October 10–11, 2017

13th Biennial State of the San Francisco Estuary Conference

www.sfestuary.org/soe

Oral Abstracts

October 10-11,

2017

Abstracts for oral sessions presented at the 2017 State of the San Francisco Estuary Conference are compiled in this document. Abstracts are listed by Session Topic in order by day. Names of presenting authors are underlined.

Contents

Day One Plenary Session

Amy Hutzel, Have Fun Storming the Castle: Working Together for a Healthy Estuary Today 1

Mary Ellen Hannibal, Ways of Seeing, Tales to Tell: John Steinbeck, Ed Ricketts, and "The Bay as It Is" 2

Philip Williams**,** Restoration Lessons from the Past: 'It's Going to be Harder Than You Think' 3

Paul Souza**,** Investing in California's Conservation Future: Science, Balance, Action, and Results 5

Outstanding Environmental Awards

Alexis Strauss**,** Outstanding Environmental Awards 7

Leaders on Protecting the San Francisco Estuary

Greg Dalton**,** Leaders on Protecting the San Francisco Estuary 8

Estuary Legacy Award

Greg Dalton**,** Leaders on Protecting the San Francisco Estuary 12

A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Cheryl Strong, A Decade of Adaptive Management: South Bay Salt Pond Restoration Project .. 13

Maureen Downing-Kunz, Sediment: The Macro and Micro of Patterns in the South Bay 14

Darell Slotton, Mercury: Physical and Biological Insights 15

Karine Tokatlian, Snowy Plovers: Doing More with Less? 16

John Bourgeois, South Bay Salt Pond Restoration Project: How are We Doing and Where are We Going? 17

The Future of Restoration: The Low-Hanging Fruit is Gone!

Beth Huning, The Future of Restoration - The Low Hanging Fruit is Gone! 18

David Thomson, Finding Opportunities at the Estuary's Margin 19

Lisamarie Windham-Myers, Restoration Aspects of Carbon and Subsidence Reversal 21

Julian Meisler, Coping with Barriers to Marsh Restoration 23

Delta Restoration Planning: Integrating Multiple Objectives and Providing for Local Engagement

J. Letitia Grenier, A Delta Renewed: A Guide to Science-Based Ecological Restoration in the Delta 24

Jessica Law, The Delta Plan: Protect, Restore, and Enhance the Delta Ecosystem 26

Christina Sloop, Delta Conservation Framework: Building Community and Integrated Practices for Delta Conservation 27

Campbell Ingram, Regional Restoration and Agricultural Sustainability Planning: Informing Best Ecological Outcomes with Least Impact to Land Uses 28

Enhancing Urban Biodiversity in an Increasingly Urbanized World

Robin Grossinger, Enhancing Biodiversity in an Increasingly Urban World 29

Erica Spotswood, Re-Oaking Silicon Valley: A Science Strategy for Re-Establishing Ecological Functions. 30

Michael Boland, Managing Among the Masses: Preserving Biodiversity in America's Most Heavily Visited National Park 32

Nicole Heller, Linking Open Space and Urban Biodiversity Planning 33

Suisun Bay and Marsh: Where the Delta Meets the Bay

Stuart Siegel, Suisun Marsh: California's Largest Marsh and Its Connection to Suisun Bay 34

Barbara Baginska, Are Fish Kills a Thing of the Past? Improving Dissolved Oxygen in Suisun Marsh 35

Denise Colombano, Juvenile Fish Nurseries in Emergent Tidal Marshes of Suisun Marsh 36

Jay Davis, Selenium in Suisun Bay – Tracking Change Post-TMDL 37

Progress and Challenges in Tackling Pesticides in the Estuary

Jan O'Hara, Progress and Challenges in Tackling Pesticides in the Estuary:

Session Overview 38

Rebecca Sutton, Identifying an Unexpected Source of Urban Pesticide Pollution: Pet Flea Control Products 39

Jennifer Teerlink, Protecting Surface Water from Pesticide Related Toxicity: Science Driven Prevention and Response 40

Danny McClure, Efforts to Reduce Pesticide Related Toxicity in the Delta and Its Tributaries in the Central Valley 41

Resilience through Social Equity: Planning Approaches for Climate Equity, Inclusion and Healthy Watersheds

Colin Bailey, Environmental Justice as Resilience: Water, Climate, People and Place..... 42

Community-Based Participatory Research

Jonathan London, Community-University Research Partnerships for Environmental Justice..... 44

Catalina Garzón-Galvis Community Environmental Monitoring as a Tool to Address Health Disparities 45

Margaret Gordon, How the West Oakland Environmental Indicators Project Got Involved with Citizen Science 47

Day Two Plenary Session

Grant Davis, Managing in an Era of Increasing Variability: Building Resiliency into our Social, Political and Eco Systems..... 49

Steven Moore, Policy Recipe for Water Reliability and Resiliency in California: What are the Ingredients? 50

Steve Ritchie, Infrastructure Stability in Increasingly Unstable Times..... 52

Jean Auer Award

Carl Wilcox, Jean Auer Award..... 53

The New Wave of Climate Resilience

Henk Ovink, Water – By Design – As Leverage for Transformative Impact 54

Henk Ovink, What Will the Next Wave of “Resiliency” Look Like? 55

Species Response to Restoration and Environmental Change

Joy Albertson, Species Response to Habitat Restoration and Management in San Francisco Bay 58

Josh Ackerman, Waterbird Nesting Ecology and Management in San Francisco Bay 59

Michelle Orr, Evaluating Tidal Wetland Restoration: 20 years of Physical and Biological Monitoring at the Sonoma Baylands Restoration 60

Julian Wood, Ridgway’s Rail Response to Adaptive Tidal Marsh Restoration 62

Lenny Grimaldo, Evaluating Tidal Marsh Benefits through the (Fish) Eye of the Beholder: Understanding How Fish Communities Respond to Wet and Dry Periods in the Upper Estuary 63

John Takekawa, Does Loss of Estuary Surf Scoters Indicate Declining Subtidal Habitats? 64

William Keener, Humpback Whales Foraging in San Francisco Bay 65

Science Innovations for Sea Level Rise Adaptation

Julie Beagle, Natural Breaks: A New Framework for Place-Based Sea Level Rise Adaptation in SF Bay 66

Katharyn Boyer, Adapting Tidal Marshes for Climate Change: Coarse Material Placement and High Tide Refuge Enhancement for Wildlife 68

Roger Leventhal, The Beneficial Reuse of Dredged Sediments to Construct Ecotone Levees: Challenges and Results from Lower Novato Creek 70

Heidi Nutters, Community-Based Visioning For Resilience in Richmond 71

San Francisco Bay Sediment – Bringing Clarity to a Turbid Topic

David Schoellhamer, Sediment Supply to San Francisco Bay: Today and Into the Future 72

Scott Dusterhoff, Sediment Savvy: Developing a Sediment Strategy for Bayland Resilience 73

Brenda Goeden, Managing Mud, A Valuable San Francisco Bay Natural Resource 75

Maximizing the Benefits of Green Stormwater Infrastructure

Joshua Bradt, Maximizing the Benefits of Green Stormwater Infrastructure 76

Jill Bicknell, Municipal Green Stormwater Infrastructure Planning Overview 77

Rosey Jencks, The Watershed Planning Game: Engaging Community Members in Assessing Infrastructure Tradeoffs 78

Nahal Ghoghaie, Environmental Justice Benefits and Consequences 79

Brent Bucknum, Urban Infrastructure Innovations for Environmental Health 80

Managing Trash Impacts in the SF Estuary

Napp Fukuda, Stormwater Trash Reduction Success Stories and Remaining Challenges 81

Chris Sommers, A New Trash Monitoring Program for Bay Area Receiving Waters 83

Tony Hale, Developing Trash Monitoring Methods for California 84

The Future of the California Bay-Delta Estuary Science Enterprise

Jessica Law, The Future of the San Francisco Bay-Delta Science Enterprise: How Can Science Best Inform Policy-Makers and Long-Term Planning Efforts? 86

Hope or Hype: How does Onsite Water Reuse Fit into the Future of the San Francisco Estuary?

Heather Cooley, Hope or Hype: How does Onsite Water Reuse Fit into the Future of the San Francisco Estuary? 90

Have Fun Storming the Castle: Working Together for a Healthy Estuary Today

Amy Hutzel, Deputy Executive Officer, State Coastal Conservancy

The Comprehensive Conservation and Management Plan for the San Francisco Estuary was released in 2016 and lays out an action-oriented blueprint of tasks and milestones for restoring the Estuary's chemical, physical, and biological processes to health. Over 80 organizations and agencies are responsible for implementing the 32 actions in this Estuary Blueprint. All of us have a role to play and there is an existential urgency to our collaborative efforts. Have fun storming the castle!

Session Title: Day One Plenary Session

Speaker Biography: Amy Hutzel is a Deputy Executive Officer at the State Coastal Conservancy, which works to protect open space, increase public access and recreation, and restore wildlife habitats along the California Coast and in the Bay Area. She worked in the San Francisco Bay Area Program of the State Coastal Conservancy for 15 years, on such projects as the Hamilton Restoration, Napa River Salt Marsh and the South Bay Salt Ponds. She is the current chair of the San Francisco Estuary Partnership and vice-chair of Resilient by Design. She has a bachelor degree in urban and environmental planning from the University of Virginia. She worked as an educator at the San Francisco Bay National Wildlife Refuge, Kilauea Point National Wildlife Refuge, and Save The Bay prior to joining the Coastal Conservancy.

Ways of Seeing, Tales to Tell: John Steinbeck, Ed Ricketts, and "The Bay as It Is"

Mary Ellen Hannibal, Author, "Citizen Scientist: Searching for Heroes and Hope in an Age of Extinction" and "The Spine of the Continent"

With World War II cracking on the horizon, and amidst fame and fury swirling around the publication of The Grapes of Wrath, in 1940 John Steinbeck declared he was through with writing fiction. Science, he declared, is the "new thinking." "I'm going back to these things which are relatively more lasting to find a new basic picture," he said, and set out to write a book about San Francisco Bay. Steinbeck's partner in this endeavor was his great friend Ed Ricketts, a marine biologist -- without a degree – a citizen scientist! With Jack Calvin, Ricketts had recently published Between Pacific Tides. This holistic guide to the intertidal was revolutionary, since it oriented the reader to species according to where they live – the customary practice was to organize species by phylogeny, or body type, an evolutionary framework with no reference to ecology. Ricketts emphasized biological "holism" and throughout his life sought to comprehend what he called "the toto picture." Steinbeck and Ricketts did not write a book about the bay, but they did produce Sea of Cortez, a meditation and expedition journal that wrestles with comprehending human systems of thought and natural systems as one. On multiple expeditions throughout his life, Ricketts contributed specimens to museums that today help us to get a toto picture of nature "as it is." Citizen scientists who make observations today are helping to pay Steinbeck and Ricketts forward, hugely expanding our comprehension of species occurrences over space and time. Today's monitoring efforts make possible a scope Steinbeck anticipated and strove after. "We wanted to see everything our eyes would accommodate," he wrote, "to think what we could, and, out of our seeing and thinking, to build some kind of structure in modeled imitation of the observed reality." As we struggle today to create a vision for the bay that is integrative and inspiring, Steinbeck and Ricketts help set our course.

Session Title: Day One Plenary Session

Speaker Biography: Mary Ellen Hannibal is an author and avid citizen scientist from the Bay Area. Her work focuses on science, culture, and the important connections between people, species, and ecosystems. Her most recent book, Citizen Scientist: Searching for Heroes and Hope in an Age of Extinction, was named one of the best titles of 2016 by the San Francisco Chronicle and receive a Nautilus Book Award for ecology and the environment. Reporting deeply, Hannibal digs into the origins of today's tech-savvy citizen science movement – tracing it back through centuries of amateur observations by writers and naturalists. Prompted by her novelist father's sudden death, she connects the activity of bearing witness to nature today with a broad inquiry into time, place, and purpose. Hannibal's previous books include The Spine of the Continent, about which Publisher's Weekly said, "This is what science writing should be: fascinating and true." Her work has appeared in The New York Times, Esquire, Nautilus, and many other publications**.**

Restoration Lessons from the Past: 'It's Going to be Harder Than You Think'

Philip Williams, Past-President, Philip Williams Associates

The 1980's and 90's were formative years in the development of new ideas in the evolving practice of restoration and environmental management. Twenty years on, after several large restoration projects have been implemented within the estuary, the validity of these ideas has been tested. Two key lessons are now embedded in the new CCMP and Goals update report. These are: We need to be managing for the landscape of the future instead of recreating the past; and that we understand the estuary is a single dynamic evolving hydro-geomorphic entity whose future structure and processes will be driven by accelerating sea level rise, changing fresh water flows, and reduced sediment availability. This means the conditions in which we designed and implemented restoration projects in the past will only rarely apply in the future, requiring that resilience and flexibility in design assume a much greater importance. Specifically: 1. In planning for sea level rise [SLR] we need to consider the implications of uncertainty in the rate of rise as well as uncertainty in the extent of rise in 2100. This means shifting our perspective from that of the pure scientist to that of applied scientist and manager who takes responsibility for decisions based on the asymmetric consequences of underestimation of SLR rates. 2. We need to take into account the system wide impacts of SLR rates of rise on the morphology and hydrodynamics of the whole estuary instead of examining it piecemeal or assuming the shape and flows of the estuary will be unchanged. One important impact of bathymetric change is on sediment dynamics within the estuary. We will need to anticipate how suspended sediment concentration [SSC] in tidal water will be reduced due to changes in sediment dynamics, likely a more important factor than reductions in SSC due to changes in sediment budget. 3. The implications for future restoration design in the future will likely include: a shift from 'evolutionary' to 'creationist' conceptual models recognizing the future paucity of sediment; an imperative for restoration of tidal processes in subsided sites now rather than deferred in favor of managed wetlands; actions to enhance SSC by restoring erodible shorelines and mudflats; priority given to wetland restoration sites in sediment rich parts of the estuary, like the far South Bay; a shift in priority to restoration sites up-estuary in response to migration inland of the salinity field; and planning for rapid SLR scenarios that attempts to mitigate loss of ecologic functions of existing wetlands through restoration in more resilient locations and by providing inputs from restored floodplains.

