2023 California Aquatic Bioassessment Workgroup Meeting and California Chapter Society for Freshwater Science Meeting Presentation Abstracts and Presenter Index

Presentation Abstracts

Monday November 6, 2023

Welcome

Ali Dunn, State Water Resources Control Board

Angela D. Dow, County of Lake Water Resources and Society for Freshwater Sciences – CA Chapter

John Olson, California State University, Monterey Bay and Society for Freshwater Sciences – CA Chapter

Session 1

Natural Dynamics in Artificial Environments: Biogeochemical Functioning in Ditches, Canals, and Urban Stormwater Ponds

AJ Reisinger, University of Florida

Humans are constantly modifying the environment in ways intended to enhance our quality of life. Anthropized ecosystems, such as ditches and reservoirs, are ecosystems that are designed, constructed, and/or managed to provide a specific service. Typically, anthropized ecosystems provide a multitude of unintentional services (and disservices) as well. Permanently inundated stormwater ponds (SWPs), a common example of an anthropized ecosystem, are designed to protect downstream ecosystems via flood control and pollutant removal, but they can also promote biodiversity and influence surrounding socioeconomic dynamics. SWPs are ubiquitous and are often expected to provide social benefits beyond their intended services. For example, property values near ponds in Florida are often elevated due to being considered 'lake-front

property', which can influence societal expectations of SWPs. Despite the intended services, SWPs can be net sources of pollutants, negatively affecting downstream water quality. While there may be a disconnect between expectation (pollutant removal) and reality (ponds as sources of pollutants), relatively little is known about the biogeochemical mechanisms occurring within SWPs. Here we present results from ongoing research focused on internal biogeochemical processes occurring within SWPs, how natural water bodies are affected by SWPs, and potential ways to enhance SWP functioning. Specifically, we have found that 1) despite the typical assumption of N pollution in urban waters, SWP denitrification may be N limited under baseline conditions; 2) urban ponds are more likely to be net N-fixing than natural ponds; and 3) ponds exhibit distinct metabolic signatures compared to urban streams, but pond effluent can influence stream biogeochemical dynamics. Stormwater ponds and other anthropized ecosystems provide novel environments to ask questions related to a range of fundamental ecological concepts. Improving our understanding of how these 'artificial' aquatic environments function can shed light on novel ecological dynamics while also providing myriad benefits for society.

Improving Biological Conditions in Engineered Channels

Raphael D. Mazor, Southern California Coastal Water Research Project

Southern California's Stormwater Monitoring Coalition (SMC) has embarked on a multiyear study to identify factors that managers can use to improve or maintain biological conditions in engineered channels. Past studies have documented the limited biological potential of these channels, but the SMC needs to move past these studies to figure out ways to successfully manage stressors that keep engineered channels from fulfilling their potential. This present study will focus on historical data analysis built on causal assessment methods, in combination with new data collection, to identify why some channels score higher than other similarly modified channels. We have determined that, although many stressors affect all types of modified channels in Southern California, nearly all had-bottom channels are likely affected by altered temperature regimes, whereas soft-bottom channels are disproportionately affected by poor water quality, leading to salinization or eutrophication. The SMC's project will result in decision tools that help managers evaluate options for improving conditions in engineered channels.

Flow-Ecology Assessment in Modified Channels

Katie Irving, Southern California Coastal Water Research Project

Flow alteration is a widespread and critical concern for the health and function of streams. In modified stream channels, flow conditions are often highly altered, and these streams often face additional stress due to homogenized geomorphology.

We developed flow-ecology relationships for modified channels in Southern California to assess the impact of flow alteration on stream condition for the benthic communities (aquatic insects and algae). Based on best observed biological conditions, modified channels can be held to a lower standard than that of natural channels. Consequently, modified channels can withstand a greater level of flow alteration.

