments (September 1998 – July 2003). Many coastal wetlands in southern California are tidally-restricted because of roadways and/or railroads that bisect the inlet or other tidal areas of the lagoons and estuaries. As a result, salt water supply to these wetlands is often restricted, while increasing freshwater runoff from developed upstream areas changes the salinity, sediment and nutrient profiles of these systems, often along environmental gradients. These water quality changes have resulted in dramatic shifts in vegetation patterns and biological interactions in the food webs of these wetlands. I have conducted research and led monitoring and assessment efforts to characterize the ecological condition of these wetlands (Los Penasquitos Lagoon, Sweetwater Marsh and Tijuana Estuary), in relation to various environmental stressors (salinity, nutrients, sediment). Such assessments are being used to propose various enhancements, restoration projects, and beneficial uses in these systems.

Principal Ecologist, Ecological Patterns and Processes in Coastal Wetlands, Earth Island Institute (September 1998 to July 2003). Designed and led research efforts to evaluate structural and functional patterns and processes in coastal wetlands. Led research and monitoring of salt marshes (hydrology, geomorphology, biotic, and abiotic factors). Developed quality assurance/quality control (QA/QC) procedures to improve site selection (both reference and target sites), experimental, sampling, and monitoring (physical, chemical, and biological parameters) procedures and protocols as part of restoration and ecological projects in southern California wetlands. Conducted bioenergetics modeling and experimental evaluation of the importance of salt marshes to fish feeding and growth.

Principal Ecologist, Tijuana Estuary Tidal Restoration Program, National Science Foundation and California Coastal Conservancy (October 2001 – July 2003). Led restoration research and monitoring efforts at the 20-acre Model Marsh, a newly created, tidally influenced coastal wetland in the Tijuana River National Estuarine Research Reserve, San Diego County. Conducted large-scale experiments and caging experiments to assess the effects of topographic heterogeneity (tidal creek designs and multiple salt marsh habitats) on coastal wetland ecosystem development and functional attributes of salt marsh plants, invertebrates, and fish. This study is providing new scientific information on restoration designs and methods.

Senior Ecologist, Ormond Beach Tidal Wetland Restoration Project, California Coastal Conservancy (March to June 2003). Participated as lead ecologist in preparing a detailed study approach and work plan in response to a Request for Proposal (RFP) for the Ormond Beach Tidal Wetland Restoration feasibility study, a 750-acre coastal site in Ventura County, California.

Biological Reviews and Assessments

Senior Technical Consultant, Technical Evaluations of the Programmatic Environmental Impact Statement/Review for the San Joaquin River Restoration Program, Exchange Contractors, California (May – July 2011). Provided detailed technical evaluations and biological opinions on the Draft PEIS/R for the San Joaquin River Restoration Program, specifically focusing on restoration of the T&E salmonid species and aquatic resources.

Senior Technical Consultant, Biological Resources Evaluations, AES-Southland (May 2011 – present). Providing technical guidance and on-site evaluations of biological resources present on AES sites, including descriptions of general settings and surrounding land use, protected areas and conservation lands, special status plants and wildlife species, and wetlands and aquatic resources on site. AES-Southland (AES-SL) owns and operates approximately 4,200 megawatts (MW) of electrical generation capacity located at three natural gas powered generating stations (Alamitos, six units; Huntington Beach, four units; and Redondo Beach, four units). To meet the requirements of the State Water Resources Control Board (SWRCB) new Once Through Cooling (OTC) Policy requiring the reduction in use of ocean water in power plant operations, support the electrical system's needs, and meet the expected Long-Term Procurement Process (LTPP) and new source solicitation timelines, AES-SL plans to implement a comprehensive, phased repowering program of its entire generation fleet at these three facilities.

Senior Technical Consultant, Third-Party EIS Reviews, Port of Gulfport Restoration Program, Mississippi State Port Authority, Gulfport, MS (May – September 2010). Provided evaluations of detailed proposals and input on selection of contractors for preparations of the Third Party EIS triggered due to the Port's rebuilding mandated after damages suffered from Hurricane Katrina. As part of this program, also provided technical input on impact assessments to T&E species including the Gulf Sturgeon.

Large Estuaries Projects

Senior Scientist, Population and Energy Dynamics of an Invasive Species in the Hudson River Estuary, Scholarly Research Grants of the Pace University Foundation (May 1997 to March 1999). Led a study that included biochemical analyses and field and laboratory experimentation to assess seasonal energetic and population dynamics of zebra mussels in the Hudson River. This study provided insights into the patterns of exotic species invasions and their potential environmental impacts in a tidal, freshwater river.

Senior Scientist, Trophic Interactions in the Chesapeake Bay and Associated Tidal Systems, Environmental Protection Agency (September 1994 to September 1995). Used mesocosm experiments, bioenergetics, and population models to assess the role of planktivorous and benthivorous fish in mediating trophic interactions among pelagic, benthic, and salt marsh invertebrate communities in the Chesapeake Bay and associated tributaries. Data were used in a larger study investigating environmental processes and human impacts in this estuary, including restoration efforts associated with the bay and its tidal tributaries.

