2021 California Aquatic Bioassessment Workgroup Meeting and California Chapter Society for Freshwater Science Meeting Presentation Abstracts and Presenter Index

Tuesday, October 12, 2021

Welcome

Ali Dunn, State Water Resources Control Board
Angela De Palma – Dow, County of Lake Water Resources Department and Society for Freshwater Science – CA Chapter

Keynote Speech

Anecita S. Agustinez | Department of Water Resources | *Tribal Policy Advisor*

Department of Water Resources (DWR) appointed Anecita Agustinez as Tribal Policy Advisor in August 2013. Her primary responsibilities are to provide policy support and recommendations regarding tribal issues to Director Karla Nemeth and Lead Deputy Director Cindy Messer. Anecita has been actively engaged with DWR's various divisions assisting in Tribal Consultation and in the development of DWR's Tribal Consultation Policy. Before joining the Department, she served as the Native American Liaison, and Manager of the Office of Legislative and External Affairs, and the Office of Health Access at the Department of Health Care Services. She previously was the Assistant Director of the Office of Native American Affairs at the Department of Justice in the Office of the Attorney General. Her experience includes developing and conducting training in the areas of tribal consultation, cultural competency, environmental justice, social justice issues, and legislative advocacy on behalf of California's Tribal Governments. The Office of the Tribal Policy Advisor coordinates communication and outreach with other state agencies and facilitates government-to-government consultation between Department of Water Resources and California's Native American Tribes and Tribal governments. Anecita is an enrolled citizen of the Navajo Nation. She is born to the Tó díchʼíinii (Bitter Water Clan) and born for the Ilocano Clan.

Presentation Abstracts

Session 1

Moderator: Ali Dunn, *State Water Resources Control Board*

COMMUNITY SCIENCE RESILIENCE: 20-YEAR REVIEW OF WATERSHED MONITORING WITH SIERRA STREAMS INSTITUTE

Alexandra Cisneros Carey

Sierra Streams Institute (SSI) is a community science watershed research organization based in Nevada City, CA that has worked with community members to monitor the Deer Creek watershed for over twenty years, and the Bear River watershed for five years. Monthly monitoring carried out by dedicated volunteers is used to track ecological changes, evaluate restoration efforts, and locate potential contamination sources. In 2020, SSI's office and laboratory were destroyed in the Jones Fire, but the decades of data remained. The Jones Fire and COVID-19 have provided an opportunity to reevaluate where, when, and how we collect data, and use our questions about climate change impacts to revise our monitoring program. We summarized the long-term ecological trends of the Deer Creek and Bear River watersheds to understand how different water quality parameters drive each other. We saw increasing temperatures and decreasing dissolved oxygen across the watershed as indicators of expected climate change driven impacts. By comparing our data to the predicted trends over the next decade, we reveal where in the watershed will be most impacted by climate change.

MACROINVERTEBRATE DISTRIBUTION ACROSS AN IMPACTED WATERSHED IN THE CALIFORNIA CENTRAL COAST: IMPLICATIONS FOR FUTURE MONITORING EFFORTS

Sarah Stinson

Freshwater aquatic ecosystems are vulnerable to anthropogenic impact and require comprehensive monitoring to protect threatened species. Sensitive macroinvertebrates are commonly used as bioindicators of habitat quality but traditional identification methods are time-intensive and require taxonomic expertise. In this study we evaluated the Salinas River watershed as a model system for studying impacts of agricultural runoff, using environmental DNA metabarcoding to link variation in water quality with the local biodiversity and composition of aquatic communities. We collected sediment from 23 sites in the Salinas River watershed, then used a multi-marker approach followed by HTS sequencing to evaluate site biodiversity for a broad range of taxa. Sequence data were analyzed using the CRUX (Creating Reference Libraries using eXisting Tools) and ANACAPA pipelines. For sequencing reads obtained from macroinvertebrates, 25% matched known Arthropod species, 16.9% matched known Annelids, and 23% matched other groups (Bacillariophyta, Mollusks, Cnidaria, Chordata). A high percentage (35.1%) were unmatched, emphasizing the need for further database

development. We found waterbody-specific patterns of alpha diversity for many groups, and sites known to be highly impacted by pesticides contained different biodiversity when compared with less impacted sites. Our study provides a robust analysis of biodiversity across a watershed using molecular methods.