However, as flow-ecology analysis is primarily dependent on watershed-scale flow metrics, it may not capture the local factors that impact stream condition. Therefore, it's important to recognize that in-channel hydraulic factors, such as water depth and velocity, also act as significant stressors for the benthic community, and assessing these changes in hydraulic conditions within modified channels is equally valuable.

We present an approach to address flow-ecology dynamics in modified stream environments, along with a discussion of its associated advantages and challenges. Furthermore, we offer our perspective and suggestions on the integration of hydraulic analyses, outlining a conceptual approach for its potential application.

Session 2

How the Water Boards Surface Water Ambient Monitoring Program Shares Data with the Public

Michelle Tang and Carly Nilson, State Water Resources Control Board – Surface Water Ambient Monitoring Program

The Water Boards collect and receive data to make informed decisions about how to manage and allocate water resources. To help facilitate the interpretation and accessibility of these datasets, the Surface Water Ambient Monitoring Program (SWAMP) has developed two public-facing data visualization platforms, the SWAMP Data Dashboard and the Harmful Algal Bloom

Reports Map. The SWAMP Data Dashboard compiles multiple datasets collected by SWAMP into a single location for easy access and retrieval. The Harmful Algal Bloom Reports Map displays the location of recently reported blooms to communicate public health risk in a timely and accessible manner. These two tools provide decision makers and the public an opportunity to explore different SWAMP datasets through a more interactive approach to better understand water quality conditions across the state.

Building a Freshwater Harmful Algal Bloom Assessment Toolbox: using a Multifaceted Approach to Evaluate the Causes of Blooms in H.V. Eastman and Hensley Lakes

Stephen Huie, Central Valley Region Water Quality Control Board - SCCWRP

California's freshwater lakes have been experiencing harmful algal blooms (HABs) at an increasing rate in recent years. HABs can produce toxins, impacting key beneficial uses. Understanding the drivers of HABs and developing potential solutions is critical for the protection of beneficial uses. Popular recreational lakes H.V. Eastman (Eastman) and Hensley are located within 15 miles of each other in the Sierra Nevada foothills and each have experienced annual HAB events. Our study took a multifaceted approach to investigate the patterns and drivers of HABs at these lakes. In situ sampling from the lakes and upstream tributaries was conducted between May 2021 and December 2022. Despite similar nutrient concentrations, our observations showed that Lake Hensley had more frequent blooms, while Lake Eastman had fewer but more extreme blooms. Through an analysis of lake hydrodynamics, we found that the differences in bloom dynamics may be due to Lake Hensley receiving more consistent inflow from the Fresno River compared to Lake Eastman's sporadic inflow from the Chowchilla River. Longer term observations of remote sensed blooms and lake hydrodynamics were collated for 2017-2022 also suggests that management of lake inflow and outflow may have an important impact on HAB dynamics in these systems.

Harmful Algal Blooms in Clear Lake: Historical Observations and Future Perspectives

Jayme Smith, Southern California Coastal Water Research Project

Harmful cyanobacteria blooms (cyanoHABs) have gained national attention over the past decade due to the increased frequency and severity of blooms, including in California, where many water bodies have experienced chronic cyanoHAB issues. Clear Lake is a large, natural lake in northern California, with many beneficial uses but also substantive environmental issues. The lake has been listed on the 303d list of impaired waterbodies since 1986 and has a decades long database of water quality measurements. In recent years, an increase in cyanoHAB events have been documented in the lake, adding to the environmental issues faced

by aquatic species present in the lake, and the local community. Regular cyanoHAB monitoring has occurred since 2014 when Big Valley Band of Pomo Indians and Elem Indian Colony initiated a collaborative program. Since then, maximal yearly microcystin levels detected in the lake have varied across five orders of magnitude, with maximal toxin concentrations exceeding California recreational trigger levels in most years. Here we will discuss the trends and potential drivers of cyanoHAB events in Clear Lake and use historical observations to evaluate the efficacy of some of the management actions implemented in the lake. Current trends of lake chemistry suggests that additional research and management efforts will be needed to address the recurrence of cyanoHABs in the future. In particular, a better understanding of cyanobacterial community interactions and top-down effects on bloom formation within the lake can help guide future cyanoHAB management strategies.