Project Scientist, Predatory Impacts of Invertebrates in the Chesapeake Bay, Environmental Protection Agency (September 1994 to September 1995). Developed and used bioenergetics and population models for the sea-

nettle medusae, *Chrysaora quinquecirrha,* to quantify its environmental impact on zooplankton population dynamics in the Chesapeake Bay.

Fisheries Ecology Projects

Principal Technologist, Palos Verdes Shelf Study on Marine Contaminants, U.S. Environmental Protection Agency (January 2004 – present). Developing and organizing training for State and Federal environmental officials to investigate accumulation and effects of PCBs and DDTs in marine fish from the Palos Verdes Shelf of the coast of southern California. Training includes the development of field identification schedules and keys for various croaker species, especially the white croaker, *Genyonemus lineatus*.

Senior Ecologist, Effects of Environmental Stressors on Marine and Estuarine Fishes, Earth Island Institute (September 1999 to September 2002). Led field and experimental study to evaluate effects of abiotic and biotic environmental stressors on energetics, growth, and distribution of marine and estuarine fish. Conducted an energetics-based evaluation of life history strategies of estuarine and marine fish species with direct applications to conservation and habitat restoration.

Senior Ecologist, Trophic Ecology of Marine and Estuarine Fishes, Earth Island Institute (September 1998 to December 2001). Led an intensive field study to evaluate mechanisms underlying trophic interactions in marine and estuarine fish. Assessed the effects of tidal and diurnal influences on feeding patterns of marine and estuarine fish and their interactions with their predators and prey. Developed integrated bioenergetics and predator-prey interaction models to quantify the effects of these interactions on the fish community. Developed QA/QC procedures to build model parameters and test and validate the modeling approach and its usefulness in environmental analysis.

Senior Scientist, Sublethal Effects of Pesticides on Fish, Scholarly Research Grants of Pace University Foundation (January 1997 to August 1998). Conducted laboratory assessments of sublethal effects of malathion on bluegill energetics. Developed a bioenergetics model that incorporated malathion effects on bluegill and applied the model to assess population level environmental impacts of malathion on bluegills in local freshwater aquatic ecosystems.

Senior Scientist, Fish-Zooplankton Interactions and Population Dynamics, Ohio Sea Grant – National Oceanic and Atmospheric Administration (March 1994 to September 1995). *Ohio Sea Grant (NOAA).* Development of quantitative bioenergetics and population models for various species of Lake Erie fish larvae. Improved in situ estimates of fish metabolic rates via biochemical assays. The models were used to assess the magnitude of various environmental impacts in freshwater ecosystems.

Large Floodplain Rivers/Aquatic Invasive Species Projects

Senior Scientist, Invasive Species in Large Turbid Rivers, Environmental Protection Agency (April 1993 to August 1994). Led an intensive study to assess the potential of invasive species colonization in the Illinois and Upper Mississippi Rivers. Conducted environmental assessments to quantify the effects of varying inorganic sediment loads and food concentrations on zebra mussel energetics. Led in situ studies on growth of zebra mussels in large rivers, and modeled population dynamics. This project allowed assessment of the colonization potential of invasive species in large rivers.

Project Scientist, Invasive Species Impacts on Native Species, Illinois-Indiana Sea Grant, National Oceanic and Atmospheric Administration (April 1994 to September 1995). Participated in designing a study that investigated the ecological, population, and energetic impacts of zebra mussels on native gastropods and bivalves. This project was used to develop conservation plans for native bivalves.

Senior Scientist, Environmental Bioassay for Invasive Species Impacts, Environmental Protection Agency (April 1994 to April 1996). Developed, tested, and used a biochemical assay to estimate in situ metabolic rates of zebra mussels. Used this assay to assess biochemical oxygen demand (BOD) by zebra mussel populations in large rivers. The study results showed that heavy infestations of zebra mussels exert significant demands on dissolved oxygen in large rivers.

Aquatic Invasive Species Projects/Quagga and Zebra Mussels

Senior Technical Consultant – Evaluation of Control and Management Methods for Zebra Mussel in the Hollister Conduit and Distribution System, San Benito County Water Authority, Hollister, California (2009-2011). Technical input and overall guidance to allow SBCWA to choose appropriate control technologies for controlling and managing mussel populations in the conduit and distribution system. Work involved exploring a suite of control options and their feasibility for use based on key criteria, an analysis of the conduit hydrology and flows in distribution system, and pros and cons of implementing various control technologies. Developed a monitoring plan for mussels to evaluate success of eradication measures in the reservoir and the conduit and distribution system.

Senior Technical Consultant – Scoping for Dreissenid Mussel Control in the State Water Project, Department of Water Resources, Sacramento, CA. 2009. Developed, coordinated and conducted a 3-d workshop for managers and personnel of the various field divisions to assess potential approaches for a work plan on the control and management of mussels in case of infestations in SWP waters.