Session Title: Day One Plenary Session

Speaker Biography: Before he retired 5 years ago Phil Williams was formerly president of Philip Williams and Associates, Consultants in Hydrology [PWA] which he founded in 1976 in San Francisco and merged with Environmental Science Associates [ESA] in 2010. PWA pioneered the integration of environmental planning into what was then traditional river and coastal engineering practice, and played a leading role in planning and design of major estuarine wetland and river restoration projects in California from Tijuana to Humboldt Bay. Within the SF Bay Estuary, during its 34 year history, PWA's clients have included BCDC, the State Coastal Conservancy, US Army Corps of Engineers, California Department of Fish and Wildlife, the Bay Institute and Save the Bay. Phil has directed projects such as the Warm Springs Marsh

restoration [1986], Napa Flood Protection Project 'Living River' plan [1994], Sonoma Baylands restoration [1996], Crissy Field wetlands design [1998], and the first stages of the South Bay Salt Pond Restoration planning in 2004. In 1985 Phil conducted the first San Francisco Bay sea level rise study for BCDC; in 1986 he was the first to present evidence for the use of the X2 salinity objective in the State Water Resources Control Board's D1485 hearing; in partnership with Phyllis Faber conducted the first long term monitoring of restoration projects in SF Bay that provided the basis of the WRMP Design Guidelines report [2003]; and played a significant role in interdisciplinary research of wetland restoration in the Delta, through the University of Washington's BREACH studies [2000].

Phil Williams has a Ph.D. in sediment hydraulics from University College London and is a registered engineer in California and the European Union. He was also founder and first president of the International Rivers Network headquartered in Berkeley.

Investing in California's Conservation Future: Science, Balance, Action, and Results

Paul Souza, Pacific Southwest Regional Director, U.S. Fish and Wildlife Service

The mission of the U.S. Fish and Wildlife Service is to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. We play an integral role in protecting a healthy environment for both people and the fish and wildlife that we are entrusted to protect, including migratory birds, endangered species, freshwater and anadromous fish, and certain marine mammals. Here in the Pacific Southwest Region, which encompasses California, Nevada, and Oregon's Klamath Basin, we manage 48 National Wildlife Refuges and 11 National Fish Hatcheries, including several here in the San Francisco Estuary that supports a number of threatened and endangered species and provide essential habitat for a majority of the Pacific Flyway's migratory waterfowl populations. But we can't accomplish our mission alone and must recognize the power of conservation partnerships. The most significant conservation challenges of our time— sea level rise, large scale habitat loss, drought, and invasive species, to name a few—are not solved by any one person or agency. They are instead solved by broad coalitions that choose to set their differences aside and focus on common ground. We are at our best when we're not constrained by our individual responsibilities and jurisdictions, but instead when we focus on working collectively on the greatest conservation priorities. This presentation will highlight several ways that the Fish and Wildlife Service is helping to facilitate and promote restoration and recovery projects in the San Francisco Estuary, including streamlined consultation, technical assistance, science support, broad partnerships, assurances, and follow through.

Session Title: Day One Plenary Session

Speaker Biography: Paul Souza is the Regional Director for U.S. Fish and Wildlife Service in the Pacific Southwest. The Pacific Southwest Region includes California, Nevada, and the Klamath Basin. The Region is responsible for managing 48 National Wildlife Refuges comprising more than 2.8 million acres. It also includes three Wildlife Management Areas in California, encompassing more than 104,000 acres; three National Fish Hatcheries and one Fish Health Center; and 11 Fish and Wildlife Offices. The Pacific Southwest has nearly 300 threatened and endangered species on the road to recovery.

Prior to his current role, Paul served as the Assistant Director for Science Applications. Paul provided leadership on science policy and scientific applications in resource management. This included leading agency efforts shape a science-driven landscape conservation business model; expanding Service capacities to acquire, apply and communicate scientific information; promoting active involvement of the Service and its employees in the larger scientific community; strengthening and expanding partnerships between the Service and other scientific organizations; and cultivating the next generation of Service scientists.

Paul also previously served as the Deputy Assistant Director for the Service's Ecological Services Program in headquarters. In this capacity, he provided national leadership for the Endangered Species Act, Marine Mammal Protection Act, Fish and Wildlife Coordination Act, Clean Water Act, and many other statutes. Paul worked closely with agencies and other partners

to leverage resources that benefit wildlife conservation and other important needs such as farming and ranching, military readiness, and energy and infrastructure development. Before coming to headquarters, Paul was the Field Supervisor for the South Florida Ecological Services Office in Vero Beach, Florida. In this capacity, Paul oversaw actions to conserve and recover 67 species listed under the Endangered Species Act and protect a host of important habitats for migratory birds, fish, and other wildlife. Paul also helped oversee the Service's efforts to restore America's Everglades with many partners, planning and implementing projects to improve the health of the environment and conditions for imperiled species such as the Florida panther, wood stork, and snail kite.

Paul joined the Fish and Wildlife Service in 1997 as a Presidential Management Fellow. He has a bachelor's degree in environmental studies with an emphasis in ecology from the University of California at Santa Barbara and a master's degree in urban and regional planning with an emphasis in environmental planning and natural resources management from Florida State University. Paul and his wife Dana have a 12 year old son named Garret and 10 year old daughter named Maddie.

Outstanding Environmental Awards

Alexis Strauss, Acting Regional Administrator, EPA Pacific Southwest Region 9

Award Title: Outstanding Environmental Awards

Presenter Biography: Alexis is the Acting Regional Administrator of EPA's Pacific Southwest Region (Region 9), based in San Francisco. She oversees a regional staff charged with implementation and enforcement of federal environmental laws in Arizona, California, Hawaii, Nevada, the Pacific Islands, and 148 tribal nations. From 1994 to 2012, she served as the Director of the Water Division in Region 9, leading implementation of the Clean Water Act, Safe Drinking Water Act, and other statutes. Earlier in her career at EPA, she worked in the Superfund and Hazardous Waste programs. In 2008, Alexis received the Presidential Rank Award.

Leaders on Protecting the San Francisco Estuary

Greg Dalton, Moderator, Climate One
John Laird, California Secretary for Natural Resources
Bob Wieckowski, California Senator, District 10
Rob Bonta, California Assemblymember, District 18
Dave Pine, Supervisor, County of San Mateo

In the San Francisco Bay-Delta Estuary, local efforts are dramatically increasing to address Bay health and sea level rise. Simultaneously, state policy makers are reviewing and updating major decisions on flows and other matters affecting the Estuary, while Congress is debating how severely to cut EPA and other programs that are the foundation for Estuary planning and stewardship. Given these significant ramifications for the future of the Estuary, this panel will address a central question: "How will local and state government help the management and protection of the San Francisco Estuary and the resilience of shoreline communities in the face of climate change?" Greg Dalton, Executive Producer and host of Climate One, will moderate this panel of state administrators, legislators, and local elected officials.

Session Title: Leaders on Protecting the San Francisco Estuary

Speaker Biographies:

Greg Dalton: Greg Dalton is Executive Producer and Host of Climate One. Greg founded Climate One at The Commonwealth Club in 2007 after traveling to Alaska and the Russian Arctic on a global warming symposium. Today Climate One produces a show on NPR Now on SiriusXM and other public radio stations around the country. It also produces a monthly TV talk show on KRCB TV 22 on Comcast and DirecTV in the San Francisco Bay Area.

Climate One's approach rejects the inflammatory rhetoric of the 24-hour news cycle and changes the conversation for good. Our discussions promote understanding, expand common ground, and point us toward a clean and prosperous future.

Past guests include US Secretary of State George Shultz, former CIA Director Jim Woolsey, Texas Governor Rick Perry, US Secretary of State Hillary Clinton, Governor Arnold Schwarzenegger, US Secretary of Interior Sally Jewell, US EPA Administrator Lisa Jackson, and IPCC Chair Rajendra Pachauri. Business executives who have been on the Climate One radio show include Google CEO Eric Schmidt, Chevron CEO Dave O'Reilly, GM Chairman Dan Akerson, and Ford Motor Co. Chairman Bill Ford.

Greg previously was a journalist for 12 years covering news in Beijing, Vancouver, New York and San Francisco for the Associated Press, South China Morning Post, McNeil-Lehrer News Hour, and Industry Standard magazine. He holds a master's degree in international affairs from Columbia University and a bachelor's in politics from Occidental College. He speaks rusty Mandarin and "kitchen Cantonese."

Secretary John Laird: John Laird was appointed California Secretary for Natural Resources by Governor Jerry Brown on Jan. 5, 2011. He has spent nearly 40 years in public service, including 23 years as an elected official.

The son of teachers and raised in Vallejo, Laird graduated with honors in politics from the University of California Santa Cruz in 1972. In 1981, Laird was elected to the Santa Cruz City Council, and served nine years until term limits ended his council service in 1990. He was a two-term mayor from 1983 to 1984 and from 1987 to 1988. During his local government service, he served as a board member for local transit, transportation, water planning, and regional government agencies.

In 2002, Laird was elected to represent the 27th Assembly District in the California Assembly, which includes portions of Santa Cruz, Monterey and Santa Clara Counties. He was re-elected in 2004 and again in 2006. While serving the maximum three terms in the Assembly, Laird authored 82 bills that were signed into law. These bills established the landmark Sierra Nevada Conservancy, restored community college health services, expanded and clarified state civil rights protections, reformed the state mandates system, and significantly expanded water conservation.

Laird was a member of the State Integrated Waste Management Board from 2008 to 2009 and taught state environmental policy at University of California Santa Cruz.

Continuing his public service as California's Secretary of Natural Resources, Laird has made climate change adaptation, water conservation and supply reliability, enhanced relationships with tribal governments, State Parks access, farmland conservation, and oceans sustainability among other issues top priorities. As Secretary, he provides administrative oversight to thirty departments, commissions, councils, museum, boards and conservancies and is a sitting member of sixteen conservancies, councils, boards and commissions within the purview of the Agency.

Laird has been a long-time resident of Santa Cruz with his spouse John Flores. He has traveled extensively, is fluent in Spanish, enjoys conducting family history research, and is a life-long Chicago Cubs fan.

Senator Bob Wieckowski: Senator Bob Wieckowski was elected on Nov. 4, 2014 and represents the 10th Senate District in the California State Legislature. The district stretches from southern Alameda County into Santa Clara County and shares the member's focus on job creation, clean technologies, protecting our environment and reducing unnecessary regulations.

Mr. Wieckowski chairs the Environmental Quality Committee and Budget Subcommittee 2 on Resources, Environmental Protection, Energy and Transportation. He is also a member of the Senate committees on Judiciary; Budget and Fiscal Review; Transportation and Housing; and Ethics. He was appointed by Senate President Pro Tem Kevin de Leon to serve on the Energy and Environment Committee of the Council of State Governments West, and in 2017 became the first Californian to chair the committee.

Senator Wieckowski's district is home to more clean tech companies than any other district in the state. Whether it's solar panels, electric vehicles or other breakthrough industries, the 10th Senate

District is a major contributor to California's clean economy. The Senator is a state leader in advocating for climate adaptation programs and has participated on state and regional panels examining green infrastructure investments.

A strong voice in the Legislature for consumers and low-income earners, he received the "Champion of Justice" Award from the East Bay Community Law Center for fighting against abusive debt collectors and oppressive wage garnishments. Statewide organizations have selected him Legislator of the Year and the California Judges Association gave him its "Scales of Justice Award" for his steadfast support for increased court funding. Tech America also named him "Legislator of the Year."

Senator Wieckowski works with state departments and local officials to improve services, increase funding and to provide new opportunities to meet local challenges. He facilitated the sale of state surplus property to Santa Clara Unified School District to construct a new school campus and provide additional park space, held discussions with state officials to help open a new local library, and he passed legislation to modify the terms of another property sale to increase access to affordable housing.

Assemblymember Rob Bonta: Assemblymember Rob Bonta was elected to the California State Assembly's 18th District in 2012, where he represents the cities of Oakland, Alameda, and San Leandro as the first and only Filipino American legislator in the 165-year history of California.

Rob's passion for justice and equality was instilled in him at a very young age by his parents, who taught him to understand injustice and the importance of joining the struggle to empower vulnerable communities. Growing up in a trailer just a few hundred yards from César Chávez's home, Rob watched closely as his parents organized Filipino and Mexican American farm workers, infusing his formative years with first-hand experience of one of the greatest social movements of all time.

Rob attended Yale College and Oxford University in England before returning to Yale for law school where he earned his Juris Doctorate.

His legal career included work as a Deputy City Attorney for the City and County of San Francisco and as a private attorney. As a City Council member and Vice Mayor of Alameda, Bonta strongly supported public safety, fostered economic development, and exercised fiscal responsibility.

As an Assemblymember, Rob has continued to fight for social justice while making other issues such as environmental preservation a top priority.

Rob and his wife Mialisa live in Alameda with their three children.

Supervisor Dave Pine: Dave Pine was first elected to the San Mateo County Board of Supervisors in a special election in May 2011, and served as Board President in 2014. He represents District 1 which includes Burlingame, Hillsborough, Millbrae, and portions of San Bruno and South San Francisco; the unincorporated communities of San Mateo Highlands, Baywood Park and Burlingame Hills; and the San Francisco Airport.

As a board member for the SF Bay Conservation and Development Commission, the SF Bay Restoration Authority, and the San Francisquito Creek Joint Powers Authority, Supervisor Pine has worked extensively on the intersecting issues of flood control, sea level rise and tidal land restoration. He also serves on the governing boards of the Peninsula Clean Energy Authority, the San Mateo County Transit District (SamTrans), the Peninsula Corridor Joint Powers Board (Caltrain), the Association of Bay Area Governments, the Bay Conservation & Development Commission, the San Francisco Bay Restoration Authority, the Bay Area Regional Collaborative, and Joint Venture Silicon Valley.

Supervisor Pine previously was a school board member for the Burlingame School District from 2003 to 2007 and the San Mateo Union High School District from 2007 to 2011. He is also a past president of the San Mateo County School Boards Association.

Before focusing his career on public service, Pine worked as an attorney representing start-up and high-growth technology companies. After working in private practice with Fenwick & West, he served as Vice President and General Counsel for Radius, Excite@Home, and Handspring.

Originally from New Hampshire, Pine is a graduate of Dartmouth College, where he was awarded a Harry S. Truman scholarship, and the University of Michigan Law School.

Supervisor Pine was elected to his second full term in June of 2016.

Estuary Legacy Award

Sam Schuchat, Executive Officer, State Coastal Conservancy

Award Title: Estuary Legacy Award

Presenter Biography: Sam Schuchat became Executive Officer of the Coastal Conservancy in July 2001. He currently sits on the boards of the Los Cerritos Wetlands Authority, the Baldwin Hills Conservancy, and the Santa Monica Bay Restoration Commission. He served from 2005 to 2013 as the Secretary to the California Ocean Protection Council and from 1999 to 2004 on the California Fish and Game Commission, including two years as Vice-President. He was the first Chairman of the San Francisco Bay Restoration Authority from 2009 to 2014.