Student Lightening Talk Session

Working Towards Preventing Freshwater Species Extinction

Angela D. Dow, County of Lake Water Resources and Society for Freshwater Sciences – CA Chapter

Terrestrial-Aquatic Connections: Invasive Ailanthus altissima Leaf Decomposition in Freshwater Ecosystems and Impacts on Macroinvertebrate Communities

Jonathon Juarez, California State University, Bakersfield

Analysis of Fire Retardant in Runoff

Alexandra Yokomizo, California State University, Monterey Bay

The California Red-Legged Frog R. draytonii Habitat: Defining and Predicting their Current and Future Ranges

Connor Quiroz, California State University, Monterey Bay. Department of Applied Environmental Science

Reimagining Urban Hydrologic Modeling: Focusing on Interplay Between Landscape, Runoff Mechanism, and Imperviousness

Dong-Hyun Kim, San Diego State University

Effects of Fire and Extreme Weather Conditions on Stream Response in the Santa Ana Watershed

Jazzmyn Luna, UC Irvine, Masters in Conservation and Restoration Science

DNA Metabarcoding of Aquatic Invertebrates Gap Analysis

Garret Keating, UC Irvine, Masters in Conservation and Restoration Science

Investigating the Influence of Flow Duration on Bioassessment Indices Across Central California

Skylar Wolfe, California State University, Monterey Bay

Daily Water Temperature Variation of the Pajaro River Channelized by Levees

Ellery Charleton, California State University, Monterey Bay

Comparison of Shell Length for C. battelariae Infected and Non-Infected B. attramentaria Within Elkhorn Slough and Japan

Ashley Rawlins, *California State University, Monterey Bay*

Presentation Abstracts

Tuesday November 7, 2023

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Session 3

The Role of Archaea in Methane Emissions, Climate Change, and Carbon Sequestration in Freshwater Systems

Gaurav Rajen, Santa Ana Regional Water Quality Control Board - Municipal Stormwater Unit

This paper reviews the importance of archaea in freshwater systems and climate change. Archaea are a separate form of single-celled life without a nucleus, much like bacteria, often conflated in the regulatory community with bacteria as "microorganisms" or "bacteria". The paper discusses the importance of archaea in making nitrogen bioavailable, conversion of carbon to methane, ammonia oxidation, and sulfur-based cycles that make carbon bioavailable. This discussion informs an integrated approach to understanding the role of archaea, bacteria, and algae in issues such as oxygen depletion in water bodies. For example, nitrogen and phosphorus are often the only substances viewed as nutrients to be regulated. Sulfur is a nutrient for some archaea and leads to the conversion of carbon into bioavailable hydrocarbons and this role of sulfur is often overlooked in discussions of excess nutrients in run-off. The importance of archaea in creating net emissions of methane from the recharge of urban stormwater into oxygen-depleted subsurface aquifers and low biodiversity retention ponds is quantified. This quantification emphasizes the relevance of archaea to climate change and greenhouse gas emissions, and points to the possible use of archaea for carbon sequestration and reductions in industrial carbon dioxide emissions.

Visualizing Benthic Macroinvertebrate Community Structures in the Sierra Foothills

Emma Walker, Sierra Streams Institute

From its headwaters in the Sierra Nevada foothills, Deer Creek winds 34 miles downstream before joining with the Yuba River and eventually flowing to the San Francisco Bay. Since 2001, Sierra Streams Institute's bioassessment program has engaged community science volunteers in monitoring the ecological health of this watershed.

Between 2001 and 2015, field crews collected samples of BMI from fourteen sites spread throughout the watershed, following SWAMP's reach wide benthos protocol. Samples were collected during peak flow and base flow conditions and identified to the family level by volunteers. Using this long-term dataset, we analyzed changes in community composition over time, in response to drought, and along the watershed elevation gradient. Community change was assessed using the total percentage of EPT, the relative diversity of EPT taxa, and the relative abundance of functional feeding groups.