Senior Technical Consultant – Dreissenid Mussels Habitat Evaluation, Tehema-Colusa County Authority (TCCA) Fish Screen Project. 2009. Evaluated habitat suitability in the Sacramento River area in the vicinity of the proposed fish screening/diversion facility. Designed water quality sampling protocol and analyzed data on water quality in relation to environmental parameters for dreissenid (zebra and quagga) mussels. Wrote technical memorandum describing habitat suitability and colonization potential for mussels.

Senior Technical Consultant – Dreissenid Mussels Habitat Evaluation, Trinity River. Dallas Water Utility. 2009. Evaluated habitat suitability in the Trinity River area in the vicinity of the Southside wastewater Treatment Plant outfall. Analyzed data on water quality in relation to environmental parameters for dreissenid (zebra and quagga) mussels. Wrote technical memorandum describing habitat suitability and colonization potential for mussels.

Senior Technical Consultant – Quagga Mussel Control, Coachella Valley Water District's Mid-Valley Pipeline, with GEI Consultants, CA. 2009. Provided senior technical advice on chlorination approaches to control quagga mussels in CVWD's water distribution system. Preparation of a position paper on control and management approaches for invasive mussels.

Senior Technical Consultant – Quagga and Zebra Mussel Control, Southern Delivery System, Colorado Springs Utilities. 2008. Provided overall guidance on implementation of control measures that will lead to the design of appropriate control structures to reduce mussel infestations of SDS infrastructure. Whole suite of control technologies were considered in a multi-barrier approach.

Senior Technical Consultant – Quagga Mussel Monitoring and Control Plan for Irvine Lake, Irvine Ranch Water District and Serrano Water District, Irvine, CA. 2008. Overall guidance and technical input into preparation of a comprehensive mussel control and management plan as required by the California Department of Fish and Game.

Senior Technical Consultant – Biology and Control, Project Development Evaluation Relative to Dreissenid (Quagga & Zebra) Mussels, Freeport Regional Water Authority (FRWA), CA. 2008. Developed and evaluated options relative to control approaches that can be implemented within the Freeport Regional Water Project to manage the threat of infestations by quagga and zebra mussels. Provided technical guidance into the development of near- and long-tem control approaches that included preventative approaches, operational control measures and proactive and reactive control methods to minimize potential impacts to the facilities from mussel infestations.

Senior Technical Consultant and Task Lead, Preliminary Assessment of the Vulnerability of State Water Project Facilities to Potential Infestations by Quagga Mussels, Department of Water Resources, Sacramento, CA. 2007. Assessment of at-risk components of State Water Project facilities to infestations by quagga mussels. Conducted 3-day workshop, including site visit to facilities to assess infestation risk of various facility components, and discuss potential control and management strategies once infestations should occur. The project is currently in progress with a draft report approved by DWR and a final report being prepared for submission.

Senior Technical Consultant and Director, Assessment of Potential Non-oxidizing Molluscicides for the Control and Management of Zebra and Quagga Mussels, Metropolitan Water District, Los Angeles, CA. 2008. Conducted a study to assess the efficacy and feasibility of using non-oxidizing molluscicides in the control of quagga mussels in specific contained locations within the CRA and its water distribution system in southern California.

Senior Technical Consultant - Biology and Control, Quagga Mussels in Lake Mead and Potential Impacts to Water Utilities, City of Henderson, NV. 2007. Technical guidance to the City of Henderson on the quagga mussel threat in Lake Mead, including life cycle requirements of the mussel, assessment of environmental conditions in Lake Mead and at the water treatment plant and potential control alternatives. Conducted site visits to detect the presence of quagga mussels in the City's raw water reservoirs.

Senior Technical Consultant and Biology Task Lead, Wichita Zebra Mussel Control Study, Wichita, KS. 2005. Analysis of the probable zebra mussel life cycle in Cheney Reservoir and the potential control alternatives. The analysis included water temperature variations, pH, alkalinity, hardness, major inorganic species, organic content, water clarity, phytoplankton populations, suspended sediment content, ecosystem species, and reservoir bottom information. CH2M HILL developed and in partnership with the City, screened a list of alternatives for each of the three basic control approaches: prevention, proactive treatment, and reactive treatment.

Lead Organizer and Presenter, Southern California Quagga Mussel Workshop, San Diego, CA. 2007. Developed, organized and held the Quagga Mussel Workshop for Water Utilities staff in coordination with the San Diego County Water Authority. Goal of the workshop was to share current state of knowledge and information on quagga mussels (and zebra mussels), operational and economic impacts of the mussel infestation, control measures including Best Management Practices, as those relate to issues affecting Southern California water utilities and natural resources.

Lead Presenter, Quagga Mussels and Water Treatment Facilities, Lunch and Learn Seminar, Olivenhain Municipal Water District, San Diego, CA. 2007. Presented an overview of quagga mussel biology and ecology, what they mean to water treatment utilities, common measures and best management practices for their control.