Session 2

Moderator: Chad Loflen; *California Regional Water Quality Control Board, Region 9, San Diego*

MONITORING AND ASSESSMENT TOOLS THAT RECOGNIZE THE UNIQUE FUNCTIONS OF CALIFORNIA'S TEMPORARY WATERS

Joseph A. Morgan

Once thought of as inferior to permanent waterbodies, temporary waters such as vernal pools and ephemeral streams are increasingly recognized as unique ecosystems that sustain unique biological communities and perform distinct ecological functions. As regulatory and management agencies work to protect temporary waters and address sources of impairment, they need assessment methods and monitoring programs that can evaluate the distribution, abundance, condition and function of temporary waters. This presentation will review new assessment tools & monitoring programs for California's temporary waters, including rapid assessments of streamflow duration and ambient surveys of Central Valley vernal pools. It will conclude with a discussion of knowledge gaps, directions for future research, and opportunities for cross-program collaboration.

THE DRYING REGIMES OF NON-PERENNIAL RIVERS AND STREAMS

Adam N. Price

The timing, magnitude, and rate at which rivers and streams dry are important variables that influence ecosystem functions, such as regulating downstream water quality, supporting fisheries, and promoting carbon storage. There is a global abundance of non-perennial rivers and streams, which is predicted to increase due to climate change and anthropogenic influences. Thus, there is a need to focus on river and stream drying, more specifically, how these systems dry. Using 894 USGS streamgages, we isolated 25,207 unique drying events, which were delineated to include the peak directly preceding a no flow event to the eventual re-emergence of flow. For each event, we calculated hydrologic signatures of drying that described the timing, duration, magnitude, and rate of change of flow and no flow. Using statistical analyses on these hydrologic signatures, we clustered events into four distinct drying regime clusters. 75% of gages had more than one drying regime occur throughout the study period and 80% of events belonged to two drying regimes. Random forest analysis revealed that land cover/use were more important predictors of a drying regime cluster membership than watershed physiography or climate. This drying regime framework could be employed to understand linkages between observed physical, chemical, and biological functions associated

with dominant drying regimes to extend estimates of ecological understanding and potential management practices to unobserved sites.

ESTABLISHING FLOW TARGETS FOR MANAGEMENT THROUGH FLOW-ECOLOGY ANALYSIS: A FUNCTIONAL FLOW-ECOLOGY APPROACH
Katie Irving

Flow alteration is a pervasive source of biological degradation due to habitat alteration and has been identified as a priority management concern throughout California. A key challenge in managing flow alteration is determining the level and pattern of alteration associated with impact on biological communities. Statewide bioassessment indices (specifically, the Algae Stream Classification Index (ASCI) and California Stream Classification Index (CSCI)) can help identify flow management targets that protect stream health. Functional flow metrics (FFM) relate ecologically important components of flow regime describing the magnitude, timing, frequency, duration and rate of change of seasonal flow events, to biological community response. We applied logistic regression to delta H (difference between current and reference condition flow) of each FFM to predict the likelihood of achieving a healthy index score for both indices. We applied these flow-ecology relationships into a highly urbanized watershed in Southern California, through which we determined the most influential metrics on both CSCI and ASCI, the likely extent of alteration due to flow alteration, and flow ranges for the area. We illustrate how this approach aids prioritization decisions, and discuss the potential for further management applications such as establishing flow management targets and causal assessment.

Session 3

Moderator: Shuka Rastegarpour, *State Water Resources Control Board*

BIOLOGICAL OBJECTIVES FOR THE SAN DIEGO REGION
Chad Loflen

On December 8, 2020, the California Water Quality Control Board, San Diego Region, adopted a Stream Biological Objective for perennial and intermittent streams in the San Diego Region, as well as implementation guidance for the adoption of future biological objectives.

ASSESSING AND MANAGING BIOLOGICAL INTEGRITY IN MODIFIED CHANNELS: UPDATES ON REGIONAL AND STATEWIDE STUDIES
Raphael Mazor and Scott Dusterhoff

Bioassessment indices have rapidly become the standard tool for measuring biological integrity in California's wadeable streams. However, their full adoption into management programs is impeded by uncertainty about how to interpret them in modified channels, such as stormwater conveyances or agricultural ditches. Preliminary studies by the Stormwater Monitoring Coalition have shown that, at least within southern California, fully hardened channels are

unlikely to attain scores typical of reference conditions (and thus may not be able to meet benchmarks derived from reference sites unless the modifications are mitigated or removed). However, there is little information about other types of engineered channels (e.g., soft-bottom channels), or about modified channels outside southern California. Today we present results from a recently completed study of modified channels in the Bay Area, as well as updates on other studies (one focusing on the Central Valley, and another with a statewide focus). The goals of these studies are to identify typical ranges of bioassessment index scores in different channel types (which can help inform the setting of interim goals), and to identify water quality improvements or channel maintenance activities that are associated with high-scoring modified channels. Ultimately, this research will help managers improve and maintain ecological conditions in California's extensive networks of modified channels.