It can be challenging to present large amounts of nuanced data in an easily understandable way. Here, we will use a variety of different data visualization tools to make our results accessible and digestible to our community members, as well as the greater scientific community. By making our results interesting and engaging, we can give back to the community that contributed to them.

Understanding the Associations between Flows and Riverine Birds to Inform the Restoration of Effluent-influenced Streams in Coastal Southern California

Melissa von Mayrhauser, University of California, Berkeley

Could treated wastewater (effluent) be a restoration tool in water-stressed streams? Portions of the Los Angeles and Santa Clara Rivers now flow perennially due to effluent discharges and urban runoff. However, water managers are preparing to expand wastewater recycling to address water supply needs, with uncertain consequences for riverine food webs. We designed a study to explore the roles of effluent and runoff in shaping communities of aquatic and riparian invertebrates, vegetation, and birds. In this presentation, we will focus on seasonal bird data that we have collected at 14 L.A. River and Santa Clara River sites since June 2022. So far, during 168 point counts we have detected 135 total species. We are characterizing the relationship between changing flows and bird richness, abundance, and composition (from taxonomic and functional trait perspectives). We predict that effluent increases the abundance and diversity of riverine birds via the provision of food and higher habitat diversity. We also predict reduced diversity baselines in the L.A. River compared to the Santa Clara River owing to

more extensive watershed modifications. Ultimately, this study will show effluent's potential and limitations to shape stream food webs and support biodiversity.

Session 4

A National Strategy for Environmental DNA

Susanna Theroux, Southern California Coastal Water Research Project

Environmental DNA (eDNA) methods are growing increasingly popular in monitoring programs across California and the US. However, a lack of universal protocols and best practices has resulted in a fragmented landscape of collection and analytical methods. This lack of coordination has limited the comparability of data between agencies and reduces our ability to make inferences across greater spatial and temporal scales. The lack of standardized methods has also been credited as being an impediment to the adoption of eDNA methods for informing management actions in regulatory programs. In order to overcome these silos and enhance coordination among federal agencies, the White House Office of Science Technology Policy (OSTP) has directed a newly formed eDNA Task Team to draft a National Strategy for eDNA. This National Strategy will identify key research priorities for eDNA method development and the technological and programmatic resources necessary to implement eDNA methods for routine monitoring. This presentation will review the key elements of the National Strategy, discuss how research in California is informing the development of the Strategy, and the anticipated opportunities that the Strategy can create for regional monitoring programs.

Harmonizing eDNA Practices for Effective Aquatic Species Monitoring and Resource Management

Gregory Schumer, Genidaqs/Cramer Fish Sciences

The ongoing drought in the Western United States has taken a severe toll on the endemic Chinook salmon (O. tshawytscha) and Steelhead/Rainbow Trout (O. mykiss), leading to acute and chronic stress levels. To carefully monitor the adverse impacts of rapidly fluctuating ecosystems on the distribution of salmonids, an effective technique for data collection is required. Systematic sampling for environmental DNA (eDNA) coupled with species-specific quantitative PCR (qPCR) analyses presents an ideal way to survey species distribution across large systems, especially when shorter or no permitting processes and rapid deployment are crucial. Since eDNA sampling does not affect the target species, extensive permits and licenses are not required. However, to ensure maximum efficiency with a limited sampling timeframe, prior experience with a study location is recommended. In situations where prior knowledge is insufficient, tools such as the publicly available artemis modeling framework can be used to

optimize the sampling design within days. By utilizing artemis and positive control experiments, we were able to calibrate our eDNA sampling strategy in advance of actual sampling. Our optimized sampling strategy entailed collecting 3 liters of water, through 3 filters, at 1 km intervals, and analyzing each filter 9 times for the presence of eDNA from both O. tshawytscha and O. mykiss. When we applied this sampling approach over a 22km study area on the Lower American River in Northern California, we discovered a higher concentration of O. tshawytscha eDNA compared to that of O. mykiss eDNA. Overall, the combination of artemis modeling and live car experiments provides a systematic way to calibrate and optimize eDNA sampling strategies, allowing for early identification of target species and better conservation outcomes.