Aquatic Ecology Projects

Senior Scientist, Freshwater Aquatic Communities, Population Dynamics and Trophic Interactions, Ohio Department of Natural Resources (January 1988 to December 1992). Led intensive scientific investigations of how zooplankton populations are regulated by various population densities of density-dependent regulation of planktivorous fish. This study showed that population-level compensatory mechanisms in zooplankton induced by fish predation can help sustain the prey base for economically valuable fish species and thus sustain increased stocking densities of key fish species.

Senior Scientist, Applications of Fish Food Consumption and Bioenergetic Models in Ecological Investigations, Ohio Department of Natural Resources (January 1993 to September 1997). Developed and used models to quantify responses of fish to environmental changes and impacts of fish predation on prey resources. The models provided a low-cost, low-effort alternative to environmental assessments and investigations of environmental impacts.

Senior Scientist, Using Ecological Manipulations to Maximize Aquaculture Fish Production, Ohio Department of Natural Resources (January 1988 to December 1992). This award-winning project applied ecological principles to produce a tenfold increase in aquaculture production of fingerling walleye and saugeye. The project involved application of principles of community ecology and limnology to improve fish production techniques by manipulating N and P ratios in freshwater to promote growth of favorable algae, manipulating timing of fish stocking and fish densities to set up trophic cascade effects that favored balanced interactions between fish and their zooplankton prey.

Great Lakes Projects

Project Scientist, The Deepwater Food Web of Lake Ontario, New York Sea Grant, National Oceanic and Atmospheric Administration (January 1985 to December 1987). Conducted field sampling of the fish community,

including salmonids, using midwater and otter trawls. Developed and used an integrated predator-prey/population model to assess relative impacts of predation by rainbow smelt and juvenile lake trout on slimy sculpin population dynamics. Results showed that even low levels of predation by rainbow smelt can adversely affect food resources for juvenile lake trout.

Project Scientist, Food Resources of Trout and Salmon in the Great Lakes, New York Sea Grant, National Oceanic and Atmospheric Administration (January 1985 to December 1986). Participated in a large-scale study designed to investigate the lakewide food resources of various species of trout and salmon in Lake Ontario. This study played an important role in defining the fish community and food web for establishing best management practices for trout and salmon in Lake Ontario.

International Projects

Senior Principal Ecologist, Remediation and Restoration of Coastal Ecosystems Impacted by 1991 Gulf War Oil Spill, Presidency of Meteorology and Environment, Kingdom of Saudi Arabia and United Nations Compensation Commission (June 2009 – present). The oil spills related to the 1991 Gulf War remain the largest in history. Over 11,000,000 barrels of oil (40 times the size of the *Exxon Valdez* spill) impacted approximately 800 km of Saudi Arabia's shoreline between the Kuwait Border and Abu Ali Island. Providing technical direction on the management of the coastal and marine restoration it has embarked upon during the 3-year period beginning in 2009. Specific key tasks include assessment of ecosystems impacts, the review/evaluation of the remediation and restoration designs, technical meetings with stakeholders, field validation surveys, development of remediation and restoration objectives, prioritization of coastal remediation and restoration projects, design of pilot, demonstration and large-scale remediation/restoration projects, overall implementation of these projects, and development and implementation of monitoring protocols, metrics and assessment framework including indices of biotic integrity and multi-metric indices to evaluate remediation and restoration success.

Senior Principal Ecologist, Biological and Ecological Characterization of Jeddah Sewage Lake, National Water Company, Kingdom of Saudi Arabia (June 2010 – January 2011). The purpose of this project was to develop the Jeddah Sewage Lake (Lake) Evacuation and Sediment Reuse/Disposal Plan, a component of which included surveys of wetlands habitat and wildlife around the lake. This planning project was initiated in July 2010 by the National Water Company (NWC) concurrent with a contract being approved for the evacuation of the lake water, removal of the dam, and cleanup or removal of organic sediment deposited in the Lake. This planning project was tasked to examine several specific issues related to the lake water evacuation performed by Huta Hegerfeld Saudi Ltd. (Lake Contractor), including the flooding potential associated with the removal of the dam; alternatives for sediment cleanup or disposal; potential impacts to water use, agricultural uses dependent on water, ecological features (wildlife and habitat) associated with the Lake; and regulatory issues and international best practices associated with the applicable lake water and sediment management issues.

Senior Reviewer, Wastewater Reuse Study, King Abdullah University of Science and Technology, Kingdom of Saudi Arabia (May – September 2011). Provided senior reviews of water quality and wastewater disposal options, focusing on the Red Sea and Arabian Gulf. Reviewed and provided guidance on developing an overview of physical and hydrologic conditions as a context for understanding water quality and the potential for various reuse activities to affect water quality. Provided guidance and technical input on how these conditions influence water use management decisions and policy in KSA, while presenting gaps in currently policy, planning, and data collection.

Principal QA/QC Reviewer, Report on Eco-environmental Impact Investigation of Baotou 11.21 Plane Crash Incident on Nanhai Park and Nanhaizi Lake, China and the Environmental Recovery Plan, Barlow Lyde and Gilbert. (April – May 2006). Provided a comprehensive review of the EIR prepared by Chinese Research Academy of Environmental Science (CRAES) to assess conformity of procedures and processes of the impact analysis with international standards, including impacts of hydrocarbons (airplane fuel spill) on aquatic life.