Wednesday October 13, 2021

Session 4

Moderator: Carly Nilson, *State Water Resources Control Board*

AN ASSESSMENT OF THREATS TO ENDANGERED AND THREATENED FRESHWATER SPECIES IN CALIFORNIA

Gary Qin

Freshwater species are particularly vulnerable in Mediterranean climates, which have a long history of land-use change and hydrological modification. This study evaluates the threat levels of all federally and state endangered and threatened animal species in California, USA. The studied species include non-freshwater species, which serve as a point of comparison to investigate threat characteristics unique to freshwater systems. We used an established protocol to highlight each species' threats' severity, spatial extent, and temporal scale. We found that most endangered and threatened species have intermittent or obligate usage of freshwater systems. The most threatened taxonomic group is fish, followed by mammals and birds. In order of prominence, the most common threats are habitat loss, invasive species, climate change, and altered hydrology. Despite altered hydrology being the only threat directly linked to freshwater, freshwater species are the most threatened in almost every threat category, highlighting the pervasiveness of threats to freshwater systems. Given the severity and extent of threats to freshwater systems, it is imperative to have a detailed understanding of the nature of threats, where those threats occur, and which taxonomic groups are affected to inform effective biodiversity conservation management.

COUPLING HABITAT AND MACROINVERTEBRATE DIVERSITY WITH JUVENILE CHINOOK SALMON GROWTH AND PRODUCTION IN THE SAN JOAQUIN RIVER RESTORATION PROJECT

Steve Blumenshine

Salmon and river restoration projects could and should focus on juvenile fish production as an integrative variable to predict restoration success under varying hydrologic and habitat conditions. The restoration of Chinook salmon to the San Joaquin River in California's Central Valley is challenged by unpredictable and diminishing water supply as well as the return and survival of Spring Run broodstock. We couple empirical approaches of habitat production potential, i.e. water temperature and invertebrate prey assemblages with simulation tools including fish bioenergetics, inSTREAM, and drone imaging to develop approaches to best assess restoration goals and probability of success. Empirical habitat assessment also includes the abundant macrophyte habitat in the SJR which is typically overlooked in habitat assessment models despite nearly 10x the invertebrate abundance compared to adjacent drift and benthic invertebrate abundances. Over recent years we are particularly interested in applying these approaches to scenarios of varying water regimes (flows) and the abundance of energy to juvenile salmon as invertebrate biomass.

NUTRIENT AND MINERAL CYCLING IN RELATIONSHIP AQUATIC ECOSYSTEM STRUCTURE: HOW CAN DATA BETTER INFORM MANAGEMENT?

Byran Fuhrmann

Water column phosphorus concentration is often a powerful predictor of algal abundance in California lakes and reservoirs. Although algae are an integral part of the aquatic food web, excessive algal growth often leads to toxins which are harmful to humans and aquatic ecosystems. Phosphorus mitigation through reducing either internal or external loading is generally the most appropriate long-term method of controlling algal abundance and associated toxins.

In addition to phosphorus, other nutrient and mineral cycles have significant implications on the aquatic ecosystem. A better understanding of these more complex biogeochemical cycles will allow for better lake and reservoir management. The speciation of nitrogen (ammonia or nitrate) and its abundance in relation to phosphorus (N:P ratio) is highly influential on algal community structure. Iron mineral cycling appears to be underappreciated in its impact on aquatic ecosystems. There is an intricate relationship between the release of phosphate and the production of dissolved iron through iron-reduction in anoxic sediments and the high requirement for both phosphate and dissolved iron by cyanobacteria. This presentation will cover the cutting-edge research that shows the interplay between elaborate nutrient and mineral cycles and how this all impacts aquatic ecosystems.

DNA-BASED METHODS USED TO IDENTIFY TOXIN-PRODUCING CYANOBACTERIA IN CALIFORNIA WATERBODIES

Jayme Smith

Blooms of toxin producing cyanobacteria are the primary cause of freshwater harmful algal blooms (FHABs) in freshwater systems throughout California. Many genera of cyanobacteria have the potential to produce multiple toxins, collectively referred to as cyanotoxins.

Cyanotoxins can contaminate drinking water, endanger human and animal health, and can be transported between systems as water moves throughout the environment. Therefore, our ability to monitor and identify cyanobacteria in a rapid and accurate manner is of critical importance to make time-sensitive management decisions. For this reason, we sampled two distinct habitats, a series of benthic cyanobacterial mats in Northern California streams and planktonic lake cyanobacteria in Southern California, to develop a molecular DNA-based approach to identify and quantify cyanobacteria biodiversity. Our studies revealed both habitats hosted unexpected cyanobacterial biodiversity, including many novel taxa, and we identified a greater number of distinct toxin-producing cyanobacteria compared to traditional morpho-taxonomic identifications. By coupling DNA-based identification with characterization of cyanotoxins and environmental conditions, we demonstrated a promising approach for identifying the key drivers of toxic bloom events and providing an improved understanding of cyanobacteria ecology.