Mr. Schuchat has an extensive background in fund-raising and management of not-for-profit organizations. He was the Executive Director of the Federation of State Conservation Voter Leagues from 1998 to 2001 and from 1992 to 1998 he was the Executive Director of the California League of Conservation Voters. He has worked as a community and union organizer, has raised money for community art projects, and was the deputy director of Sacramento AIDS foundation in the late 1980s. He is currently the President of Temple Sinai in Oakland.

He received his BA in Political Science at Williams College in Williamstown, Massachusetts, in 1983 and his MA in Public Administration at San Francisco State University in 1989. He is an avid cyclist and birdwatcher, plays the harmonica and the saxophone, and has backpacked all over the Eastern and Western United States. He resides in Oakland with his wife and cat.

A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Cheryl Strong, USFWS, cheryl_strong@fws.gov

At over 15,000 acres, the South Bay Salt Pond Restoration Project is the largest tidal wetland restoration project on the west coast. Beginning in 2003, the Project committed to implementing a phased restoration approach using a science-based, adaptive management decision-making process with a high degree of transparency to the public. This session will provide an update on three critical areas of research: 1) sediment trends and availability, 2) management actions in response to legacy mercury contamination, and 3) trends for the western snowy plover, a species that breeds and winters in some of the former salt ponds being converted to tidal wetlands. Each talk will present key research findings as well as management actions in response to the science. At the end of the session, a Project overview will be provided on the assessment of Project's performance over the past decade, and the proposed next steps for science and management.

Keywords: wetlands, restoration, sediment, mercury contamination, western snowy plovers

Session Title: A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Speaker Biography: Cheryl is a wildlife biologist with the Don Edwards San Francisco Bay National Wildlife Refuge where she focuses on managed pond and tidal marsh restoration as part of the South Bay Salt Pond Restoration Project, with an emphasis on waterfowl and shorebird conservation, endangered species, and adaptive management. One of Cheryl's main objectives regarding this restoration effort is to balance the needs of endangered species such as the marsh-loving endangered Ridgway's rail and the dry salt-panne loving threatened western snowy plover with the tens of thousands of waterfowl and shorebirds that utilize the ponds during the winter and migratory months. Cheryl is the moderator of this session.

Sediment: The Macro and Micro of Patterns in the South Bay

Maureen Downing-Kunz, U.S. Geological Survey, mokunz@usgs.gov
John Callaway, Delta Science Program, Delta Stewardship Council,
John.Callaway@deltacouncil.ca.gov
Daniel Livsey, U.S. Geological Survey, dlivsey@usgs.gov
David Schoellhamer, U.S. Geological Survey, dschoell@usgs.gov

Restoration of the 6000 hectares of former commercial salt-evaporation ponds in the southern reach of San Francisco Bay, a major goal of the South Bay Salt Pond Restoration Project, requires sediment deposition to succeed. Sediment is needed in subsided ponds to obtain elevations high enough for plant colonization and, along with organic matter accretion, to help sustain tidal marshes as sea level rises. At the macro scale, sediment sources for the project are local watershed inputs (Guadalupe River and Coyote Creek) and transport from the greater San Francisco Bay. Available data to date indicate that the latter, net southerly transport from the greater San Francisco Bay past the Dumbarton Bridge, dominates sediment supply to the project area, although no large storms in the local watersheds have been observed during the sampling period. At the micro scale, sediment transport processes include tides, wind-generated currents, and wind-wave resuspension, leading to rapid sediment deposition and accretion on salt pond surfaces. In this presentation, we compare trends of net sediment transport at the macro scale to observed sediment accretion rates in existing and restored tidal marshes in the project area. Linking observations at these scales will guide current and future restoration project activities as well as inform sediment management practices at the regional level.

Keywords: accretion, restoration, resuspension, salt ponds, sediment transport, tidal marshes, tides

Session Title: A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Speaker Biographies:

Maureen Downing-Kunz: Maureen is a Research Hydrologist at the USGS California Water Science Center in Sacramento. Her studies include water quality and sediment transport throughout San Francisco Bay. She completed her PhD at UC-Berkeley in Civil and Environmental Engineering in 2011. Maureen spent her youth in Louisville, Kentucky climbing rocks and riding bicycles.

John Callaway: John is the Lead Scientist for the Delta Science Program and Delta Stewardship Council. He also is a Professor in the Department of Environmental Sciences at the University of San Francisco. John received his PhD from Louisiana State University.

Mercury: Physical and Biological Insights

Darell Slotton, UC Davis, dgslotton@ucdavis.edu
Mark Marvin-DiPaqualie, USGS, mmarvin@usgs.gov
Josh Ackerman, USGS, jackerman@usgs.gov
James Hobbs, UC Davis, jahobbs@ucdavis.edu

The goal of restoration is to reconstruct physical habitats which support desirable ecosystem functions believed to be important to target organisms. In South San Francisco Bay approximately 15,100 acres of former salt evaporator ponds were acquired in 2003 with a vision to restore salt marsh for wetland dependent biota. However, those restoration goals were tempered in certain areas by concerns over legacy contamination from historic mercury mining upstream in the Guadalupe River watershed. Therefore, the restoration project proceeded with a set of large-scale experiments to understand the physical and biological effects of opening up these areas to the Bay.

To test the effects of restoring these areas to tidal action, the A8 pond complex in the Alviso area was designed with reversible, variable flow tidal gates, allowing for an experimental approach to reconnecting the pond with tidal waters in the adjacent slough.

Through a series of studies over multiple years, a number of parameters were monitored to inform adaptive management of the tidal gates and, ultimately, the wider saltpond complex. These included physical parameters such as water quality, total mercury and methyl-mercury concentrations in the water column and on sediment particles, aquatic species abundance, diversity and condition in the pond complex and in Alviso Slough, and mercury concentrations in the tissues of select fish species and bird eggs.

This presentation will present the most recent relevant findings on the biotic and physical parameters that led to the June 2017 decision to open up all 8 gates on the water control structure.

Keywords: Restoration, tidal wetland, adaptive management, fish, invertebrates, habitat quality, hypoxia, mercury

Session Title: A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Speaker Biography: Darell Slotton has worked on mercury bioaccumulation issues in California for over 25 years. His research group and laboratory at UC Davis have studied mercury in water, sediment and, particularly, fish and other organisms in many applied research projects. They have specialized in the use of young-of-year wild fish and macro-invertebrates as sensitive, localized biosentinels of methylmercury exposure. The technique has been a valuable feedback tool for adaptive management in relation to mercury concerns, in projects throughout California and elsewhere. Darell received his doctorate in Ecology from the University of California.

Snowy Plovers: Doing More with Less?

Karine Tokatlian, San Francisco Bay Bird Observatory, ktokatlian@sfbbo.org

Federally threatened Western snowy plovers breed in the south San Francisco Bay, and rely on habitat provided by former salt evaporation ponds to lay their nests and raise their young. Beginning in 2003, the San Francisco Bay Bird Observatory (SFBBO) has monitored plover breeding activity and success in the south bay. Unfortunately the plover population continues to struggle as a result of mounting predator pressure in a highly urban landscape, and habitat loss due to tidal marsh restoration. With support from the South Bay Salt Pond Restoration Project, SFBBO has investigated a method of using oyster shell habitat enhancement to potentially maximize breeding success even as pond breeding habitat is restored to native tidal marsh. Federally threatened Western snowy plovers breed in the south San Francisco Bay, and rely on habitat provided by former salt evaporation ponds to lay their nests and raise their young. Beginning in 2003, the San Francisco Bay Bird Observatory (SFBBO) has monitored plover breeding activity and success in the south bay. Unfortunately the plover population continues to struggle as a result of mounting predator pressure in a highly urban landscape, and habitat loss due to tidal marsh restoration. With support from the South Bay Salt Pond Restoration Project, SFBBO has investigated a method of using oyster shell habitat enhancement to potentially maximize breeding success even as pond breeding habitat is restored to native tidal marsh.

Keywords: Snowy plovers, breeding success

Session Title: A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Speaker Biography: Karine Tokatlian oversees SFBBO's plover-related research and monitoring activities. Karine has a B.S. in Field and Wildlife Biology from California Polytechnic State University, San Luis Obispo. She has spent several years monitoring protected breeding bird populations along the California coast, including the Western Snowy Plover and California Least Tern. As a native of California, Karine has a profound respect for the conservation of coastal ecosystems and, gratefully, has the opportunity to nurture her interests through the efforts of the Bird Observatory.

South Bay Salt Pond Restoration Project: How are We Doing and Where are We Going?

John Bourgeois, State Coastal Conservancy, john.bourgeois@scc.ca.gov

The South Bay Salt Pond Restoration Project is the largest tidal wetland restoration project on the West Coast of the United States. As planned, the project will restore 15,100 acres of former industrial salt ponds to a mosaic of tidal wetlands and managed ponds for the benefit of native wildlife, public access, and flood risk reduction. As we finish up our first decade on the Project and ramp up design and planning for the next phase, we created a score card to gauge progress of our science and adaptive management program and investigations of key uncertainties. In collaboration with our project management and local science team, we derived a "traffic light" system for rating. Most topics ranked favorably, including sediment dynamics and mercury contamination; while water quality and island design for nesting birds clearly need more attention. This check-in on our progress comes at a time when reduced funding and impending sea level rise are key issues that are stressing the system. However, let's not forget the progress that has been made in just 10 years: >3000 acres restored to the tides, >700 acres of ponds enhanced for wildlife, and sightings of endangered species in new marsh habitat. This self-assessment in light of applied studies such as those discussed earlier in this session will help guide the use of future science and monitoring funds as we move forward to the next ten years of restoration.

Keywords: salt pond restoration, adaptive management, tidal restoration

Session Title: A Decade of Adaptive Management: South Bay Salt Pond Restoration Project

Speaker Biography: John Bourgeois became Executive Project Manager of the South Bay Salt Pond Restoration Project in December 2009. For the previous 12+ years, he worked as a restoration ecologist with H. T. Harvey & Associates, where he worked on the early planning and design for the South Bay Salt Pond Restoration Project starting in 2004. Prior to moving to California from Louisiana, John worked on wetland issues in the Gulf Coast and Central Pacific.

The Future of Restoration - The Low Hanging Fruit is Gone!

Beth Huning, San Francisco Bay Joint Venture, bhuning@sfbayjv.org
John Bourgeois, South Bay Salt Pond Restoration Project, John.Bourgeois@scc.ca.gov

The restoration of San Francisco Estuary wetlands is at a transition point. The more straight-forward restoration projects, although never "easy", have mostly been constructed. Projects that simply involve grading for elevation and channels, then opening levees have mostly been completed. The low hanging fruit has been picked.

As in the case of the South Bay Salt Pond Restoration Project now planning for Phase 2, we are entering an unofficial "Phase 2" of restoration planning and habitat delivery throughout the Estuary. Project planning, design, and implementation are becoming more complex as projects move inland from the margins of marsh and in closer contact with the developed Bay edge. These more complex projects have to account for subsidence and climate change as well work around or within existing infrastructure. The projects will require new restoration strategies and non-conventional partnerships.

This session will discuss some of the emerging challenges, as projects become more multi-habitat and multi-benefit. The Baylands Goals 2015 update called out the need to plan upland transition zones into projects. Many of the newly planned projects will require far more material than is available form dredging. Carbon farming is an option to accumulate peat and biomass, but it can only succeed in certain locations. Planning around important infrastructure can be an obstacle, or incorporating wetlands into infrastructure planning can be an opportunity. Some of the non-traditional projects might encroach into the Baylands in new ways, and will require vision, flexibility, and creativity from the regulators.

Much has been accomplished. However, to face the coming challenges of sea level rise, a whole new generation of projects is being planned that will test the limits of our traditional restoration methods and expectations.

Keywords: restoration, wetlands, sediment, transition zone, carbon

Session Title: The Future of Restoration: The Low-Hanging Fruit is Gone!

Speaker Biography: Beth Huning is the Coordinator of the San Francisco Bay Joint Venture, a public-private partnership for wetlands protection and restoration. She has been actively involved in wetlands conservation in the Bay Area for 35 years, including 18 years with the National Audubon Society when she helped found, and then chair, the Joint Venture. She holds a BA in geography and was honored in 2001 as a Fellow by the Stanford Graduate School of Business Center for Social Innovation for non-profit management. In her free time, she hikes, kayaks, rafts rivers, dances, photographs, and travels the world. An accomplished photographer, she is the 2011 recipient of the North American Nature Photography Association's Philip Hyde Grant award for conservation photography.

Finding Opportunities at the Estuary's Margin

David Thomson, San Francisco Bay Bird Observatory, dthomson@sfbbo.org
Amber Manfree, UC Davis Center for Watershed Sciences, admanfree@ucdavis.edu
Brian Fulfrost, Brian Fulfrost & Associates, bfaconsult@gmail.com
Denise Colombano, UC Davis Center for Watershed Sciences, dpdecarion@ucdavis.edu

The sea is projected to rise, expanding the San Francisco Estuary at a rate that may push tidal marshes both upslope and up-estuary in the long term. In the short to mid-term, land managers are working to expand or enhance tidal marshes to stabilize the ecosystem. To accommodate rising sea levels, managers will need to prepare the way for tidal marshes to migrate upslope by reconnecting upland transitional areas and adjacent open space to the estuary. To allow tidal marsh habitats to migrate up-estuary, from San Francisco and San Pablo Bays through the Carquinez Straits into Suisun Bay and eventually the Delta, marsh migration may require human assistance to move some species between wetland habitats that cannot be connected. Until recently, managers lacked information about the distribution and quality of connected and disconnected transition zones throughout the estuary. Now opportunities and constraints to current tidal marsh ecosystem stability and migration in the future are mapped and quantified throughout San Francisco, San Pablo and Suisun Bays to show relative conservation potential at specific locations.

Conservation planning must incorporate sea level rise projections and harness tidal marsh ecosystem functions to support mid and long-term dynamic equilibriums in landscape processes. Recent research indicates that complexes of contiguous ecosystems, though often novel in geomorphology and species composition due to human alterations, possess processes that support diverse and productive food webs. This research also suggests that habitat management is maximized by maintaining corridors, protecting existing productivity hotspots, and engineering new ones. The influence of upland transitional connectivity to aquatic ecosystem productivity is an area of active research, with case studies in Suisun Marsh and the Cache Slough Complex. The intersection of these considerations and emerging knowledge will lead to the most resilient and productive projects in the estuary.