Project Scientist, Microbial Degradation of Petroleum Wastes in Aquatic Ecosystems, Bombay, India (January 1982 to June 1984). Conducted research on biochemical pathways used by microbes to degrade petroleum

wastes and assessed bioremediation processes for coastal systems in the Arabian Sea, off the coast of Bombay, India.

Project Scientist, Assessing Industrial Pollution in the Mithi River, Bombay, India, (January 1980 to June 1981). Participated in a large-scale study designed to investigate the types and effects of industrial pollutants present in the Mithi River.

Professional Recognition, Organizations/Affiliations

Member of the American Academy of Environmental Engineers
Science Panel & Review, Restore America's Estuaries
Society of Wetlands Scientists
Society of Ecological Restoration
American Fisheries Society

Specialized Computer Skills

Ecological Modeling packages

Professional Development

Science/Technical Advisory Panels and Senior Science Advisor Roles

Great Salt Lake Science Panel. Proving guidance and support on research and restoration activities for the Great Salt Lake ecosystem, an arid climate terminal lake with significant pollutant issues. 2005-present.

Southern California Wetlands Recovery Project. Prepare position papers for the Governing Board on important scientific issues related to wetlands ecology and restoration. Guide Southern California wetlands restoration research programs and aid in the development of a regional strategy for restoration and monitoring. 2000-2006.

Southern California Edison*.* Provided expert guidance on ecological monitoring and scientific analysis of a restored coastal system, San Dieguito Lagoon. 2002.

Southwest Wetlands Interpretive Association/State Coastal Conservancy*.* Provide expert guidance on coastal and estuarine habitat restoration projects. 2002-2003.

San Dieguito Wetlands Draft EIR/EIS*.* Reviewed the EIR/EIS and evaluated which of the six restoration alternatives would be best suitable for the habitat. Wrote a letter of support for the selected alternatives. 2002.

Camp Pendleton Wastewater Disposal Project*.* Served as biological consultant to scope out alternatives to wastewater disposal and assess potential impacts of each alternative to adjacent and onsite salt marshes. 1999.

Research and Restoration Committee Panel of the Tijuana River National Estuarine Research Reserve (TRNERR*).* Provide guidance and identify research issues of local and national importance to NERRs. Participate in selection and guidance of NERR graduate fellows. 1998-2003.

Zebra Mussel Population Invasions in North American Rivers – Future Research Goals: Was a panel member at the New York Sea Grant Workshop to discuss potential future invasion patterns of zebra mussels in inland waters, and to discuss priorities for future research with nonindigenous species. 1996.

Research and Strategy Panel for Nonindigenous Species: Was an advisory panel member at the Upper Mississippi and Illinois River Zebra Mussel Strategy Session, U. S. Army Corps of Engineers, North Central Division, Chicago, Illinois. 1993-1994.

René Langis

Project Manager
Senior Environmental Permitting Specialist
Senior Technical Consultant
Wetland Scientist

Education

PhD, Water Sciences, University of Quebec, 1989
MS, Environmental Engineering, University of Montreal, 1982
BS, Environmental Biology, Mc Gill University, 1979

Distinguishing Qualifications

- Twenty one years of experience in environmental documentation and permitting
- Sixteen years of environmental permitting experience in the United States, including negotiations with USACE, USFWS, NMFS and state environmental agencies
- Five years of environmental permitting experience in Canada
- Proven experience in preparation of environmental impact assessments and reports
- Manager for numerous environmental and biological studies and analyses, including environmental and permitting tasks for the a variety of public and private organizations
- Twenty-one years of experience in addressing biological issues in environmental impact assessments and reports (including CEQA, NEPA, and CEC documents)
- Sixteen years of experience in wetland permitting

Relevant Experience

Dr. **Langis** is a senior technical consultant with over 25 years of experience in applied aquatic ecology, and 21 years of experience in environmental consulting in Canada and the United States. He has **c**oordinated and negotiated environmental compliance issues and mitigation plans with resources agencies for several projects. Dr. Langis serves as Senior Technical Consultant for biological resources on various environmental assessements.

Representative Projects

Redondo Beach Energy Project. Senior reviewer for biological resources on the Application for Certification and responsible for addressing potential wetland issues with California Coastal Commission and US Army Corps of Engineers..

Wetland Restoration Ecologist: Oil Sands Restoration Planning; Multiple Clients; Client Confidential; Athabasca Oil Sands Region, Alberta. Preparing detailed site reclamation plans for thousands of hectares of oil sands extraction and tailings areas.

Project Manager: New Irvington Tunnel (NIT). Environmental Compliance Manager for the construction of a 3.5 mile, $326 million water conveyance tunnel. Environmental compliance issues included neighborhood air and noise

disturbance, storm water control, creek and upland restoration and protection of sensitive species among four separate active work sites. The NIT project is part of City of San Francisco's $4.3 billion improvement of the Water System Improvement Program.