Mapping Molecules: Advancing Marine Biomonitoring in the Era of Climate Change Through eDNA

Nastassia Patin, California Cooperative Oceanic Fisheries Investigations, Scripps Institution of Oceanography, University of California, San Diego; Southern California Coastal Water Research Project

Environmental DNA (eDNA) is a powerful tool for efficient, accurate, and scalable marine biomonitoring. eDNA from a single water filter can provide valuable data on microbial, plankton, invertebrate, and fish communities, including taxa that are often overlooked using traditional methods. At the California Cooperative Oceanic Fisheries Investigations (CalCOFI), we are leveraging eDNA approaches to expand and complement existing biodiversity surveys. Our research efforts include optimizing sampling and processing methods to target ecologically important taxa, including marine mammals. Moreover, we are working with our partners at SCCWRP on the harmonization of eDNA data products to better compare and integrate results from CalCOFI and the Bight Program. These efforts extend to our partners in the West Coast Ocean Biomolecular Observation Network (WC-OBON), a network of biomonitoring programs all along the west coast of North America. This data integration will enable us to detect spatially and temporally resolved patterns of biodiversity and thereby better understand ecosystem responses to climatic and oceanographic perturbations, including marine heat waves and ocean acidification.

Implementation of Routine eDNA Monitoring Within California Department of Water Resources

Sarah Stinson, California Department of Water Resources

The California Department of Water Resources (DWR) supports the development and use of cutting-edge technologies to study and monitor potential impacts of water operations to the San Francisco Bay Delta ecosystem. DWR has developed an Environmental DNA (eDNA) Strategy to act as a roadmap for operationalizing eDNA technologies to support sustainable management of water resources in California. This eDNA Strategy establishes five goals that are critical steps that will harmonize internal and external eDNA efforts, establish best practices for eDNA methods, integrate eDNA data into management decision making, and create meaningful engagement with the community. The newly established DWR Genetic Monitoring (GeM) program will participate in implementing the goals set forth in the Strategy and has commenced eDNA work on several projects. GeM projects (in collaboration with outside entities) support the overarching goal of efficiently meeting conditions in the 2019 U.S. Fish and Wildlife Service Biological Opinion and the 2020 California Department of Fish and Wildlife Incidental Take Permit for long-term operation of the State Water Project. In this presentation, we will provide an overview of the eDNA Strategy goals that will assist DWR in approaching routine eDNA monitoring and highlight several ongoing eDNA projects. Project highlights include: Harmful Algal Bloom (HAB) pilot studies, monitoring of listed fish species at Barker's Slough Pumping Plant, eDNA/eRNA monitoring for dreissenid mussels and nutria, and larval smelt entrainment monitoring efforts at water export facilities.

Presenter Index

Charleton, Ellery; California State University, Monterey Bay

I am a Senior at Cal State Monterey Bay(CSUMB) and have worked in the Watershed Environment Ecology lab(WEE) for 2 years and the Geomorphology lab for 1 year. I enjoy fieldwork and data collection the most but hope to develop my analytical and writing skills through my final capstone project. I plan on graduating from CSUMB with research experience and a BS that will allow me to enter the workforce. After receiving my bachelor's, I will narrow my interests and continue to advocate for the environment throughout my professional career. Eventually, I will plan on attending grad school after a few years to progress in my career.

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.