Session 5

Moderator: Jennifer Siu, *United States Environmental Protection Agency, Region 9*

A FRAMEWORK FOR BIOASSESSMENT AND MONITORING OF CALIFORNIA'S ESTUARIES
Jan Walker

Estuaries are a critical aquatic resource and are often a receiving water subject to numerous stressors. Similarly, billions of dollars are being spent to restore, remediate, and manage estuaries statewide. However, California lacks a coordinated estuary monitoring program, and the consistent application of bioassessment tools is limited. To help address these gaps, the Ocean Protection Council is supporting development of a statewide estuarine monitoring and assessment framework that will initially be used to evaluate the efficacy of the estuarine Marine Protected Area program. The monitoring framework enables estuaries across California to be systematically assessed, monitored, and linked to offshore MPA performance. A key aspect of this program is a focus on ecological functions versus a single type of flora or fauna. This focus on function allows the framework to accommodate different estuary types and assimilate data from diverse existing monitoring programs, while maintaining an underlying comparability. In service of assessing functional performance, we have developed standard protocols to assessing key estuarine features across different estuaries, coupled with standard data templates and guidance on analysis, synthesis, and reporting, focused on four guiding principles – flexibility, comparability, interpretability, and practicality. Currently, our team is testing our monitoring framework in the field across three geographic regions and fifteen estuaries. The framework provides an opportunity to develop additional bioassessment tools that can directly assess beneficial uses and to expand to additional estuaries across the state.

CASE STUDY: THE APPLICATION OF EMPA ASSESSMENT TOOLS IN CARMEL RIVER ESTUARY
Kevin O'Connor

California's MPA network include a variety of estuaries including embayments, riverine estuaries, and lagoonal estuaries (aka bar-built estuaries-BBE). BBE's are dynamic systems providing unique habitats and special ecological services owing to the varying conditions related to closures and breaches of the beach berm. The Carmel River lagoon is a BBE on the central coast of California selected as a control site for the development of the Estuary MPA monitoring program. The Technical Team prioritized indicators for inclusion in the proposed estuarine assessment framework around key ecological functions. The protection and maintenance of ecological functions and ecosystem services is the goal of many coastal managers. Focusing an assessment framework on ecological functions allows for the creation of linkages between assessment results and the designated beneficial uses for each estuary. Furthermore, an assessment framework built to evaluate ecological functions will have greater flexibility for application within a highly heterogeneous state like California. The suite of protocols are being tested address ecological functions including support for Shellfish, Wildlife, Vascular plants and Protected species, amelioration of sea level rise, Secondary Production, Nutrient Cycling, Nekton and Bird habitat. We will summarize the protocols and initial results of in-situ monitoring arrays and field sampling efforts at Carmel Lagoon.

PREDICTING FISH ASSEMBLAGES IN CALIFORNIA ESTUARIES, RUSSIAN RIVER ESTUARY RANDOM FOREST MODELING

Michelle Tarian

Estuaries are critical habitat for many fish species in California, including salmon, steelhead, and tide water Gobi and are often managed by breaching inlet sandbars. To understand how the estuary fish assemblage changes in response to chemical and physical changes, including breaching of the sandbars, we modeled fish responses in the Russian River Estuary in Central California using random forest. Both abundance and presence / absence of five fish species were modeled and included other fish species as predictor variables to understand species interactions. Model performance was evaluated by calculating the area under the curve (AUCs) and percent variance explained. These models can be applied to predict the entire estuary fish assemblage, providing mangers with data driven guidance for estuary management. The data will be used to develop the Aquatic Species Assessment Tool (ASAT), which aims to capture the complexity of species-habitat interactions in a simple end-user interface for estuary management. The ASAT is in the process of being applied to estuaries throughout California.

Cal-SFS Traditional Ecological Knowledge Panel

Moderator: Angela De Palma – Dow; *County of Lake Water Resources Department and Society for Freshwater Science – CA Chapter* and John Olson; *California State University, Monterey Bay*

In 2020, Cal-SFS and CABW attendants expressed interest in a Tribal Ecological Knowledge (TEK) workshop. In response, organizers of this year's Cal-SFS and CABW have planned a TEK Session. The session will include presentations by each invited speaker so that attendees can get a better understanding of the speaker's work with freshwater systems and Tribal communities. After all speakers have presented, they will join a panel for further discussion and Q&A that will be moderated by Cal-SFS Fellows. The panel discussions and Q&A will be used to enable speakers to share information, advice, and knowledge on how students, early career aquatic scientists, and career agency scientists can better cooperate, partner, and work with and alongside Tribes. This is particularly important when working in systems that are culturally important for Tribes and for recognizing that non-indigenous, western science protocols and methods have a history of intentionally and unintentionally extracting TEK, data, and resources from Tribal communities without consent or reparations as well as excluding Tribes from processes and conversations that they should have been a part of. This history has impacted water quality data integrity and resulting water policy in California as well as relationships between Tribes and water management agencies. Moreover, non-indigenous academic and career pathways usually do not prepare students for working with Tribes, which is a huge disservice to the ultimate goals of successful freshwater science and management. This single session can't solve all these aforementioned social, political, and educational issues. However, we hope this session will address part of the education gap, start conversations, raise awareness, increase collaboration, and create a lasting dialog and partnerships that can be used for those working with Tribes in freshwater systems now and into the future.