Permitting Lead: Shell Pond Cleanup and Wetland Restoration Project. Environmental Permitting Lead for the clean-up and tidal marsh restoration of a 73-acre wastewater retention pond located within the San Francisco Bay mash land. Tasks included participation in development of wetland restoration concept, as well as CEQA documentation and multi agency permitting and coordination (USACE, Regional Water Quality Control Board, San Francisco Bay Conservation and Development Commission, and California Fish and Game Department, USFWS and NOAA-NMFS).

Senior Technical Consultant: Twelvemile Creek Bank Stabilization. Senior Technical Consultant for design and implementation of geomorphic bank stabilization measures along Twelvemile Creek, Liberty, South Carolina. Task was part the Schlumberger Technology Corporation Twelvemile Creek Dredging Project, recipient of a 2012 CEO Excellence Award.

Task Manager: Wetland Mitigation Concepts, Pittsburg California. Task manager for the development of several mitigation wetland concepts in San Francisco Bay Delta for the Pittsburg Dow Chemical facility.

Task Manager: San Jose/Santa Clara WPCP Pond A18 Master Plan. Managed and prepared the water and endangered species, sediment quality sections of the opportunities and constraints report for future use of a former South Bay salt pond (Pond A18).

Senior Technical Consultant: Confidential submarine transmission line; San Francisco, CA. Senior reviewer for the hydrology-water quality section of the environmental assessment for a 3-mile 230 kV submarine transmission line.

Task Manager: City of San Jose Trail Projects; City of San José, San Joé, CA. Environmental Lead for design and environmental support for various City of San Jose Trail Projects. Task included the preparation of various documents necessary to bring projects in compliance with NEPA.

Project Manager: Lower Silver Creek Trail Initial Study Negative Declaration, City of San José, San José CA. Managed the preparation of the CEQA environmental document for the 5-mile Lower Silver Creek Trail between Coyote Creek and Lake Cunningham Park.

Senior Biologist: Santa Clara Habitat Conservation Plan; Santa Clara County, CA. Senior biologist on the Santa Clara Habitat Conservation Plan Environmental Impact Report/Statement (EIR/S). Managed the preparation of the biological resource chapter of the EIS/EIR, as well as prepared the sections describing impacts and mitigation for specific Santa Clara County species.

Task Lead/Permitting Specialist: Saratoga Creek Raw Water Intake Improvement Project; San Jose Water Company, CA. Managed the CEQA clearance (Categorical Exemption) and permits/authorizations, including UA Army Corps of Engineers (Section 404), Regional Water Quality Control Board (RWQCB) Water Quality Certification (Section 401), and California Department of Fish and Game (CDFG) Streambed Alteration Agreement (Section 1602), including coordination of protective measures for the federally listed California red-legged frog.

Environmental Coordinator and Lead Biologist: Coyote Watershed Program; Santa Clara Valley Water District; San José, CA. Responsible for US Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Game permitting, regulatory negotiation and environmental documentation per CEQA and NEPA. The program is implementing a series of stream restoration and flood control improvement projects within the

watershed, many of which under an accelerated schedule. Major issues include wetlands, endangered species, cold water fisheries, and habitat conservation and restoration. Dr. Langis also conducted a number of interagency meetings that included the National Marine Fisheries Service, US Fish and Wildlife Service, USACE (Regulatory Branch), California Fish and Game, and the Regional Water Quality Control Board to discuss project impacts and proposed mitigation.

Project Manager: Phase II of the Gilroy Hot Springs Road Repair Project; Santa Clara County; Gilroy, CA: Conducted resource agency coordination for the realignment of a section of Coyote Creek using fluvial geomorphic and bio-engineered methods. This project involved the preparation of an Initial Study/Negative Declaration per CEQA and the preparation of US Army Corps of Engineers (Section 404), Regional Water Quality Control Board (Section 401), and California Department of Fish and Game permits. The project required Section 7 Consultations for the federally listed California red-legged frog and the preparation of a mitigation plan for the state protected foothill yellow legged frog.

Project Manager: Upper Penitencia Creek Flood Control Project Environmental Impact Statement/Report (EIS/R), Phase 1; USACE; San Jose, CA. Dr. Langis was the Project Manager for Phase 1 of the EIS/EIR completed in August 2006. Managed the collection of data, evaluation and documentation of the existing condition along Upper Penitencia Creek as well as the preparation of a Waters of the US and Wetland Delineation Report.

Project Manager: Nesting Bird Surveys for the Upper Guadalupe River Flood Control Project; USACE; San José, CA. Coordinated the seasonal nesting raptor and bird surveys in Reach 10 of Upper Guadalupe River for compliance with the Migratory Bird Treaty Act and California Fish and Game Code from 2008 through 2011.