Huie, Stephen; Central Valley Regional Water Quality Control Board

Stephen Huie is an environmental scientist from the Central Valley Regional Water Quality Control Board. He received his B.S. in Marine Science from Cal Poly San Luis Obispo and shortly joined the Waterboards. His focus is on eutrophication and HABs in lakes and reservoirs. He has worked on the consolidation of CA public datasets to produce a lakes inventory to be used in the development of a bioassessment framework for lakes and reservoirs for the Central Valley Region. His goal is to assess the risk of eutrophication and HABs within Central Valley lakes and help determine future sampling priorities.

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.

Juarez, Jonathan; California State University, Bakersfield

Jonathan is a first-generation graduate who received his B.S. in Biology from CSU Bakersfield in 2022. He is currently pursuing his M.S. in Biology at CSU Bakersfield. His graduate research is focused on leaf decomposition of native and invasive species in aquatic ecosystems and their impacts on macroinvertebrate communities. After graduation, he plans to pursue a career at a government agency in monitoring aquatic and riparian ecosystems. In his free time, he enjoys fishing and playing tabletop games with friends.

Mayrhauser, Melissa von; University of California Berkeley

Melissa von Mayrhauser is a freshwater ecology PhD candidate in the Department of Environmental Science, Policy, and Management at UC Berkeley. She is researching the meaning of changing flows for ecosystems and people along the Los Angeles River and Santa Clara River in Southern California. She is also mentoring undergraduates on their senior theses and laboratory protocols. Prior to starting her doctoral research, she worked as the Watershed Programs Manager at Los Angeles Waterkeeper. She has a master's degree in Water Science, Policy, and Management. Please feel free to connect with her at mvonmayrhauser@berkeley.edu.

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.

Nilson, Carly; State Water Resources Control Board

Carly Nilson works as a senior environmental scientist managing the Freshwater and Estuarine Harmful Algal Bloom (FHAB) Program at the State Water Board. She coordinates with the nine different Regional Water Boards, counties, and waterbody managers across the state for harmful algal bloom (HABs) incident response and ensures this information is rapidly available to the public. She helps facilitate special studies, partner monitoring programs, and education and outreach. She manages contracts to expand the knowledge of HABs, including incorporating remote sensing and convening technical advisory committees to improve the understanding and management of HABs across the state.

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.

Patin, Nastassia; California Cooperative Oceanic Fisheries Investigations, Scripps Institution of Oceanography, University of California, San Diego; Southern California Coastal Water Research Project

Nastassia Patin is the Molecular Ecology Program Coordinator for the California Cooperative Oceanic Fisheries Investigations (CalCOFI). In this role, she is leading efforts to establish environmental DNA sampling and analysis in marine biodiversity surveys along the entire West Coast of North America as part of the West Coast Ocean Biomolecular Observing Network (WC-OBON). Nastassia's background is in marine microbiomes and includes extensive field experience collecting eDNA at sea, as well as developing bioinformatic tools to analyze eDNA data. She got her B.S. at Stanford University, M.S. at San Francisco State University, and Ph.D. at the Scripps Institution of Oceanography.

Rajen, Gaurav; Santa Ana Regional Water Quality Control Board

Dr. Gaurav Rajen has a doctorate in mechanical engineering from the University of Delaware

with a specialization in thermal-fluid sciences. He has over thirty years of experience with national laboratories, state and tribal governments and the oil and gas industry. He has numerous publications in conference proceedings, book chapters and journals, dealing with subsurface heat and mass transfer, waste management, environmental monitoring, modeling the role of thermal convection and amines in the early evolution of life and archaea. His current research is focused on stormwater management and greenhouse gas emissions reductions including conversion of carbon dioxide to fuels.

Rastegarpour, Shuka; State Water Resources Control Board

Shuka Rastegarpour is an Environmental Scientist at the State Water Resources Control Board. She received her Bachelor of Science degree in Environmental Studies at California State University, Sacramento. She has 10 + years of experience at the State Board collectively working on ocean water quality policy, stormwater permitting, and currently lead coordinator of the Statewide Bioassessment Monitoring Program.