Panelists include Sarah Ryan (Clear Lake Tules and Beyond: Collaborative Tribal Beneficial Use Development), AnMarie Mendoza (Bursting Through Concrete: Indigenous Water Planning In Tovaangar), Dr. Beth Rose Middelton Manning and Atta Stevenson (Building Understandign Across Worldviews to Increase Recognition of Tribally Specific Beneficial Uses) and Keith Parker.

Presenter Index

Blumenshine, Steve*; California State University, Fresno*

I am a Biology Professor and Director of Research & Development for the California Water Institute; both at CSU-Fresno. My research program focuses on inland surface waters as habitats, primarily for fish. Our current focus is the San Joaquin River Restoration Program, where we've sustained work on juvenile Chinook salmon ecology in this system through a combination of empirical approaches, fish bioenergetics models, and coupled ecosystem simulation models. Earlier this year I was fortunate to start a new research front on the SeeWandel (='lake change') collaborative project in Lake Constance, which borders Germany, Switzerland, and Austria.

Cisneros Carey, Alexandra*; Sierra Streams Institute*

Alex Cisneros Carey graduated from UC Berkeley with a degree in Environmental Sciences and Forestry in 2020. She focused on California plant and vertebrate ecology and natural history. As an undergrad, Alex developed a passion for research and experimental design while working for freshwater ecology and plant physiology labs. She served as Sierra Streams Institute's AmeriCorps River Scientist in 2020-21, and currently runs the Water Quality Lab and volunteer monitoring program. Alex is interested in data-driven conservation research and the impact of climate change on California's plant communities. She is applying to graduate school for ecosystem ecology.

De Palma – Dow, Angela; *County of Lake Water Resources Department and Society for Freshwater Science – CA Chapter*

Angela De Palma-Dow is a Program Coordinator in the County of Lake Water Resources Department where she coordinates various programs such as aquatic plant management, quagga mussel prevention program, storm water, surface-water quality monitoring, cyanobacteria outreach, water quality data management, and post-fire water quality monitoring. Angela has a BS in Biological Science and chemistry minor from California State University, California and a MS in Fisheries and Wildlife with an emphasis on Limnology from Michigan State University. Angela has conducted aquatic surveys and monitoring in over six states with multiple universities, state and local agencies, and non-profits. Angela is the current president / Chair of the California Chapter Society of Freshwater Science and she is also a Certified Lake Manager from the North American Lake Management Society. Angela also writes the bi-weekly "Lady of the Lake" column in the Lake County News.

Dunn, Ali*; State Water Resources Control Board*

Ali Dunn is a senior environmental scientist with the California Water Boards and the Surface Water Ambient Monitoring Program. She obtained her degree at California State University, Sacramento in Biological Conservation and has nearly 10 years of experience working in natural resource conservation and watershed management for the state of California.

Dusterhoff, Scott*; San Francisco Estuary Institute-Aquatic Science Center*

Scott Dusterhoff is a senior scientist and geomorphologist at the San Francisco Estuary Institute-Aquatic Science Center with a background in fluvial geomorphology, watershed hydrology, and estuarine/tidal wetland dynamics. For over two decades, Scott has been working in coastal and upland watersheds throughout California, Oregon, and Washington, as well as in the Mid-Atlantic, on projects that use in-depth scientific investigations to inform sustainable ecosystem management approaches. He specializes in understanding the impacts of land disturbance and flow regulation on geomorphic processes and aquatic habitat for a variety of endangered species. He has extensive experience using a combination of field-based data, numerical modeling, and geospatial tools to characterize fluvial and coastal sediment transport dynamics and hydrologic/hydraulic processes. Scott currently leads several projects in the San Francisco Bay Area that focus on developing holistic management approaches that support resilient, multi-benefit landscapes.

Fuhrmann, Byran*; SePRO Corporation, EutroPHIX Division*

Byran is an aquatic technology development scientist at SePRO corporation and he is the Northern California director of the California Lake Management Society (CALMS). He received his PhD in Environmental Systems from UC Merced where he studied redox and oxygen control on water quality in California reservoirs. He also holds a BS in Chemistry, an MBA and an MS in Environmental Engineering Sciences. He has previously worked as an instructor for an environmental engineering course on water quality and as the quality assurance manager at an environmental laboratory.