Senior Aquatic Biologist: Pond A-4 Tidal Wetland Restoration; Santa Clara Valley Water District, Santa Clara, CA. Task leader for preparation of the Water Quality Section of the Opportunity and Constraints Memorandum. Task included analysis of existing conditions and of potential effects on water quality of opening Pond to tidal exchange including potential effect on mobilization of toxic material.

Senior Technical Consultant: Caltrans District 4 On-Call Environmental Services; San Francisco Bay Area, CA. Senior reviewer– task leader, intimately familiar with Caltrans projects, procedures, and document standards. Provided senior review on the preparation of Natural Environment Study reports and Biological Assessments as well as provided strategy and support for Caltrans' permitting efforts with the California Department of Fish and Game, US Fish and Wildlife Service, California Regional Water Quality Control Board, and US Army Corps of Engineers.

Permitting Manager: Seismic Retrofit of Richmond-San Rafael Bridge; Caltrans District 4 CA; Richmond, CA. Task manager for all environmental permitting efforts associated with the seismic retrofit of the Richmond-San Rafael Bridge. Required permits included permits from USACE, RWQCB, and BCDC as well as Section 7 Endangered Species Act consultations with FWS. Coordinated the preparation of environmental permits/authorizations, including US Army Corps of Engineers Individual Permit (Section 404), Dredge Material Management Office Permit, San Francisco Bay Conservation and Development Commission Major Permit, RWQCB Water Quality Certification (Section 401), United States Fish and Wildlife Service/National Marine Fisheries Service (USFWS/NMFS) Section 7 Consultation Endangered Species Act. Also prepared a mitigation and monitoring plan for potential negative impacts to eelgrass beds. Coordinated the development of mitigation and monitoring plans for the peregrine falcon, the Pacific herring, harbor seals, and double-crested cormorants. Incorporated permit requirements in project PS&E.

Permitting Manager: Los Esteros Critical Energy Facility Permanent Stormwater Outfall; Calpine Corporation, San José CA: Task manager for the preparation and coordination of US Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Game (CDFG) permit applications, as well as coordinated with National Marine Fisheries Service and CDFG regarding rare, threatened and endangered species.

Project Manager: Montevina Raw Water Pipeline, San Jose Water Company, San José, CA: Managed the preparation of environmental document under CEQA (Initial Study Negative Declaration) and permits/authorizations, including Section 404 and 401 of the Clean Water Act and Section 1602 of the California Fish and Game Code.

Permitting Specialist: On-call Environmental Services; Alameda Public Works Agency; Oakland, CA. Managed CEQA compliance and permitting/authorizations, including Section 404-401 of the Clean Water Act and Section 1602 of California Fish and Game Code.

Bécancour Energy Project, TransAlta. Managed the preparation of the environmental document and addressed public hearing on water quality and biological resources sections for a combined-cycle gas turbine power plant in Bécancour, Québec.

Publications

Kimmelshue, J.E., R. Langis, M. Dellinger and J. Bays. 2000. Wildlife Habitat and Treatment Wetlands Design and Construction. Treatment Wetlands for Water Quality Improvement - Quebec 2000 Conference Proceedings (Selected Papers). CH2M HILL, Waterloo.

Kimmelshue, J.E., M. Dellinger, R. Langis, and J. Bays. 2000. Basin 2000/Lyons Creek wildlife habitat and treatment wetlands design and construction. WEFTEC 2000 Technical Proceedings.

Langlois, C. and R. Langis. 1995. Presence of airborne contaminants in the wildlife of northern Québec. Science of the Total Environment, 160/161: 391-402.

Langlois, C., R. Langis and M. Pérusse. 1995. Mercury contamination in Northern Québec environment and wildlife. Water, Air and Soil Pollution 80: 1021-1024.

Gibson, K.D., J.B. Zedler and R. Langis. Limited response of cordgrass (Spartina foliosa) to soil amendments in a constructed marsh. 1994. Ecological Applications 4(4): 757-767.

Zedler, J.B., M. Busnardo, T. Sinicrope, R. Langis, R. Gersberg and S. Baczkowski. 1994. Pulse-discharge wastewater wetlands: the potential for solving multiple problems by varying hydroperiod. In: Mitsch, W.J. (ed.) Global Wetlands, Old World and New. Elsevier, Amsterdam: 363-368.

Busnardo, M.J., R.M. Gersberg, R. Langis, T.L. Sinicrope and J.B. Zedler. 1992. Nitrogen and phosphorus removal by wetland mesocosms subjected to different hydroperiods. Ecological Engineering 1: 287-307.

Sinicrope, T.L., R. Langis, R.M. Gersberg, M.J. Busnardo and J.B. Zedler. 1992. Metal removal by wetland mesocosms subjected to different hydroperiods. Ecological Engineering. 1 : 309-322.

Zedler, J.B. and R. Langis. 1992. Urban Wetland Restoration: A San Diego Bay Example. Proceedings: Third Annual "Country in the City" Symposium, Portland, Oregon, April 1990; Audubon Society of Portland.

Zedler, J.B. and R. Langis. 1992. Urban Wetland Restoration: A San Diego Bay Example. Proceedings: Third Annual "Country in the City" Symposium, Portland, Oregon, April 1990; Audubon Society of Portland, 1992.