Keywords: transitions, mapping, accommodation, migration, SLR, connectivity, hotspots, aquatic, priorities,

Session Title: The Future of Restoration: The Low-Hanging Fruit is Gone!

Speaker Biographies:

David Thomson: David Thomson (MS in Biology from SE Louisiana U) is the Habitats Program Director for the San Francisco Bay Bird Observatory. He leads applied research projects on the management of estuarine-terrestrial transitional plant communities around San Francisco Bay, supporting large scale tidal marsh ecosystem restoration projects. He has been collaborating with Brian Fulfrost (Brian Fulfrost & Associates) to map the distribution of upland transitional habitats and predict their value to tidal marsh ecosystem conservation, both now and considering sea level rise scenarios.

Amber Manfree: Amber Manfree (PhD in Geography from UC Davis) is a Postdoctoral Researcher at the UC Davis Center for Watershed Sciences. Her dissertation detailed historical landscape change in Suisun Marsh and her research interests include landscape-scale physical geography, water management, and cartography. She has been collaborating with Denise Colombano (UC Davis Center for Watershed Science) to better understand how estuarine marshes function as fish nurseries. Colombano is currently studying how fishes use tidal habitats in Suisun Marsh.

Restoration Aspects of Carbon and Subsidence Reversal

Lisamarie Windham-Myers, U.S. Geological Survey, lwindham-myers@usgs.gov
Sara Knox, U.S. Geological Survey, sknox@usgs.gov

Coastal wetlands in the San Francisco Bay (SFB) Delta range from saline to freshwater, from mineral to organic soils, and across a range of Sea-Level-Rise affected hydrologies (from fully tidal to riverine deltas to floodplains). Opportunities for wetland restoration exist across all of these gradients, and each can have substantial ecosystem benefits, including wildlife habitat, estuarine foodweb support, storm surge protection, and recreation, as well as carbon (C) sequestration, a natural process of productivity and accretion in wetland soils. Promoting wetland carbon sequestration, is one option for national and state climate change mitigation policies. The relative strength and benefit of this climate change mitigation approach is a function of the net greenhouse gas (GHG) balance, which can vary strongly in both direction and magnitude. Over the past 20 years, multiple studies have improved our understanding of the net GHG balances of SFB-Delta wetland and upland ecosystems, and the relative strengths and timescales of wetland restoration opportunities. Subsidence reversal through belowground biomass accumulation (precursor to peat growth) shows the highest rates of carbon dioxide (CO_2) uptake, but also the highest rates of methane (CH_4) release, a more potent greenhouse gas than CO_2. Alternatively, sediment accretion in newly breached subsided lands can support wetland re-establishment through elevation gain but there is little evidence of GHG mitigation potential until the colonization of wetland vegetation on site. Complete documentation of the Net Ecosystem Carbon Balance (NECB) in a brackish tidal marsh (SFB-NERR's Rush Ranch, Suisun Marsh) shows a high degree of interannual variability in CO_2 uptake, consistently low CH_4 emissions, and likely a significant C export to the SFB-Delta through tidal exchange. Current GHG emissions from diked agricultural lands are significant for both CO_2 and N_2O, such that re-establishing wetlands can shift landscapes from net sources to net sinks of GHGs. Of the 30,000 acres proposed for wetland restoration through the EcoRestore program, tidal and floodplain wetlands are the dominant land cover habitats targeted, both of which may have a net climate mitigation benefit. We review available data and identify the data needed to monitor and verify the climate mitigation benefit of wetland restoration directly and through models.

Keywords: carbon dioxide, methane, tidal, brackish, restoration, wetland, soil, greenhouse gas

Session Title: The Future of Restoration: The Low-Hanging Fruit is Gone!

Speaker Biography: Lisamarie Windham-Myers is a Research Ecologist in the USGS National Research Program, Menlo Park, CA, and Lead Scientist for Plant:Soil:Water Interactions in Wetland Ecosystems. She is the lead PI for a NASA Carbon Monitoring System project which synthesizes U.S. field datasets and leverages spatial data and remote sensing products to improve greenhouse gas inventory approaches for coastal wetlands. She is the lead author on the Tidal Wetland and Estuary chapter in the forthcoming 2nd State of the Carbon Cycle Report from the U.S. Global Change Research Program. Her research focuses on integrating wetland biogeochemistry into an ecosystem context, including high frequency atmospheric flux data, biomass and soil stock mapping, and geomorphic models. From CARB to IPCC, she serves in a range of local, national and international science advisory efforts to evaluate wetland management

opportunities and modeling approaches to quantify wetland carbon sequestration, greenhouse gas budgets and/or mercury methylation and export.

Coping with Barriers to Marsh Restoration

Julian Meisler, Sonoma Land Trust, julian@sonomalandtrust.org
Wendy Eliot, Sonoma Land Trust, wendy@sonomalandtrust.org

On the north shore of San Pablo Bay, many of the big and accessible tidal wetland restoration projects are underway or complete. While hard lessons have been learned about the cost of avoiding impacts to infrastructure, innovative designs have also resulted in unexpected outcomes such as seasonal wetland conservation as a compromise to reduced tidal wetland acreage. However, even these success stories must face the challenges of sea level rise and an inability for marshes to easily migrate. The same barriers that hamper marsh migration from near shore projects also increase the complexity of restoring diked baylands located further inland. This talk will showcase design challenges and ultimately the successes driven by barrier constraints at the Sears Point Restoration Project in Sonoma County as well as the challenges and potentially enormous opportunities associated with changes to State Route 37, the region's largest transportation artery which spans the northern arc of San Pablo Bay through existing and historic marshes.

Keywords: wetland, tidal, seasonal, infrastructure, migration, Sears Point

Session Title: The Future of Restoration: The Low-Hanging Fruit is Gone!

Speaker Biography: Julian Meisler is the Baylands Program Manager at Sonoma Land Trust and has responsibility for overseeing the Trust's conservation planning, management and restoration work along San Pablo Bay, including the Sears Point Restoration Project. Prior to Sonoma Land Trust, Julian worked for the Laguna de Santa Rosa Foundation and the Solano Land Trust. He holds a BS from Colorado State University and a MS from the University of Vermont.

A Delta Renewed: A Guide to Science-Based Ecological Restoration in the Delta

J. Letitia Grenier, San Francisco Estuary Institute, letitia@sfei.org
Julie Beagle, San Francisco Estuary Institute, julieb@sfei.org
April Robinson, San Francisco Estuary Institute, april@sfei.org
Sam Safran, San Francisco Estuary Institute, sams@sfei.org
Robin Grossinger, San Francisco Estuary Institute, robin@sfei.org

The Sacramento San-Joaquin Delta is a linchpin of California's water supply, an important agricultural area, and home to native wildlife found nowhere else in the world. This vital region is hampered by poor water quality, an over-allocated water supply, decaying infrastructure, invasions of alien species, and novel ecosystems that no longer support desired functions. Creating a healthy future Delta ecosystem requires understanding what that ecosystem looks like. While regional planning efforts identify the need to restore large tracts of interconnected habitats, very little information is available to help design the complex landscapes that are likely to achieve this goal. To help fill this gap, we drew on an understanding of the Delta's historical ecology (circa 1800) and a detailed study of landscape change since the pre-development period. We used this information to identify a series of strategies for restoring resilient landscapes in the Delta that could provide a broad suite of desired ecological benefits. These strategies identify and emphasize the reestablishment of large-scale processes of sediment and water movement that sustain interconnected habitats (as opposed to emphasizing the restoration of habitats themselves). Examples of strategies include 'Reestablish tidal marsh processes in areas at intertidal elevations,' 'Reestablish connection between streams and tidal floodplains,' and 'Reestablish fluvial processes along actively migrating streams.' For each strategy, we layered relevant environmental data sets to identify areas where the strategy might be implemented and considered how individual strategies should be arranged and combined to achieve desired ecological functions at the landscape-scale. These strategies can be referenced during regional and local planning processes as a framework for how individual projects planned in the near-term can contribute toward a coherent, long-term vision of improving ecosystem function across the Delta.

Keywords: Sacramento San-Joaquin Delta, process-based restoration, historical ecology, regional planning

Session Title: Delta Restoration Planning: Integrating Multiple Objectives and Providing for Local Engagement

Speaker Biography: Letitia Grenier co-directs the Resilient Landscapes Program at the San Francisco Estuary Institute. Her focus is to help conserve California's living resources by developing landscape-scale, collaborative visions and solutions for ecological resilience. She was the science lead for the 2015 State of the Estuary Report and the 2015 climate change update to the Baylands Ecosystem Habitat Goals, heading a team of over 200 environmental scientists, managers, and regulators to develop recommendations for restoring and maintaining the health the Bay's tidal wetlands in the face of rising sea levels and other stressors. She is a principal investigator for the Delta Landscapes project, which has completed in-depth analyses on the

change in the Delta over time and is now offering guidance on how ecosystem health can be recovered as part of this working landscape. Letitia has a Ph.D. in Conservation Biology from the University of California at Berkeley.

The Delta Plan: Protect, Restore, and Enhance the Delta Ecosystem

Jessica Law, Delta Stewardship Council, Jessica.law@deltacouncil.ca.gov

The 2009 Delta Reform Act directs the Delta Stewardship Council (Council) to ensure that the Delta Plan includes broad, measurable, and science-based goals, objectives, and strategies that improve the Delta estuary and wetland ecosystems. The Delta Plan (2013) defines restoration (Water Code Section 85066) as "the application of ecological principles to restore a degraded or fragmented ecosystem and return it to a condition in which its biological and structural components achieve a close approximation of its natural potential, taking into consideration the physical changes that have occurred in the past and the future impact of climate change and sea level rise." In 2015, with the State's pivot away from the comprehensive ecosystem-based planning of the Bay-Delta Conservation Plan, the Council made a commitment to revisit the Delta Plan to assess the need for revised approach to landscape-level planning through an amendment to the Ecosystem chapter. In this panel discussion, Jessica Law, Chief Deputy Executive Officer, will discuss the Council's approach to developing revisions to the Delta Plan in partnership with other local, State, and Federal agencies and stakeholders, and discuss how the tremendous amount of progress that has been achieved over the past few years lays a future for Delta restoration work.

Keywords: Delta Stewardship Council, Delta Plan, ecosystem restoration, planning, outreach

Session Title: Delta Restoration Planning: Integrating Multiple Objectives and Providing for Local Engagement

Speaker Biography: Jessica Law, Chief Deputy Executive Officer at the Delta Stewardship Council, has been working on land use planning and natural resource management in California for the past ten years, mainly focused on the Sacramento-San Joaquin Delta. At the Delta Stewardship Council she leads a variety of efforts intended to increase State and Federal agency coordination and collaboration, and support decision-making based on best-available science. Jessica is a certified land use planner and a member of the American Planning Association, and holds a bachelor's degree in Ecological Biology from Connecticut College and a Masters in Regional Planning from the University of Massachusetts, Amherst.

Delta Conservation Framework: Building Community and Integrated Practices for Delta Conservation

Christina Sloop, California Department of Fish and Wildlife, christina.sloop@wildlife.ca.gov

For many years, agencies, stakeholders, scientists, and planners have tried to arrive at a collective vision for the conservation of ecosystems in the Delta. In recent decades great strides have been made in advancing Delta science capacity. Despite these efforts to unite the various Delta interests around a common vision for conservation in the Delta, to date the region remains confronted with many problems, including native species declines, invasions of alien species, and a complex and costly water management structure. The Delta Conservation Framework is a collaborative effort intended to advance conservation in the Delta, Yolo Bypass, and Suisun Marsh through 2050. It offers a new planning paradigm that combines the needs of the Delta community with scientific guidance on rebuilding functional ecosystems. The Delta Conservation Framework includes long-term, landscape-scale goals to achieve this vision, and promotes an approach focused on education, cooperation, and collaboration with Delta stakeholders and community members. Strategic conservation that builds on the history and environmental richness of the region can contribute to the strong sense of place and socio-economic values of the Delta. Through non-traditional partnerships and a focus on multi-benefit outcomes it is possible to identify paths forward which integrate ecosystem conservation with socio-economic needs at the landscape scale. For example, the Delta Conservation Framework highlights the need to focus conservation efforts on public lands in each region of the Delta. The Delta Conservation Framework envisions the Delta in 2050 as a place composed of resilient natural and managed ecosystems situated within a mosaic of towns and agricultural landscapes, where people prosper and healthy wildlife communities thrive.

Keywords: Delta, conservation, framework, restoration, ecosystems, vision, community, landscape-scale, collaboration, partnerships

Session Title: Delta Restoration Planning: Integrating Multiple Objectives and Providing for Local Engagement

Speaker Biography: Dr. Christina Sloop is a Senior Environmental Scientist in CDFW's Ecosystem Conservation Division. She has worked for over 25 years in the fields of ecology and natural resource conservation across California, and North America's Central and Pacific flyways. Her scientific expertise spans across multiple disciplines, including conservation science, wetland ecology, climate adaptation, migratory birds, and population genetics. She has served as science advisor on a number of federal agency technical committees. She joined CDFW in 2016 to lead the Delta Conservation Framework planning effort. Dr. Sloop has led or contributed to the development of conservation planning documents, including the 2015 California Wildlife Action Plan, 2015 Baylands Ecosystem Habitat Goals Science Update for Climate Change, and 2012 SFBJV San Francisco Bay Monitoring and Evaluation Plan. She also participated in developing a collaborative decision-analytic framework for the San Francisco Bay to maximize resilience of tidal marshes to climate change.

Regional Restoration and Agricultural Sustainability Planning: Informing Best Ecological Outcomes with Least Impact to Land Uses

Campbell Ingram, Delta Conservancy, cingram@deltaconservancy.ca.gov

The Delta Conservancy is supporting two regional planning efforts to engage the Delta community and agencies in collaborative processes to identify how science based ecosystem restoration and agricultural sustainability can be compatible. Phase 1 of the Cache Slough Planning Project was a pilot test of a new concept of collaborative planning in the Delta. The project brought together Cache Slough regional interests with State and local government agencies to evaluate all components of the system to determine potential opportunities and conflicts among all beneficial uses within the Cache Slough Complex. Where could ecosystem values be enhanced while co-existing sustainably with other current beneficial uses of land and resources in the CSC? The collaboration effort was successful in demonstrating that the various interest groups are motivated to work together to gather, evaluate, and support the use of appropriate data sets and other information for consideration in the planning process. Data collection, review, and validation was viewed as valuable by the participants. Data overlays, evaluation, and interpretation was limited in Phase 1, but began to show the potential for visualization to foster discussion and agreement. Additional collaboration will be needed in Phase 2 to determine which data will be most useful in analysis and decision-making. A similar process known as the Central Delta Corridor Partnership is underway working with representatives of publically owned and publically financed lands along a corridor that extents from the Northeast Delta through the Central and West Delta. Here the participants are trying to identify challenges to overall economic sustainability and opportunities to restore ecological processes without taking land out of private ownership. Both efforts are relying on real time collaboration and data visualization tools to realize efficiencies and improve planning outcomes. The presentation will describe the processes and lessons learned.