Rawlins, Ashley; California State University, Monterey Bay

Ashley Rawlins is an undergraduate student at California State University, Monterey Bay majoring in Biology (Ecology, Evolution, and Organismal Biology) with a minor in Environmental Science. Ashley is fascinated by parasitism and invasive species ecology- two niche subjects that don't intersect often, but highlight most of her research. Aside from these topics, she is also highly interested in the effects of climate change on threatened populations and fragile ecosystems; studies of which she hopes to have the opportunity to delve into with her future research.

Reisinger, AJ; University of Florida

Dr. Alexander J. ("AJ") Reisinger is an assistant professor and state extension specialist for urban soil and water quality in the Department of Soil, Water, and Ecosystem Sciences at the University of Florida. He is an urban ecosystem ecologist and biogeochemist focused on how human activities on the landscape affect export of pollutants to aquatic ecosystems, and how these aquatic ecosystems respond to pollutants. In particular, AJ focuses on nitrogen and phosphorus cycling as well as the effects of pharmaceuticals and personal care products in aquatic ecosystems. AJ received a BS in Environmental Sciences from the University of Notre Dame, an MS in Biology from Kansas State University, and a PhD in Biology from the University of Notre Dame. He has been at UF since August 2017, where his current extension and research programs focus on biogeochemical

dynamics of urban watersheds, including the effects of residential landscape management on nutrient leaching and runoff, nutrient cycling and algal dynamics of stormwater ponds, and nutrient and energy dynamics of urban streams.

Schumer, Gregory; Genidaqs/Cramer Fish Sciences

Gregg Schumer, with 20+ years of experience in molecular biology, has transitioned from human pathogens and vaccine production to molecular ecology, fisheries genetics, and eDNA detection of cryptic aquatic species. Leading the Genidaqs lab at Cramer Fish Sciences, he transferred these technologies to ecology projects for state and federal agencies, water districts, and consulting firms, focusing on cryptic, threatened, invasive, and endangered species. Gregg and the Genidaqs team develop eDNA protocols and methods, culminating in the creation of artemis, an R tool for custom eDNA study design and data analysis.

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.

Stinson, Sarah; California Department of Water Resources

Sarah Stinson is an Environmental Scientist with the CA Department of Water Resources Collaborative Ecological Studies unit. Sarah earned her Ph.D. in Ecology in 2021 at the University of California at Davis, co-advised by Drs. Richard Connon and Sharon Lawler. Her Ph.D. research focused on how environmental stressors, such as pesticides, affect the gene expression, behavior and distribution of freshwater invertebrate and fish species. In her current position at DWR, she primarily works in the Genetic Monitoring lab using molecular tools to protect at-risk aquatic species. She is also interested in citizen science, community outreach and teaching, to make science accessible to everyone. In addition to her scientific pursuits, she was also a professional dancer for 15 years and currently teaches dance classes in Sacramento, CA.

Tang, Michelle; State Water Resources Control Board

Michelle Tang is an Environmental Scientist in the Office of Information Management and Analysis at the State Water Resources Control Board. She has been working at the State Water Board for over ten years and specializes in web development and GIS. Her current work focuses on developing tools and resources to make data more accessible and usable for all. Michelle completed her bachelor's degree in Geography from the University of California, Berkeley.

Theroux, Susanna; Southern California Coastal Research Project

Susie Theroux is an ecologist at SCCWRP, where she works on algal bioassessment and the use of molecular methods in biomonitoring. She is also the lead for the California Molecular Methods Workgroup.

Walker, Emma; Sierra Streams Institute

Emma grew up in Chicago, Illinois. She received a BS from the University of Miami with a double major in Biology and Ecosystem Science and Policy. Emma first began working for Sierra Streams Institute as an AmeriCorps member, assisting the organization's community science water quality monitoring program. After completing a year of service, she continued on to manage the Benthic Macroinvertebrate lab. When she is not wading through streams, Emma enjoys hiking, painting and reading.

Wolf, Skyler; California State University, Monterey Bay