Langis, R., M. Zalejko and J.B. Zedler. 1991. Nitrogen assessments in a constructed and natural salt marsh from San Diego Bay. Ecological Applications 1(1):40-51, 1991.

Zedler, J.B., R. Langis, J. Cantilli, M. Zalejko and S. Rutherford. 1989. Assessing the functioning of constructed marshes. pp. 311-318, in Hughes, H.G. and T.M. Bonnicksen, eds., Restoration '89: The new management challenge. Proceedings of the first annual meeting of the Society for Ecological restoration, January 16-20, 1989, Oakland, CA; Society for Ecological Restoration, Madison, WI.

Zedler, J.B., R. Langis, J. Cantilli, M. Zalejko, K. Swift and S. Rutherford. 1988. Assessing the functions of mitigation marshes in southern California. pp. 323-330, in Kusler, J.A., S. Daly and J. Brooks, eds., Urban Wetlands, Proceedings: National Wetlands Symposium, June 26-29, 1988. Oakland, CA., Association of Wetland Managers, Berne, NY.

Cluis, D., R. Langis and P. Couture. 1988. Contribution of atmospheric and groundwater sources to surface water quality during extreme hydrologic events. Atmosphere Ocean 28(3):437-448.

Langis, R., D. Proulx, J. de la Noüe and P. Couture. 1988. Influence of a biofilm on an intensive Daphnia culture. Aquacultural Engineering 7:21-38.

Langis, R., P. Couture, J. de la Noüe and N. Méthot. 1986. Induced response on algal growth and phosphate removal by three molecular weight DOM fractions from a secondary effluent. J. Wat. Pollution Control Fed., 58:1073-1077.

Conferences

Langis, R., M.R. Tompkins, A. Falzone and M. Klemencic. 2009. The Lower Silver Creek Project, San José, California - From an Urban Flood Control Channel to a Naturally Functioning Urban Creek. 3rd National Conference On Ecosystem Restoration. July 20-24, 2009, Los Angeles, California.

Langis, R. and M. Busnardo. 2006. Using the Pulse-Discharge Concept to Protect Estuarine Salt Marsh Habitats from Freshwater Dilution: A Case Study. The 3rd National Conference on Coastal and Estuarine Habitat Restoration, December 9-13, 2006, New Orleans, Louisiana.

Langis, R., M.R. Tompkins, and M. Klemencic. 2005. Lower Silver Creek Project: Integration of Fluvial Geomorphology Concepts in the Design of an Urban Flood Control Channel. 2005 Conference of the Floodplain Management Association. September 6-9, 2005, Sacramento, California.

Kimmelshue, J., Dellinger, M., Langis, R.* and Bays, J. 2000. Design and construction of Lyons creek wildlife habitat and treatment wetlands, Lake County, California. Symposium on Constructed Wetlands For Wastewater and Stormwater Applications. Society for Wetland Scientist. Quebec City, August 2000.

Langis, R., Ngim, L., Byron, E., Winslow, K. and P. LaCivita. 1999. In-situ Use of Irradiance and Turbidity to Monitor Effects on Eelgrass (*Zostera marina*) Beds During Dredging Episodes at Richmond Harbor, California. 4th Biennial State of the Estuary Conference. San Francisco, CA, March 17-19, 1999.

Langlois, C. R. Langis and M. Pérusse. 1994. Mercury contamination in Northern Québec environment and wildlife. International Conference on Mercury as a Global Pollutant. Whistler, B.C. July 10-14, 1994.

Langis, R. 1990. The significance, disruption and restoration of California's coastal wetlands. 8th Symposium Marine Biology. June 4-8, 1990, Ensenada, Baja California, Mexico (Invited).

Langis and J.B. Zedler. 1989. Some aspects of nutrient dynamics in natural vs. man-made salt marshes. Presented at the Society for Ecological Restoration and Management Annual Meeting, Jan. 16-20, 1989, Oakland, California.

Langis, R., J.B. Zedler, M. Zalejko and J. Cantilli. 1989. Assessing the development status of a constructed marsh. 10th Biennal International Estuarine Research Conference, October 8-12, 1989, Baltimore, MD.

Langis, R., P. Couture and P.G.C. Campbell. 1988. Effect of dissolved organic matter on iron bioavailability to a freshwater green alga. ASLO Winter Meetings, San Francisco, December 1988.

Specialized Training

Fluvial Geomorphology in River and Stream Restoration: Principles and Applications Symposium taught by Dr. G. Matthias Kondolf of U.C. Berkeley. Owens Valley Laboratory, Bishop, CA. 2003

Creating and Using Wetlands for Wastewater and Stormwater Treatment/Water Quality Improvement, Part I and II, University of Wisconsin, Madison. 1998.

Tidal Wetland Restoration, American Society of Civil Engineers, 1997

Jurisdictional Delineation of Wetlands, University of California Berkeley, 1997

Wetlands Regulation and Mitigation, University of California Davis, 1996