Irving, Katie*; Southern California Coastal Water Research Project*

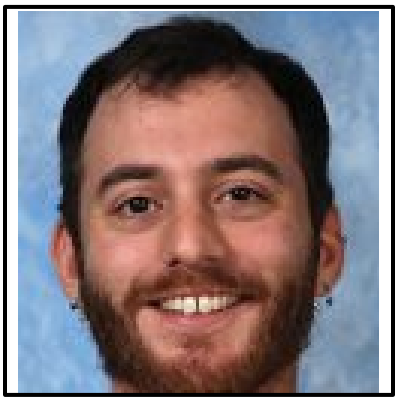
Dr.rer.nat Katie Irving is a Scientist specializing in the relationship between the distribution of river species and their environment. Her doctoral degree dealt with the role of hydrology in Species' Distribution Models (SDMs) on benthic macroinvertebrates. This work involved developing SDM methodology by creating a hydrologic dataset, optimizing variable selection and testing the performance of existing hydrological datasets. Her current research with SCCWRP focuses on the effects of hydrologic alteration through the development of flow-ecology models, aiming to conserve the health of Californian streams.

She received her doctoral degree from Berlin's Liebniz Institute for Freshwater Ecology and Inland Fisheries and Freie Universistaet, her M.S. in freshwater and marine ecology from Queen Mary University of London, and her B.S. in marine biology from the University of Plymouth.

Loflen, Chad*; California Regional Water Quality Control Board, San Diego*

Chad Loflen works as a Senior Environmental Scientist for the State of California Water Quality Control Board San Diego Region. Chad oversees the water quality monitoring, assessment, and research program at the San Diego Regional Board, including the Region's Surface Water Ambient Monitoring Program (SWAMP). Chad is currently the project lead for the San Diego Region on adoption of biological objectives for perennial and intermittent streams.

Mazor, Raphael*; Southern California Coastal Water Research Project*



Dr. Raphael D. Mazor is a freshwater biologist who specializes in freshwater bioassessment methods using benthic macroinvertebrates and algae. Working at large temporal and spatial scales, he has improved precision, accuracy, and sensitivity of bioassessments using the reference condition approach. In addition, he has studied the population genetics of rare and endangered invertebrates endemic to the vernal pools of California. His current research areas focus on the ecological impacts of hydrologic alteration, particularly in intermittent and ephemeral streams.

He received his B.A. in neuroscience and behavior from Columbia University in 1999 and Ph.D. in environmental science, policy, and management from the University of California, Berkeley in 2006. He joined SCCWRP in 2006.

Mendoza, AnMarie*; University of California, Los Angeles*

AnMarie Mendoza was born and raised in the San Gabriel Valley and identifies with both the original people (Gabrieleno-Tongva) and the distinctive working-class communities of the area. AnMarie is a proud first-generation transfer student from Citrus Community college who has a bachelor's degree in Political Science and a Master's in American Indian Studies from UCLA. Generations of her family have witnessed, endured, and contributed to the molding of Los Angeles (Occupied Tongva territory), which inspired her to continue her academic study in Urban Planning. Her scholarship focuses on the barriers and opportunities that local Native Nations and Indigenous peoples face in participating in proposed water projects in Los Angeles. She is co-creator and director of the "Aqueduct Between Us," a five-part radical oral history documentary about the impacts of the Los Angeles Aqueduct from indigenous perspectives. Topics covered in the documentary include an introduction of each tribal community (Gabrieleno-Tongva and Pauite/Shoshone), their lifestyle pre-colonial contract, shared colonial struggles, and contemporary environmental injustice issues. The documentary can be accessed online.

Middelton Manning, Beth Rose*; University of California, Davis*

Beth Rose Middleton Manning is a Professor of Native American Studies at UC Davis. Her research and teaching center on Native environmental policy and Native activism for site protection using conservation tools, and her broader research interests include intergenerational trauma and healing, rural environmental justice, digital humanities, African and Indigenous intersections in the Americas, and Indigenous analyses of climate change. Beth Rose has written two books: Trust in the Land: New Directions in Tribal Conservation (UA Press 2011), on Native applications of conservation easements, and Upstream (UA Press 2018), on the history of Indian allotment lands at the headwaters of the California State Water Project, and published articles and chapters on a range of topics, including Native American cultural heritage protection, Native economic development, Indigenous approaches in political ecology, Federal Indian law as environmental policy, and the application of market-based conservation tools to Indigenous site protection. Beth Rose is passionate about increasing under-represented perspectives, especially Indigenous perspectives, in academia and in environmental policy and planning.