Keywords: Planning, restoration, sustainability, community involvement, collaboration, data visualization

Session Title: Delta Restoration Planning: Integrating Multiple Objectives and Providing for Local Engagement

Speaker Biography: Campbell Ingram became the first Executive Officer of the Sacramento-San Joaquin Delta Conservancy in March of 2011. The Conservancy is tasked with being a lead agency for ecosystem restoration in the Delta and supporting efforts that advance environmental protection and the economic well-being of Delta residents. Previously, Campbell was an Associate Director of The Nature Conservancy's California Water Program where he participated in the Bay-Delta Conservation Plan effort as a Steering Committee member. Campbell previously worked for the U.S. Fish and Wildlife Service where he was responsible for implementing several CVPIA restoration programs and the CALFED Environmental Water Program; and prior to that was employed by the U.S. Bureau of Reclamation working directly for the CALFED Ecosystem Restoration Program.

Enhancing Biodiversity in an Increasingly Urban World

Robin Grossinger, San Francisco Estuary Institute, robin@sfei.org

Throughout the 20th century a wave of urbanization has swept across the planet, driving a radical transformation of our landscapes that is predicted to accelerate over the next century. These changes challenge us to find new ways to design and manage our cities. This session will explore advances in enhancing the ecological function of urban settings, highlighting the potential to improve biodiversity while providing benefits for people. The Bay Area is a center of significant examples of research and application, from innovative projects such as the Presidio of San Francisco to comprehensive ecological investments at the Google campus in the South Bay. We will explore the benefits, from improving wildlife connectivity and linking regional ecosystems to bringing nature closer to urban residents. This exciting, highly visual session will create a new understanding of existing nature and potential future of our familiar neighborhoods and cities, drawing on remote wildlife cameras, innovative urban ecological visions, and cutting edge demonstration projects in San Francisco and Silicon Valley.

Keywords: urban biodiversity, ecological function, urban ecology, ecological resilience, landscape resilience

Session Title: Enhancing Urban Biodiversity in an Increasingly Urbanized World

Speaker Biography: Robin Grossinger is a Senior Scientist at the San Francisco Estuary Institute, where he co-directs SFEI's Resilient Landscapes program. Robin leads efforts throughout the state to reintegrate natural processes within our highly modified landscapes, creating healthier and more adaptive neighborhoods, cities, and surrounding landscapes. He has advised restoration strategies for San Francisco Bay, the Sacramento-San Joaquin Delta, urban landscapes such as the Google campus, and rivers throughout California. He has been recognized with a Local Hero award from Bay Nature magazine and the Carla Bard Bay Education Award from The Bay Institute and Aquarium of the Bay.

Re-Oaking Silicon Valley: A Science Strategy for Re-Establishing Ecological Functions

Erica Spotswood, San Francisco Estuary Institute, ericas@sfei.org
Robin Grossinger, San Francisco Estuary Institute, robin@sfei.org
Steve Hagerty, San Francisco Estuary Institute, steveh@sfei.org
Erin Beller, San Francisco Estuary Institute, erin@sfei.org
April Robinson, San Francisco Estuary Institute, april@sfei.org
Letitia Grenier, San Francisco Estuary Institute, letitia@sfei.org
Ruth Askevold, San Francisco Estuary Institute, ruth@sfei.org

Could restoring lost ecosystems to cities play a role in building ecological resilience across landscapes? Here, we explore this opportunity in Silicon Valley, using oak ecosystems as a model. Both beautiful and functional, native oaks can be excellent choices for streetscapes, backyards, and landscaping. Requiring little water after establishment, oaks can save money by reducing irrigation requirements while sequestering more carbon than most other urban trees common to our region. Oaks are also foundation species, forming the base of a complex biotic community that forms the most diverse habitat type in California.

Over the last century, oaks were felled across Silicon Valley as woodlands were converted to orchards and then urbanized, eliminating much of this habitat from our cities. Building on the foundation developed by SFEI's historical ecology research, we compare the historical structure and composition of Silicon Valley oak woodlands to contemporary urban forests to quantify the extent of ecosystem transformation. A loss of large trees coupled with the importation of hundreds of species of non-native trees likely reduces the ability of urban forests to support biodiversity. Replacement of grasses, wildflowers and shrubs with lawns and pavement has altered the landscape further. However, we show that canopy cover remains similar, making it possible to re-oak our cities without dramatically increasing the number of trees.

We also consider the benefits native oaks could offer to urban communities—from drought-tolerance to deeper connections to nature and a greater sense of place. Providing an array of specific guidelines for urban forestry and landscaping, this project begins to envision how we could design the more ecologically healthy and resilient cities of the future.

Keywords: oaks, urban ecology, biodiversity, historical ecology, ecosystem services

Session Title: Enhancing Urban Biodiversity in an Increasingly Urbanized World

Speaker Biography: Erica Spotswood is an Applied Ecologist at the San Francisco Estuary Institute where she leads projects related to urban ecology and ecological resilience. Current projects address how regional planning can integrate with local project-scale design, and how urban greening efforts can be coordinated to contribute to broader regional goals. Her areas of expertise include urban ecology and plant community ecology. Before joining SFEI, Erica conducted postdoctoral research with Katherine Suding, and received her PhD from the University of California at Berkeley in the department of Environmental Science, Policy and Management.

Prior to graduate school, Erica worked for the Wildlife Conservation Society in Central Africa, and as a Peace Corps volunteer in West Africa.

Managing Among the Masses: Preserving Biodiversity in America's Most Heavily Visited National Park

Michael Boland, The Presidio Trust, mlboland@comcast.net

For over 200 years the historic Presidio of San Francisco served the military needs of three nations – Spain, Mexico, and the United States. When it closed in 1994, our nation's longest operating military site became part of the Golden Gate National Recreation Area, the most heavily visited national park unit in the United States. Although the U.S. Army had radically transformed most of the Presidio in the course of its military use of the site, it inadvertently preserved the most intact collection of remaining biodiversity in San Francisco. Although these small relic natural areas were isolated by derelict historic landscapes and senescent plantations, they preserved rich biodiversity – over 300 native plant species in 13 different plant communities, including 22 special status plant species.

Since 1994, the Presidio Trust, National Park Service, Golden Gate National Parks Conservancy and thousands of community volunteers have used a community-based stewardship approach to return these relic natural systems to health and to double the acreage of natural area at the Presidio. Implementation of "green" design and maintenance practices throughout the historic designed landscapes and forest plantations improved the environmental performance of the surrounding national historic landmark district at the same time that the Presidio community, which includes over 800 buildings, was undergoing a dramatic revitalization to become the first self-funding national park site in the United States.

Keywords: Presidio, Urban Biodiversity, Urban National Park, Tennessee Hollow, Mountain Lake

Session Title: Enhancing Urban Biodiversity in an Increasingly Urbanized World

Speaker Biography: Since 2001 Michael Boland has played a key role in making the Presidio a world class national park site. Under his leadership, his team has delivered an array projects that include restoring the Presidio's rich mosaic of natural and cultural landscapes, establishing national park experiences that serve urban youth, and reinventing the historic army post as a contemporary park community. Boland has also played a role in the transformation of the GGNRA, America's largest urban national park. Between 1990 and 1997, as Director of Park Projects for the Golden Gate National Parks Conservancy, he managed the transformation of Crissy Field, the Alcatraz Island Master Plan, National AIDS Memorial Grove, and early work on the Presidio's transition from Army post to national park. Boland holds a bachelor's degree in architecture, and master's degrees in landscape architecture and in city and regional planning, all from the University of California at Berkeley.

Linking Open Space and Urban Biodiversity Planning

Nicole Heller, Peninsula Open Space Trust, nheller@openspacetrust.org

The conservation of natural lands in the San Francisco Bay Area is critical in light of heightened vulnerability due to climate change. Conservation of large open spaces around cities, in conjunction with smaller open spaces within cities -- such as linear or pocket parks with forest or wetland patches -- together have the capacity to diminish the vulnerability of human communities to higher temperatures, water shortages, flooding and other impacts of climate change. In addition, native plants and animals need to migrate to track their climate niche, and the chances of successful migration will be increased if species have access to safe habitat across the entire landscape from the uplands to the baylands and to the ocean. Thus there is a strong rationale to do more conservation and restoration in urban areas for both biodiversity protection and urban community resilience. Despite this alignment, nature conservation has tended to ignore urban lands in planning and action, and urban recreation and landscape planning is typically not done with the aim of biodiversity conservation. The two sectors have essentially been developing on separate paths. In this talk, I will discuss how urban greening can better align with open space conservation by drawing on ecological research and theory, and with examples from projects conducted in the San Francisco Bay Area. Research and theory suggest that there are considerable opportunities for linking agendas across sectors in ways that could yield multiple benefits and ensure greater resilience for biodiversity. There are however both social and ecological challenges to linking agendas. In some cases difficult choices will need to be made about which values are most important, or where in the landscape different values should be prioritized. The nexus of open space conservation with urban greening is ripe for greater collaboration, experimentation and demonstration of impact.

Keywords: Open Space, Resilience, Climate Change, Urban Greening, Connectivity, Green Infrastructure

Session Title: Enhancing Urban Biodiversity in an Increasingly Urbanized World

Speaker Biography: Nicole Heller is the Director of Conservation Science at Peninsula Open Space Trust. Trained as a field ecologist, she been conducting research and working in the Bay Area since 1999. Her work is focused on applying ecological and climate science to the sound management of California ecosystems. She has led various efforts to forward a biodiversity resilience agenda through collaborations with colleagues at POST, the Terrestrial Biodiversity and Climate Change Collaborative (TBC3.org), Resilient Silicon Valley, Santa Cruz Mountains Stewardship Network, and the Amah Mutsun Land Trust. She has authored or co-authored ~ 30 articles and book chapters in ecology, conservation and climate change. Nicole holds a BA in Ecology and Evolution from Princeton University, a PhD in Biological Sciences from Stanford University. Nicole conducted postdoctoral research at University of California Santa Cruz, and has held teaching positions at Franklin and Marshall College and Duke University.

Suisun Marsh: California's Largest Marsh and Its Connection to Suisun Bay

Stuart Siegel, San Francisco Bay National Estuarine Research Reserve, siegel@sfsu.edu

Suisun Marsh supports many beneficial uses, centered around recreation (mainly hunting, fishing, wildlife observation) and resident and migratory species support. Covering 100,000 acres, Suisun combines 52,000 acres of diked wetlands managed mostly for waterfowl hunting, 22,000 acres of shallow bays and 3,000 acres of sloughs used for fishing and supporting numerous fish and wildlife species, 8,000 acres of tidal marsh supporting a variety of fish and wildlife species and several listed plant species, and 16,000 acres of surrounding uplands. Suisun is a core region supporting several listed fish species, both resident such as Delta and Longfin Smelt and migratory such as Chinook salmon. These beneficial uses face several challenges, most notably: salinity levels linked to Delta outflow, invasive aquatic and terrestrial species, water quality impairments from legacy and ongoing land uses, sea level rise and warming waters, and regional declines in sediment supply. Within Suisun, efforts are underway to improve duck club operations to improve impaired water quality, restore tidal marsh to restore fish, plant and wildlife habitats and their associated functions and services, the Regional Board is developing TMDLs to address water quality impairments, and SRCD coordinates wide-ranging improvements to diked wetlands to address beneficial uses and impaired water quality. Suisun also holds one of the region's two National Estuarine Research Reserve sites – Rush Ranch – which provides a focal point for wetland-oriented applied research including listed species recovery and carbon sequestration. Several entities have ongoing fisheries and aquatic ecology research, helping to elucidate opportunities for improving beneficial uses through tidal marsh restoration and diked wetland management, including illuminating complexities around restoring shallow water habitats and "mature" emergent tidal marsh for their ecological functions and ecosystem services. The 2017 winter illustrated the value of high Delta outflow to Suisun beneficial uses, alongside levee failure hazards those flows cause.

Keywords: Suisun, diked wetlands, tidal marsh, TMDL, water quality, beneficial uses

Session Title: Suisun Bay and Marsh: Where the Delta Meets the Bay

Speaker Biography: Dr. Stuart Siegel is the Coastal Resilience Specialist for the San Francisco Bay National Estuarine Research Reserve, Adjunct Professor of Earth and Climate Sciences at San Francisco State University, and Principal of Siegel Environmental. He focuses on the intersections of climate change, natural resources resiliency, ecosystem restoration, management-relevant science, and regional planning. Dr. Siegel leads the Suisun Low Dissolved Oxygen improvement implementation study. He has lead design teams for several wetland restoration projects responsive to climate change, including Aramburu Island, Sonoma Creek, and Sears Point. He was a co-lead scientist for DRERIP, technical lead for the Delta Vision Ecosystem Workgroup, Suisun Marsh Plan Science Advisor, and lead PI for the Integrated Regional Wetland Monitoring Pilot Project. He co-authored the Wetland Carbon Sequestration Road Map to Implementation, authored the climate change chapter of the Moyle Suisun Marsh book, and served on technical advisory panels for large restoration projects.

Are Fish Kills a Thing of the Past? Improving Dissolved Oxygen in Suisun Marsh

Barbara Baginska, San Francisco Bay Water Board, bbaginska@waterboards.ca.gov
Kevin Lunde, San Francisco Bay Water Board, klunde@waterboards.ca.gov
Sujoy Roy, Tetra Tech Inc., Sujoy.Roy@tetratech.com

Suisun Marsh, the largest contiguous brackish water marsh remaining on the West Coast continues to be a managed resource. It was protected from urban development in the 1970s. The focus of its ongoing protection has been as habitat for waterfowl and wildlife. While it remains a large wetland today, there are ongoing water quality concerns due to diking and periodic discharges from managed duck ponds which have caused low dissolved oxygen (DO) concentrations (between zero and two mg/L) in some slough channels, and have been associated with fish kills in the past. The San Francisco Bay Water Board is in the process of developing a Total Maximum Daily Load (TMDL) also referred to as a water quality attainment strategy. The focus of the TMDL is on implementation of management practices to improve water mixing and timing of discharges to prevent the adverse impacts of low DO on fish and aquatic life. Thus far, early-implementation of TMDL best management practices have yielded substantial improvements in water quality conditions. A component of this project includes development of DO objectives specific to slough channels. DO objectives were established in the San Francisco Bay Basin Plan in 1975. This is the first effort the Water Board has embarked upon to evaluate the appropriateness of its DO objectives. It involved evaluating the sensitivity and oxygen requirements of Suisun Marsh fish and application of the U.S. EPA approved Virginian Province Approach to develop chronic and acute DO objectives. The approach taken to develop site-specific objectives for Suisun Marsh sloughs is likely applicable to other marsh slough channels in the Bay.