Morgan, Joseph A.*; U.S. Environmental Protection Agency, Region 9*

Joe Morgan is a life scientist with the Wetlands Section of U.S. Environmental Protection Agency's Region 9 office in San Francisco. He coordinates Clean Water Act §404 permit review and jurisdictional assessment across the Region and particularly focused on inland Northern California. He's also a Project Officer and technical contact for several EPA grants to state agencies and regional governments, including projects mapping Central Valley vernal pools and Delta aquatic resources. He lives in Oakland with his wife Emily and 13-month-old son Finn.

Nilson, Carly*; State Water Resources Control Board*

Carly Nilson has a B.S. in Biology and has been a researcher, consultant, and fellow for water quality protection. She has worked for the Water Boards for almost 15 years, most recently taking on the new position at the State Water Resources Control Board as the co-lead for the Freshwater and Estuarine Harmful Algal Bloom Program.

O'Connor, Kevin*; Central Coast Wetlands Group at Moss Landing Marine Labs*

Kevin O'Connor is an ecologist specializing in wetland restoration, monitoring and assessment, and is the Project Manager for CCWG since 2008. Kevin is involved with wetland and upland restoration in the Lower Salinas Valley, the development of a rapid assessment methods (CRAM, RipRAM) for multiple wetland types, along with an Estuary MPA Monitoring Program in California, and participation with the California Wetlands Monitoring Workgroup (CWMW).

Olson, John*; California State University, Monterey Bay*

John Olson is a freshwater scientist at California State University Monterey Bay who studies the ecology of streams and rivers and how they influenced by the landscape around them. He examines freshwater ecosystems using a variety of tools like DNA, satellites, and models to better understand how they function. He then applies this knowledge to developing ways to improve the management and health of rivers and streams.

Parker, Keith*; Yurok Tribe of California*

Keith Parker is currently a Fisheries/Molecular Biologist for the Yurok Tribe of California. Keith co-manages fish harvest management on the Klamath River and conducts genetic analysis of returning Trinity River Hatchery salmon. For the past six years, Keith has conducted four fisheries biology, hydrology, and river ecology research projects in Alaska, Washington, and California - funded by the National Science Foundation (NSF). Keith received a Bachelor of Science degree in Fisheries Biology in 2015 from Humboldt State University (HSU) and a Master of Science degree in Natural Resources (Fisheries) from HSU in 2018 with a thesis on conservation genetics. He examined the spatiotemporal genetic structure of Klamath River Pacific lamprey (eels) using high-throughput genetic sequencing and discovered two new ecotypes of "eels", naming them using words from the Yurok language. Keith's work is in the process of being published in a scientific journal. He is a 2018 NOAA and NSF GRIP awardee, 2016 Switzer Fellow, a 2015 NSF GRFP Fellow, a 2012 NSF URM Fellow, and has won research awards at both the AISES and NSF Emerging Researchers Network national conferences. Keith also sits on the HSU President's Native American Advisory Committee and was appointed to the Oregon Fish and Wildlife Pacific Lamprey Technical Workgroup Committee in 2017. Prior to 2011, Keith was the CEO of the Yurok Economic Development Corporation and prior to that was a Federal agent for the Naval Criminal Investigative Service (NCIS) with a rank of Sergeant and three letters of commendation. Keith lives on the Yurok reservation at the mouth of the Klamath River and has focused his studies on tribal trust fish species and dam removals. His goal is to be a catalyst for positive environmental change by being a "translator" in bridging the gaps between traditional ecological knowledge and modern science.

Price, Adam N.*; Department Earth and Planetary Sciences, University of California, Santa Cruz, California*

Adam Price is a Ph.D. Candidate at the University of California, Santa Cruz whose research focuses on the insights and applications of machine learning and artificial intelligence on emerging hydro and hydrogeological issues. His research specifically includes applying AI/ML methods to intermittent streams and rivers.

Qin, Gary*; University of California, Riverside*

Gary Qin is a 2nd year Ph.D. student in Evolution, Ecology, and Organismal Biology at UC Riverside, advised by Dr. Helen Regan and Dr. Kurt Anderson. His research interests are in freshwater ecology, ecosystem health, and ecosystem services. His current dissertation work is on evaluating the ecological sustainability and governance structure of the Santa Ana River Watershed in Southern California. Specifically, he is focused on studying the current and future ability of the watershed to deliver ecosystem services sustainably and equitably. In his free time, he enjoys cooking, exercising, and attending music festivals.

Rastegarpour, Shuka*; State Water Resources Control Board*

Shuka Rastegarpour is an Environmental Scientist for the State Water Resources Control Board. She received her Bachelor of Science degree in Environmental Studies at California State University, Sacramento. She has nearly 10 years of experience at the State Board working on Ocean Water Quality Policy, Industrial Stormwater Permitting, and currently coordinating the Statewide Bioassessment Monitoring Program.