Keywords: Suisun Marsh, water quality, dissolved oxygen, site-specific objectives, TMDL

Session Title: Suisun Bay and Marsh: Where the Delta Meets the Bay

Speaker Biography: Barbara has been with the Planning and TMDL section of the Water Board for the past 11 years. Before, she worked for 7 years for the Environment Protection Authority in Sydney, Australia. Barbara holds a PhD in Earth Sciences from Warsaw University in Poland.

Juvenile Fish Nurseries in Emergent Tidal Marshes of Suisun Marsh

Denise Colombano, Center for Watershed Sciences, UC Davis, dpdecarion@ucdavis.edu
Amber Manfree, Center for Watershed Sciences, UC Davis, admanfree@ucdavis.edu
John Durand, Center for Watershed Sciences, UC Davis, jrdurand@ucdavis.edu
Teejay O'Rear, Center for Watershed Sciences, UC Davis, taorear@ucdavis.edu
Peter Moyle, Center for Watershed Sciences, UC Davis, pbmoyle@ucdavis.edu

Coastal and estuarine nearshore habitats provide essential habitat for juveniles of fish species that make ontogenetic shifts to adult populations. We investigated the role of emergent tidal marsh in providing fish nursery habitats in Suisun Marsh, located in the upper San Francisco Estuary. Using a long-term otter trawl and beach seine data set (1995-2016), we asked, 'Do species partition juvenile rearing habitats in space and time?' and, 'What factors contribute to juvenile habitat use in reference and modified tidal wetlands?' We found that the three most abundant species (Striped Bass, Sacramento Splittail, and Tule Perch) consistently used the reference tidal marsh for juvenile rearing, but displayed different patterns of peak abundance throughout the spring/ summer recruitment window. Modified tidal marshes also supported juvenile rearing where terminal sloughs shared similar features as the reference site, including complex topography, geomorphology, and connectivity to upland watersheds. We propose that, in addition to providing resilience to sea level rise, shallow estuarine aquatic-emergent marsh-upland transition ecosystem complexes represent contiguous habitats (i.e., core patches and surrounding corridors) that together enhance aquatic food webs and benefit juveniles of many fish species. We recommend priority areas in Suisun Marsh where tidal marsh restoration and connectivity to upland transition zones are more likely to support juvenile fish recruitment into the uncertain future.

Keywords: tidal marsh, fish, ecology, connectivity, restoration

Session Title: Suisun Bay and Marsh: Where the Delta Meets the Bay

Speaker Biography: Denise Colombano is a PhD Candidate and Delta Science Fellow conducting research at the Center for Watershed Sciences at the University of California, Davis. She studies fish ecology in conjunction with the Suisun Marsh Fish and Invertebrate Study in Dr. Peter Moyle's laboratory.

Selenium in Suisun Bay – Tracking Change Post-TMDL

Jay Davis, San Francisco Estuary Institute, jay@sfei.org
Robin Stewart, U.S. Geological Survey, arstewar@usgs.gov
Jennifer Sun, San Francisco Estuary Institute, jennifers@sfei.org
Sujoy Roy, Tetra Tech, Sujoy.Roy@tetratech.com
Tom Grieb, Tetra Tech, tom.grieb@tetratech.com

Suisun Bay is a focal point for selenium concern in the Estuary due to the abundance of the non-native overbite clam (*Potamocorbula amurensis*) and it being a preferred habitat of a sensitive fish species: white sturgeon (*Acipenser transmontanus*). The San Francisco Water Board established a total maximum daily load (TMDL) control plan for selenium in the North Bay in 2016, with the goal of preventing increases in the food web. The TMDL established targets for selenium in white sturgeon and in water. Monitoring is needed to provide a robust dataset for evaluating whether the targets are met, to ensure that concentrations do not increase, and to assess the potential impact of changes in selenium inputs to Suisun Bay from the Delta as a consequence of Delta water management or other management actions in the Central Valley. The Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) is developing a monitoring plan for sturgeon, water, and clams to track trends, with a special emphasis on early detection of change. The U.S. Geological Survey has generated a robust 20-year dataset on trends in concentrations in clams. The RMP has also conducted monitoring of trends in white sturgeon for 20 years, but with a limited sampling intensity. The long-term clam dataset indicates that high Delta outflow has been correlated with lower selenium concentrations in North Bay clams. Clam concentrations were relatively high during the 2012-2016 drought, and levels in sturgeon muscle in 2015 and 2016 were also relatively high and more frequently above the TMDL target. The extremely high freshwater flow during the wet season of 2016/2017 is expected to lead to lower concentrations in clams, which should also lead to lower concentrations in the white sturgeon tissue that will be collected by the RMP in the fall of 2017.

Keywords: Suisun Bay, selenium, sturgeon, clam

Session Title: Suisun Bay and Marsh: Where the Delta Meets the Bay

Speaker Biography: Dr. Jay Davis grew up near the PCB-contaminated aquatic food web of Lake Michigan. He has worked on contaminant issues in San Francisco Bay since 1986. He received his Ph.D. in Ecology at the University of California, Davis in 1997. Dr. Davis is Lead Scientist of the Regional Monitoring Program for Water Quality in San Francisco Bay, a comprehensive water quality monitoring program. He is also lead scientist for the Bioaccumulation element of the California State Water Resource Control Board's Surface Water Ambient Monitoring Program, which conducts statewide surveys of contaminants in aquatic food webs. Dr. Davis is also the co-Director of SFEI's Clean Water Program. His primary research interests are monitoring the accumulation of persistent contaminants in aquatic food webs of the Bay, its watershed, and aquatic ecosystems in California; and the work of John Lillison, England's greatest one-armed poet.

Progress and Challenges in Tackling Pesticides in the Estuary: Session Overview

Jan O'Hara, SF Bay Regional Water Board, johara@waterboards.ca.gov

Efforts to alleviate and prevent pesticides-related water pollution are taking a new direction. Monitoring and research increasingly focus on obtaining information that is useful for developing pollution mitigation measures. Three excellent examples of current actions and research are presented in this session.

Keywords: Pesticides, pollution mitigation measures

Session Title: Progress and Challenges in Tackling Pesticides in the Estuary

Speaker Biography: Jan O'Hara is an engineer with the SF Bay Regional Water Board. One of her responsibilities is implementing the TMDL for Pesticide-Related Toxicity in Urban Creeks, a task that requires integrating scientific data on pesticides & aquatic impacts; political realities of how pesticides are regulated; and social considerations like how people do/don't tolerate pests in their homes and yards.

Identifying an Unexpected Source of Urban Pesticide Pollution: Pet Flea Control Products

Rebecca Sutton, San Francisco Estuary Institute, RebeccaS@sfei.org

Urban insecticides fipronil and imidacloprid were monitored in eight San Francisco Bay Area wastewater treatment plants. In influent and effluent, ubiquitous detections were obtained for fipronil (13-88 ng/L), fipronil degradates including fipronil sulfone (1-28 ng/L) and fipronil sulfide (1-5 ng/L), and imidacloprid (58-306 ng/L).

In influent, 100% of imidacloprid and about two-thirds of the fipronil and degradates were present in the dissolved state, with the rest bound to particles. The insecticides persisted during wastewater treatment, regardless of treatment technology. About one-third of the fipronil and degradates partitioned into sludge; the rest of the fipronil and essentially all of the imidacloprid were discharged in effluent. This first regional study on fipronil and imidacloprid in raw and treated sewage revealed widespread detection and marked persistence to conventional treatment.

Spot-on flea and tick treatments for pets were identified as potential sources of pesticides in wastewater meriting further investigation and inclusion in chemical-specific risk assessments. While outdoor pesticide use is known to contaminate local creeks and urban runoff, this study was the first to suggest indoor uses like spot-on flea control treatments may also be significant. More recently, a study by the California Department of Pesticide Regulation measured significant levels of fipronil in wash water from fipronil-treated dogs that were bathed up to 28 days after receiving treatments. Safer flea control practices include oral medications or frequent indoor vacuuming.

Keywords: fipronil, imidacloprid, wastewater treatment plants, effluent, emerging contaminants, pollution prevention

Session Title: Progress and Challenges in Tackling Pesticides in the Estuary

Speaker Biography: Dr. Rebecca Sutton joined SFEI in 2013 as a Senior Scientist for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP). She leads the RMP's Emerging Contaminants Workgroup and a team of scientists investigating contaminants of emerging concern and microplastic in the San Francisco Bay and other regions of California. She also manages SFEI's Green Chemistry focus area, and has been appointed to California's Green Ribbon Science Panel to aid in the implementation of the state's Safer Consumer Products Regulations. Dr. Sutton received her B.S. in Environmental Resource Science from the University of California, Davis and her Ph.D. in Environmental Chemistry from the University of California, Berkeley. Prior to joining SFEI, she was a senior scientist with research and advocacy non-profit Environmental Working Group, where she conducted research on chemicals of concern in air, water, soil, consumer goods, and people.

Protecting Surface Water from Pesticide Related Toxicity: Science Driven Prevention and Response

Jennifer Teerlink, Calif. Dept. of Pesticide Regulation (CDPR), Jennifer.Teerlink@cdpr.ca.gov
Kean Goh, CDPR; Nan Singhasemanon, CDPR; Yuzhou Luo, CDPR; Robert Budd, CDPR; Michael Ensminger, CDPR; Xin Deng, CDPR; Sue Peoples, CDPR; Dan Wang, CDPR; Xuyang Zhang, CDPR; Aniela Burant, CDPR; Kevin Kelley, CDPR; Kaylynn Newhart, CDPR; Scott Wagner, CDPR; Yina Xie, CDPR; Korena Goodell, CDPR; Sean May, CDPR; Karri Peters, CDPR; Minda Dimaano, CDPR; Pamela Wofford, CDPR

The mission of the California Department of Pesticide Regulation's Surface Water Protection Program (SWPP) is to protect surface water from pesticide contamination caused by the use of pesticides in agricultural and urban environments. To achieve its mission, the program integrates the following key components: a) the evaluation of pesticide products submitted for registration in California, b) the monitoring of surface water and sediment for high use pesticides with high aquatic toxicity potential, c) the modeling of fate and transport of pesticides to predict environmental concentrations and assess environmental risk, d) the evaluation of the effectiveness of best management practices to mitigate the offsite movement of pesticides, e) the outreach to pesticide users to implement best management practices, and f) the implementation of regulatory measures. To implement the program mission, our scientists and analytical chemists work collaboratively with pesticide registrants, county agricultural commissioners, State and Regional water boards, pesticide users, and university researchers.

Keywords: Pesticides, Mitigation, Outreach, Monitoring, Modeling

Session Title: Progress and Challenges in Tackling Pesticides in the Estuary

Speaker Biography: Dr. Jennifer Teerlink is a Senior Environmental Scientist with the Department of Pesticide Regulation, Surface Water Protection Program. She serves as interagency liaison to State and Federal Agencies to coordinate and communicate efforts related to pesticides in surface water. Her current research focuses on identifying and quantifying pesticide inputs to wastewater catchments. Dr. Teerlink has a B.S. and M.S. in Geology and a PhD in Environmental Engineering.

Efforts to Reduce Pesticide Related Toxicity in the Delta and Its Tributaries in the Central Valley

Danny McClure, Central Valley Water Board, dmcclure@waterboards.ca.gov

For over 30 years, the Central Valley Water Board has been working on pesticide related toxicity in the Central Valley, including the Delta and its tributaries. Through a number of regulatory and non-regulatory efforts by the Board and others, there has been a reduction in the widespread toxicity once seen in the Delta and its major tributaries due to the organophosphate pesticides diazinon and chlorpyrifos. Concerns have now shifted to the potential toxic effects of pyrethroid pesticides and other pesticides which are detected in the Delta and its tributaries. The Central Valley Water Board is continuing to work on a number of fronts with partner agencies, researchers, the regulated community and other stakeholders to address current pesticide toxicity issues and help prevent future pesticide impairments.

Keywords: pesticides, toxicity, diazinon, chlorpyrifos, pyrethroids

Session Title: Progress and Challenges in Tackling Pesticides in the Estuary

Speaker Biography: Danny McClure, P.E. is Senior Water Resource Control Engineer with the California Regional Water Quality Control Board, Central Valley Region. Mr. McClure graduated from Humboldt State University in 1997 with a B.S. in environmental resources engineering. He worked at the Colorado River Basin Regional Water Board from 1998 to 2001 and at the Central Valley Regional Water Board from 2001 to present. At the Central Valley Regional Water Board, he worked on the development and implementation of water quality standards and control programs and Total Maximum Daily Loads (TMDL) for the pesticides diazinon and chlorpyrifos in multiple Central Valley waterbodies, water quality monitoring and assessment, and the development of the pyrethroids pesticides control program and TMDL.

Environmental Justice as Resilience: Water, Climate, People and Place

Colin Bailey, The Environmental Justice Coalition for Water, colin@ejcw.org
Hannah Doress, Shore Up Marin, hannah@WordOutConsulting.com
Marcus Griswold, Skeo, mgriswold@skeo.com
David Ralston, Bay Area Air Quality Management District, dralston@baaqmd.gov
Doria Robinson, Urban Tilth, doria@urbantilth.org

Planners and decision makers are beginning to embrace climate equity as a foundational principle in climate resilience. Frontline communities, including low-income and communities of color, are some of the first to experience impacts from climate change, and will be disproportionately impacted.

An integrated and multi-benefit approach is necessary to build coalitions, assess needs and develop and implement projects that not only improve water quality in frontline communities but also address issues of crime and illegal dumping, access to open space and active transportation, reduce multiple pollution burdens, engage youth and address long standing trust issues.

Keywords: climate equity, resilience, social justice

Session Title: Resilience through Social Equity: Planning Approaches for Climate Equity, Inclusion and Healthy Watersheds

Speaker Biographies:

Colin Bailey: Colin Bailey is the Executive Director and Managing Attorney of The Environmental Justice Coalition for Water (EJCW). An accomplished social justice attorney, Colin supports EJCW's policy agenda, programs, and grassroots member organizations. Building upon California's historic adoption of the Human Right to Water policy in 2012, EJCW supports the grassroots effort to implement and enforce this mandate statewide. Colin serves on several advisory committees for various State agencies and academic institutions. Colin received his J.D. from UCLA School of Law, with a certificate from the Public Interest Law and Policy Program and the Critical Race Studies Program. As a legal aid attorney, Colin served as lead counsel for a community coalition that, in 2012, after a five-year campaign, defeated a proposal to construct an underground natural gas storage facility that threatened to cause massive explosion and fire and contaminate the groundwater in a low-income community of color in south Sacramento.

Hannah Doress: Hannah Doress, is co-director of Shore Up Marin, a ground-breaking multi-racial coalition advocating for equitable approaches to sea-level rise, flooding, and emergency preparedness. She serves on the Steering Committee of Bay Area environmental justice and climate resilience planning coalition the Resilient Communities Initiative. She is also known for her leadership role in national digital news start up The Breaking News Network and for consensus-changing events promoting social, health and environmental progress on both coasts through Hannah Doress Events. Her success generating measurable climate actions through her Earth Day Marin Festivals was recognized with the Essence Award from the Renaissance Entrepreneurship Center.

Marcus Griswold: Marcus is a Senior Associate at Skeo, a national consulting firm focused on embedding equity and social justice into decisions made in and adjacent to environmental justice communities across the U.S. He received a Ph.D. in Environmental Engineering Sciences, where he has since utilized his background in, and love of nature, to manage watershed, climate change and environmental education programs and to support the use of science at a number of non-profits. Before moving to the west coast, he was a founding board member of Blue Water Baltimore and the Maryland Climate Communications Consortium, where he led efforts to communicate complex scientific issues to lay audiences.

David Ralston: David Ralston, PhD. After obtaining a masters in city planning and architecture, David received his doctorate in cultural geography from UCLA based on research of place-water and the cultural (re)formation of Los Angeles from the modern to postmodern periods. David has worked in the urban greening, environmental justice and community development fields also serving 15-years as a project planner for the City of Oakland. David is currently the community engagement manager for the regional government (Air District) in the San Francisco Bay Area and also works as an adjunct professor teaching regularly at Merritt College as a fellow of the Brower-Dellums Institute for Sustainable Policy Studies. David lives with his family in Oakland, California.

Doria Robinson: Doria is 3rd generation resident of Richmond, California and the Executive Director of UrbanTilth, a community based organization rooted in Richmond dedicated to cultivating a more sustainable, healthy, and just food system.

In 2014 she led the charge to develop Urban Tilth's Basin's of Relations Watershed restoration and stewardship training program, drawing on the work she did with the Watershed Project, Urban Creeks Council and the thinking and insights of her friend Brock Dolman of the Water Institute at Occidental Arts and Ecology Center. Basins of Relations trains and employs young people from West Contra Costa County to become stewards of their watersheds, communities, and the creeks that run through them. Each year, this program employs and trains a Watershed Restoration Technician (WRT) team capable of contributing to restoration projects and leading watershed awareness programs in West Contra Costa County. Over the course of a summer training program and a year-long apprenticeship, the WRT team develops a set of skills and expertise that will help them support their local watershed, their community, and their own career. Topics covered include riparian ecology, native flora and fauna identification, horticulture, hydrology, water quality testing, community engagement and leadership, storm water management and creek restoration.

Doria currently lives in the neighborhood she grew up in in Richmond with her wonderful 15 year old twins.

Community-University Research Partnerships for Environmental Justice

Jonathan London, UC Davis Department of Human Ecology and Center for Regional Change, jklondon@ucdavis.edu

Community-university research partnerships can be empowering for all parties, but only if they are based on the principles of mutual respect, shared power and reciprocal learning. This is especially important in partnerships with communities that have been historically underserved and marginalized. The UC Davis Center for Regional Change is dedicated to building community-university research partnerships to develop solutions-oriented that can inform policy and advocacy to build healthy, prosperous, sustainable and equitable regions in California and beyond. This presentation shares the process and outcomes to date of an action research project on drinking water access in Disadvantaged Unincorporated Communities (DUCs) in California's San Joaquin Valley. Residents in DUCs typically lack access to clean, affordable, and abundant water supplies for drinking and sanitation uses. The CRC has partnered with a diverse range of water justice advocates to design and implement this study to ensure that it is relevant their policy advocacy goals.

Keywords: environmental justice, community-university research partnerships, human right to water

Session Title: Community-Based Participatory Research

Speaker Biography: Jonathan London is an educator, researcher, and community-builder with experience in participatory research, rural community development, and community engaged planning. He holds a B.A. in Environmental Studies from Brown University; a Master's Degree in City and Regional Planning; and a Ph.D. in Environmental Science Policy and Management from UC Berkeley. Jonathan's research addresses conflicts and collaboration in natural resource and environmental management, with a particular emphasis on environmental justice in rural communities. Jonathan also directs the UC Davis Center for Regional Change, which serves as a catalyst for multi-disciplinary research that informs efforts to build healthy, prosperous, equitable, and sustainable regions in California and beyond.

Community Environmental Monitoring as a Tool to Address Health Disparities

Catalina Garzón-Galvis, Senior Health Educator, California Environmental Health Tracking Program, catalina.garzon@cdph.ca.gov

Community environmental monitoring can be a powerful tool for documenting environmental health conditions and supporting public health actions to address health disparities. As a form of citizen science, community environmental monitoring can engage local residents and other impacted stakeholders in collecting, analyzing, and disseminating data about environmental and health conditions. Community environmental monitoring that applies a participatory research approach can increase the relevance of research questions, demystify and democratize the production of scientific knowledge, support innovations in environmental sensors and other data collection technologies, lead to improved regulatory monitoring and enforcement, and impact policies that promote and protect health. Several examples of community and stakeholder engagement in environmental monitoring projects at various stages of development will be shared to help illustrate the strengths and limitations of this approach. We will discuss the creation of community air monitoring networks in California's Imperial Valley and Coachella Valley in partnership with community-based organizations in order to provide real-time information on particulate matter levels that can support public health actions to reduce exposure. We will also share our efforts to crowdsource a statewide map of service area boundaries for drinking water systems in collaboration with local water boards and state agencies, which is a key step in our objective to map drinking water quality throughout the state. Applications and implications of the outcomes of these projects to support public health actions to improve air and water quality as well as to address related health disparities will be discussed. Ways to optimize and sustain meaningful community and stakeholder engagement via collaborative partnerships with academically-credentialed researchers throughout the research and project development process will also be emphasized.

Keywords: Citizen science, participatory research, air quality monitoring, drinking water systems

Session Title: Community-Based Participatory Research

Speaker Biography: Catalina Garzón-Galvis is Senior Health Educator with the California Environmental Health Tracking Program of the Public Health Institute. Garzón-Galvis has over fifteen years of experience in leadership development, popular education, participatory research, training and technical assistance on environmental health and justice issues. Her work has included coordinating community-based planning, participatory action research, and participatory curriculum development partnerships with community-based organizations and coalitions on issues including youth justice, park conditions, freight transport planning, and climate change adaptation. She holds a Master's Degree in City and Regional Planning from UC Berkeley and is a PhD Candidate in the Department of Environmental Science, Policy and Management at UCB, where she is focusing her dissertation on Community-Based Participatory Research partnerships for environmental justice in the San Francisco Bay Area. Garzón-Galvis is the 2010 recipient of

the Thomas I. Yamashita Prize, which honors scholars whose work serves as a bridge between academia and communities.

How the West Oakland Environmental Indicators Project Got Involved with Citizen Science

Margaret Gordon, West Oakland Environmental Indicators Project, margaret.woeip@gmail.com

West Oakland Environmental Indicators Project (WOEIP) came together as a way to educate residents to learn the power of Community Base Participatory Research (CBPR), starting in 2002. By having indicators as tools to measure and strengthen base assessments and the disparities of issues or concerns, this new method came about addressing lack of resources and tools in West Oakland.

Coming together as a group to use CBPR, we as community of residents, with the support of a research partner, the Pacific Institute, wrote the following reports: Neighborhood Knowledge of Change (2002), Clearing the Air (2004), and Pay with our Health (2006).

Each year following a CBRP publication, WOEIP participated and engaged residents in on-the-ground training such as counting trucks to know how many travelled to West Oakland, counting trees to know the relationship with air quality and to protect them from toxic air pollution, doing indoor and outdoor studies with room air monitors, and working with senior citizens living near the three freeways of West Oakland.

Then 2006 or 2007, WOEIP through the participation of regulatory agencies, learned that all the agencies' air monitors were three floors off the ground, which to WOEIP was not a measure of air quality nor where people were who daily suffer from air pollution that comes from the Port of Oakland or three freeways surrounding West Oakland.

Intel had a pro-type project development in Berkeley in 2008 and had heard of WOEIP doing on-the-ground air monitoring. Through WOEIP connecting with Intel, they gave WOEIP technology assistance in the use of the TSI Dusk Tracker. WOEIP starting training residents, youth, and EJ groups in the City of Oakland how to use TSI. Unknowingly by having used the equipment to test air quality, WOEIP had been engaging in Citizen Science and in 2013, WOEIP received the White House Champion of Change Science award.

Keywords: citizen science equity environmental justice community participatory research West Oakland

Session Title: Community-Based Participatory Research

Speaker Biography: Ms. Margaret Gordon is co-founder and co-director of the West Oakland Environmental Indicators Project (EIP). EIP works with neighborhood organizations, physicians, researchers, and public officials to ensure West Oakland residents have a clean environment, safe neighborhoods, and access to economic opportunity. Gordon¹s expertise has earned her roles on the California Environmental Health Tracking Projects Alameda County Pilot Project, the West Oakland Project Area Committee, and the Bay Area Air Quality Management District¹s Community Air Risk Evaluation Program. Governor Schwarzenegger appointed Gordon to the

Cabinet Level Goods Movement Working Group. She is an at-large member of the state Air Resources Board's Environmental Justice Advisory Committee, and co-chairs the planning process for the Port of Oakland Maritime Air Quality Improvement Plan. Gordon won the Purpose Prize, Bay Area Business Roundtable Spotlight Award, Healthy Communities Oakland Environmentalist Award, the ACLU Grover Dyer Award, and the Multi Ethic Hall of Fame Humanitarian Award.

Managing in an Era of Increasing Variability: Building Resiliency into our Social, Political and Eco Systems

Grant Davis, Director, California Department of Water Resources

Session Title: Day Two Plenary Session

Speaker Biography: Grant Davis was appointed Director of the California Department of Water Resources by Governor Edmund G. Brown Jr. in August 2017. DWR operates and maintains the California State Water Project, manages floodwaters, monitors dam safety, conducts habitat restoration, and provides technical assistance and funding for projects for local water needs. Davis will oversee the Department and its mission to manage and protect California's water resources, working with other agencies in order to benefit the State's people and to protect, restore and enhance the natural and human environments.

Davis has been the General Manager of the Sonoma County Water Agency (SCWA) since 2009, where he also served as the Assistant General Manager from 2007 to 2009. Davis was responsible for SCWA's core functions of maintaining nearly 100 miles of streams and detention basins for flood protection, restoring habitat for three federally listed fish species in the Russian River, delivering drinking water to more than 600,000 residents of Sonoma and Marin counties, and providing wastewater management for 60,000 customers. In cooperation with the U.S. Army Corps of Engineers, he was also responsible for the operation of Lake Mendocino and Coyote Valley Dam and Lake Sonoma and Warm Springs Dam. Davis was instrumental in implementing a renewable energy portfolio that has resulted in a carbon free water supply and distribution system. Prior to joining the Sonoma County Water Agency, Davis was Executive Director of The Bay Institute – a science-based, non-profit organization dedicated to protecting the San Francisco Bay-Delta watershed and improving water management in California. He was Executive Director from 1997 – 2007. In addition, Davis has an extensive legislative and policy background working at the local, State and federal levels of government. A graduate of the University of California, Berkeley, Davis received a Bachelor of Arts degree in Political Science.

Policy Recipe for Water Reliability and Resiliency in California: What are the Ingredients?

Steven Moore, Vice Chair, State Water Resources Control Board

Water supply reliability and ecosystem protection were established as the state's co-equal goals for the Bay-Delta in 2009, and we continue to struggle to find a recipe for success. The California Water Action Plan was developed by the Brown Administration as an all-of-the-above menu for action-based water policy in late 2013, just as the state was entering its worst drought. Some successes related to the Action Plan include the passage of Prop 1's $7.5 billion Water Bond by voters and its orderly distribution, the passage of the Sustainable Groundwater Management Act (SGMA) and formation of Groundwater Sustainability Agencies (GSAs) in over 99% of the affected basins, the increased monitoring and reporting of water diversions and urban water production, and the resulting 20% improved water efficiency that has been sustained beyond the drought. Many challenges remain such as safe drinking water for over 300 disadvantaged communities, and the decline of aquatic ecosystems amplified by the drought, an issue especially relevant to the San Francisco Bay-Delta Estuary. The principles of the Action Plan are as important as ever as the Brown Administration enters its final year, helping the state's water systems and environment become more resilient as they are challenged by a changing climate, increasing population, and aging infrastructure. What have we learned from the successes achieved under the Action Plan, and what ingredients were critical to getting these issues over the finish line, which could be applied to remaining challenges? What is the recipe for success? This presentation will discuss elements of some successful initiatives, especially collaboration and trust-building, local management with a state backstop, treating water as a service and not a commodity, and the importance of open water data and joint fact-finding to build trust and support for difficult decisions.

Keywords: California water policy, California Water Action Plan, water supply reliability, water system resilience, ecosystem protection,

Session Title: Day Two Plenary Session

Speaker Biography: Steven Moore was appointed to the board by Governor Edmund G. Brown Jr. in 2012, reappointed in 2016, and elected as Vice Chair of the Board in 2017. He previously served on the San Francisco Bay Regional Water Board from 2008-2012 under the Brown and Schwarzenegger administrations and held staff positions at that Regional Water Board at various times between 1992 and 2006.

Between 1989 and 2012, Mr. Moore worked over 10 years as an engineer and consultant on a wide variety of water infrastructure projects, including sewer reconstruction, recycled water, stormwater, water supply, stream and wetland restoration, and Environmental Impact Reports throughout California. Mr. Moore has experience both obtaining and issuing discharge permits, wetland permits, and clean water grants and loans. He led Basin Planning for the Regional Water Board from 2002 to 2006.

Mr. Moore holds a B.S. in biological sciences and an M.S. in civil engineering, both from Stanford University. He is a registered civil engineer and a member of the American Society of Civil Engineers.