Ryan, Sarah*; Big Valley Band of Pomo Indians*

Sarah Ryan has worked for the Big Valley Band of Pomo Indians since September 2001 and has been the Environmental Director since 2006. She has a degree in Government from the College of William and Mary in Virginia and has obtained various certifications for the environmental protection activities that she performs on a regular basis.

Smith, Jayme; Southern California Coastal Water Research Project

Dr. Jayme Smith is a senior scientist at Southern California Coastal Water Research Project (SCCWRP) who studies the ecology of harmful algal blooms (HABs) in aquatic systems. Dana Shultz is a senior research technician at SCCWRP who specializes in HAB ecological studies. Rich Fadness is an engineering geologist with the North Coast Regional Water Quality Control Board and has extensive experience with benthic cyanobacteria in Northern California. Dr. Emily Duncan is a senior environmental scientist with the Los Angeles Regional Water Quality Control Board and is the regional HAB response liaison. Dr. Susanna Theroux is a senior scientist at SCCWRP who focuses on the development of molecular methods for bioassessment and the study of microbial communities.

Siu, Jennifer*; United States Environmental Protection Agency, Region 9*

Jennifer Siu is a senior ecologist at EPA Region 9 in the Wetlands Office. She serves as a regulatory expert for Section 404 and 401 of the Clean Water Act (CWA) and the Marine Protection Research and Sanctuaries Act (MPRSA), with an interest in forging effective partnerships with agencies and stakeholders to ensure multi-beneficial environmental outcomes. She is currently working on several initiatives to improve regional wetland outcomes, including development of a SF Bay Wetlands Regional Monitoring Program, supporting the Bay Restoration Regulatory Integration Team to improve wetland restoration permitting, and serving on interagency project teams to promote the beneficial reuse of dredged sediment for Bayland restoration. Jennifer has over 23 years' experience in aquatic system characterization and management including water, sediment, and biota monitoring, rapid ecological assessment, wetland jurisdiction delineation, compensatory mitigation analysis, and NEPQ/CEQA compliance.

Stevenson, Atta*; California Indian Water Commission*

Ms. Atta P. Stevenson is a member of the Cahto Tribe of Laytonville, and an elected officer for tribal Executive Council. I am an avid freshwater and marine traditional fishing woman, traditional hunter, and gatherer of natural foods, stories, and cultural heritage. Have held many talking circles with tribal individuals and families regarding freshwater use, conveyance, tribal water rights, and the impacts of climate change. Seeking environmental justice for water, fish, wildlife and tribal people. Remain dedicated to nonviolent resistance to policies opposing impoverished communities to protect water, trees and our

relatives who speak for themselves. Currently First Responder (EMI), Field Medic (CDC & FWU), trained in Mass evacuation, Quarantine, Mobilization of Medical Units. Former Sec/Treasurer for Cahto Tribe, former President of Inter Tribal Council of California (5) yrs, former Chairwoman of Consolidated Tribal Health Project (24) yrs, Co-Founder California Indian Water Commission, Co-Founder Frontline Wellness United (nationwide, Germany & Africa), Women's Talking Circle, California Water Summit. All organizations have water as a central theme. Access is imperative.

Stinson, Sarah*; University of California, Davis*

Sarah Stinson is a Ph.D. candidate in Ecology at UC Davis, in the Connon and Lawler labs. Her current research focuses on the effects of pesticides of emerging concern on aquatic invertebrates and fish, using molecular techniques and behavioral assays. Her professional interests include aquatic ecotoxicology, molecular ecology and environmental justice. In addition to her scientific pursuits, she was a professional dancer for 15 years and teaches dance classes in Sacramento. When she isn't pipetting small volumes of clear liquids into other liquids, she is usually camping, coding or crafting.

Tarian, Michelle; California State University Monterey Bay

Michelle Tarian is in her 2nd year of the California State University Monterey Bay's Environmental Science Masters Program. She received her undergraduate degree from Ohio University in Environmental Geography and Women and Gender Studies. Michelle's studies focus on estuary and land management. She has been developing a fish assemblage model for the Russian River Estuary that will be applied to all estuaries in California in order to assist estuary management. Michelle also works with Garrapata State Park assessing seacliff buckwheat habitat range to support Smith's Blue Butterfly.

Walker, Jan; Southern California Coastal Water Research Project

Dr. Jan Walker is an Ecologist at the Southern California Coastal Water Research Project (SCCWRP), who specializes in developing assessment tools and programs for coastal wetland ecosystems. She received her B.S. in Environmental Science from the University of Virginia and her Ph.D. in Ecology from the joint-doctoral program at San Diego State University and U.C. Davis. Her research interests focus on developing condition assessment tools for estuaries and other marine habitats, as well as causal assessment methodologies to identify and predict potential stressors to these ecosystems.