Infrastructure Stability in Increasingly Unstable Times

Steve Ritchie, Assistant General Manager of Water Enterprise, San Francisco Public Utilities Commission

Infrastructure, particularly water infrastructure, is one of the major elements that binds a society together. Threats to the stability of our water infrastructure are many and varied. Fire, drought, earthquake, climate change, aging workforce, reduced revenue, regulatory changes, and legislative changes all represent challenges to our ability to deliver water to 2.7 million people in the San Francisco Bay Area. This presentation will cover each of these challenges, the potential instability they represent, and how we need to be resilient to them.

Session Title: Day Two Plenary Session

Speaker Biography: Steven Ritchie is Assistant General Manager for Water of the San Francisco Public Utilities Commission (SFPUC); responsible for overseeing water system operations and planning including the management of SFPUC lands and natural resources. Prior to this, he managed the South Bay Salt Pond Restoration Project, a multi-agency effort to restore 15,100 acres of valuable habitat in South San Francisco Bay while providing for flood risk management and public access. In addition, in his 40-year career, he has worked in management positions at the San Francisco Bay Regional Water Quality Control Board, the CalFed Bay-Delta Program, and URS consultants. He has a B.S. and M.S. in Civil Engineering from Stanford University.

Jean Auer Award

Carl Wilcox, Policy Advisory to the Director for the Delta, California Department of Fish and Wildlife

Award Title: Jean Auer Award

Presenter Biography: Carl Wilcox is the Delta Policy Advisor to the Director of the California Department of Fish and Wildlife, which included directing the Department's involvement in the Bay Delta Conservation Plan. Prior to his assignment as Policy Advisor, he managed the Department's Bay Delta Region and was responsible for fisheries and wildlife management, lands management, and habitat conservation planning and permitting programs. Mr. Wilcox has a Master of Science in Biology from New Mexico Highlands University and a Bachelor of Science in Biological Conservation from California State University Sacramento.

Water – By Design – As Leverage for Transformative Impact

Henk Ovink, Special Envoy for International Water Affairs, Kingdom of The Netherlands

Global urbanization provides many opportunities for growth, prosperity, innovation, emancipation, equality and prosperity. At the same time, rapid population growth and the increasing disastrous impact of climate change threaten our cities and landscapes, ecology and citizens, our society. Our current use of raw materials is unsustainable, and its combined effect with climate change is disastrous. Water is at the heart of these crises, at the heart of that uncertain future. Floods and droughts, contamination and water conflicts are linked worldwide to rapid urbanization, the growing demand for energy and food, and the pressures of migration and climate change. The combination of all this is lethal and disruptive to people and the planet. But this also goes the other way: a better understanding of these complex risks and impact dependencies provides insight into pathways forward, real solutions with transformative capacity. Water is then the inspiration, the source and the lever for change, with key interventions, on every scale across all interests. From risk to reward, with real added value for all.

And it is on us, we are the ones that have the capacity, the understanding and capability. Never were we in a better place; we see the urgency and can identify the opportunities and potential solutions. And we have all means at our hands to act upon our knowledge and understanding. Wicked problems can only be met with inclusive approaches, by collaboration in strong coalitions. With partners on every scale and from every discipline, background and representation. We have no time to waste, let's work on this together. Now.

Session Title: The New Wave of Climate Resilience

Speaker Biography: Henk Ovink was appointed by the Dutch Cabinet as the first Special Envoy for International Water Affairs (2015). As the Ambassador for Water, he is responsible for advocating water awareness around the world, focusing on building institutional capacity and coalitions among governments, multilateral organizations, private sector and NGO's to address the world's stressing needs on water and help initiate transformative interventions. Ovink is also Sherpa to the High Level Panel on Water, installed by UN Secretary General Ban Ki Moon and President of the World Bank Jim Kim with 10 Heads of State / Heads of Government to catalyze change in water awareness and implementation. Henk was the Principal for Rebuild by Design, the resilience innovation competition he developed and led for President Obama's Hurricane Sandy Rebuilding Task Force where he was Senior Advisor to the Chair. He has been Director General for Planning and Water Affairs and Director for National Spatial Planning in The Netherlands. Ovink teaches at the London School of Economics and at Harvard GSD and is a member of the International Advisory Board for the City of Rotterdam. He was Curator for the 5th International Architecture Biennale Rotterdam 2012 'Making City', and curated the debate series 'Design and Politics: the next phase' for Aedes network Campus Berlin. He initiated the research program and is chief editor of the series of publications with NAI010 Publishers on Design and Politics.

What Will the Next Wave of "Resiliency" Look Like?

Henk Ovink, Moderator, Special Envoy for International Water Affairs, Kingdom of the Netherlands
Josh Bradt, Environmental Planner, SFEP
Letitia Grenier, Resilient Landscapes Program Director, SFEI
Kiran Jain, Chief Operating Officer and General Counsel of Neighborly and former Chief Resiliency Officer, Oakland
Lindy Lowe, Planning Director, BCDC
Rachelle Reichert, Artist, San Francisco

What will the next wave of "resiliency" look like? We will explore this question during a moderated conversation among panelists from various sectors who are changing the way we think about resiliency planning and implementation in the Bay Area.

Session Title: The New Wave of Climate Resilience

Speaker Biographies:

Henk Ovink: Henk Ovink was appointed by the Dutch Cabinet as the first Special Envoy for International Water Affairs (2015). As the Ambassador for Water, he is responsible for advocating water awareness around the world, focusing on building institutional capacity and coalitions among governments, multilateral organizations, private sector and NGO's to address the world's stressing needs on water and help initiate transformative interventions. Ovink is also Sherpa to the High Level Panel on Water, installed by UN Secretary General Ban Ki Moon and President of the World Bank Jim Kim with 10 Heads of State / Heads of Government to catalyze change in water awareness and implementation. Henk was the Principal for Rebuild by Design, the resilience innovation competition he developed and led for President Obama's Hurricane Sandy Rebuilding Task Force where he was Senior Advisor to the Chair. He has been Director General for Planning and Water Affairs and Director for National Spatial Planning in The Netherlands. Ovink teaches at the London School of Economics and at Harvard GSD and is a member of the International Advisory Board for the City of Rotterdam. He was Curator for the 5th International Architecture Biennale Rotterdam 2012 'Making City', and curated the debate series 'Design and Politics: the next phase' for Aedes network Campus Berlin. He initiated the research program and is chief editor of the series of publications with NAI010 Publishers on Design and Politics.

Josh Bradt: Josh Bradt is an Environmental Planner and Project Manager at the San Francisco Estuary Partnership. His work primarily focuses on the promotion of Green Infrastructure practices and policies at the local and regional levels. Josh's current projects range from design & construction of site specific stormwater retrofits to developing planning tools and funding streams to ensure widespread implementation. Josh is brings watershed planning and urban stream restoration expertise to the Partnership from his previous career stops at the City of Berkeley, the Urban Creeks Council of California, and the Contra Costa Countywide Clean Water Program. He is enthused by place-making, community engagement, and opportunities to be in the field.

Letitia Grenier: Letitia Grenier is a Senior Scientist at the San Francisco Estuary Institute, where she co-directs the Resilient Landscapes Program. She was the science lead for the 2015 State of the Estuary Report (a SF Estuary Partnership project) and the 2015 climate change update to the Baylands Ecosystem Habitat Goals (a California Coastal Conservancy project), heading a team of over 200 environmental scientists, managers, and regulators to develop science-¬based recommendations for restoring and maintaining the health the Bay's tidal wetlands in the face of rising sea levels and other stressors. She is a principal investigator for the Delta Landscapes project, which has completed in-depth analyses on the change in the Delta over time and is now offering science-based guidance on how ecosystem health can be recovered as part of this working landscape. Letitia holds a Ph.D. in Conservation Biology from the University of California at Berkeley and has previously worked on investigating bioaccumulation of contaminants in estuarine food webs, the condition of California's wetlands, and other ecological questions about San Francisco Bay. Her focus now is to work with partners to conserve California's living resources by developing landscape-¬scale, collaborative visions and solutions for ecological resilience.

Kiran Jain: Kiran Jain is the Chief Operating Officer and General Counsel of Neighborly, a venture-backed company delivering modern public finance to build the infrastructure people rely on to work, live, and play. She is the former Chief Resilience Officer for the City of Oakland, one of the inaugural cities in the 100 Resilient Cities network pioneered by the Rockefeller Foundation. Kiran also served as a senior deputy city attorney focusing on land use, urban redevelopment and municipal governance. She is also the founder of the Civic Design Lab, a firm focused on building community resilience. From 2010 through 2013, Kiran served on the board of Asian Law Caucus, the nation's first legal and civil rights organization serving low-income Asian Pacific American communities. Kiran also served as the founding attorney for Kiva, a nonprofit microfinance platform with a mission to connect people through lending to alleviate poverty. She also pioneered the partnership between Kiva and the City of Oakland to crowdfund local economic development, which has raised over 400 zero-percent loans totaling over $2 million. Prior to law school, Kiran worked at the United Nations Climate Change Secretariat in Bonn, Germany. Kiran has an A.B. in economics and minor in environmental science from Barnard College, a Master's Degree in international affairs from Columbia University, and a Juris Doctorate from Georgetown University.

Lindy Lowe: Lindy Lowe was most recently the Director of Planning Programs at the Bay Conservation and Development Commission, where she developed and led the Adapting to Rising Tides (ART) Program, a nationally recognized climate adaptation planning program. At BCDC, she headed the planning team and focused on complex planning and policy issues and improving public and stakeholder processes. Prior to joining BCDC she worked for the City of San Diego as a community planner focusing on the urban-wildlands interface, wildfire reduction, habitat conservation planning, community engagement and affordable housing. Lindy studied Urban and Regional Planning with an emphasis on Public Health and Environmental Law from the University of California, Los Angeles.

Rachelle Reichert: Rachelle Reichert is an artist and educator in San Francisco. Rachelle creates drawings and sculptures with mined or harvested substances, such as graphite and salt, as foundation in exploring social and ecological concerns. Select exhibitions include the German

Consulate in New York City, SFMOMA Artist Gallery, Southern Exposure, and Mills College Art Museum. Rachelle was awarded residencies at Planet Labs, Can Serrat in Spain, and grants from the Susan Pilner Money for Women Artist Fund and the Russek Foundation. Her work has been reviewed and published in the San Francisco Chronicle, Make Magazine, and New American Paintings. This year Rachelle presented her artwork at the California Climate Change Symposium, Stanford University's Urban Resilience Initiative and has been granted a Research Ambassadorship from Planet's Labs to create climate-related artwork with satellite imagery. She earned her MFA from Mills College in Oakland, CA and a BFA from Boston University. To see her artwork visit www.rachellereichert.com.

Species Response to Habitat Restoration and Management in San Francisco Bay

Joy Albertson, U.S. Fish and Wildlife Service-San Francisco Bay NWR Complex, Joy_Albertson@fws.gov

San Pablo Bay and Don Edwards San Francisco Bay National Wildlife Refuges are managed by the U.S. Fish and Wildlife Service for the benefit of federally-listed species, migratory birds, and other native wildlife and plants. Refuge actions focus on habitat restoration and management to improve nesting, roosting, and foraging opportunities for target species, and on reduction of negative impacts to these species from threats such as predation, habitat degradation, and climate change. Working in cooperation with many agencies, public, and private partners, we plan and implement recovery actions for tidal marsh dependent species and other listed species, and work toward habitat restoration and species population goals defined in regional plans.

Recent large-scale wetland restoration projects, such as the South Bay Salt Pond Restoration Project in the South San Francisco Bay, and numerous wetland restoration projects in San Pablo Bay are already showing benefits to species such as the California Ridgway's rail, salt marsh harvest mouse, waterfowl, and shorebirds. Two marsh restoration sites that have recently developed into functioning tidal marsh are Sonoma Baylands in San Pablo Bay and Pond A21 in the South Bay, both of which now support populations of Ridgway's rail. Populations of waterfowl and shorebirds are thriving in the South Bay Salt Ponds and in newly breached tidal marsh restoration projects such as Cullinan Ranch.

The Refuge is working within an adaptive management framework to learn from these past efforts, and considering potential climate change impacts in planning future restoration projects to increase species resilience in an uncertain future. Tidal marsh restoration design incorporates features such as marsh-upland transition zones and high tide refuge islands, as well as considering sediment re-use to accelerate the restoration process. Pond management includes managing water levels to provide adequate waterbird foraging opportunities, and managing nesting islands.

Keywords: tidal marsh, restoration, endangered, migratory birds, San Francisco Bay

Session Title: Species Response to Restoration and Environmental Change

Speaker Biography: Joy Albertson is the Supervisory Wildlife Biologist for the San Francisco Bay National Wildlife Refuge Complex, leading a team of biologists on seven diverse refuges throughout the San Francisco Bay area. She earned a bachelor degree in Zoology-Wildlife Biology from North Dakota State University, and a graduate degree in Conservation Biology from San Francisco State University. Joy studied California Ridgway's rail ecology for her master's thesis, and has worked as a biologist in the San Francisco Bay area for more than 25 years. Her expertise is endangered species management and tidal marsh restoration.

Waterbird Nesting Ecology and Management in San Francisco Bay

Josh Ackerman, USGS, jackerman@usgs.gov
Alex Hartman, USGS, ahartman@usgs.gov
Mark Herzog, USGS, mherzog@usgs.gov

The South Bay Salt Pond Restoration Project faces several challenges in maintaining waterbird populations in San Francisco Bay, including loss of island nesting habitat, an expanding population of predatory California Gulls, and widespread mercury contamination. The number of colonies and overall population sizes of American Avocets, Black-Necked Stilts, and Forster's Terns have decreased over the past decade. The majority of Avocets and Terns nest on islands within managed wetland habitats, yet these managed ponds along the Bay's margins are being lost to tidal marsh conversion. Using a series of habitat selection studies, we developed a recipe for island design to maximize bird use of new nesting islands being installed by managers within remaining managed ponds. Additionally, we implemented social attraction techniques (decoys and electronic call systems) to establish nesting colonies of Caspian Terns (>300 nests) within two managed ponds containing 46 newly constructed nesting islands (Ponds SF2 and A16). The nesting population of California Gulls has expanded rapidly, and they are the predominant predator of waterbird eggs and chicks, accounting for 55% of Avocet, 54% of Forster's Tern, and 15% of Black-Necked Stilt chick deaths. The managed relocation of the largest California Gull colony in the estuary (Pond A6: 24,000 gulls) substantially increased Forster's Tern chick survival (by 900%) in the nearby tern colony compared to a more distant reference tern colony. Finally, habitat management actions can result in increased mercury contamination of the food web. We found that conversion of a former salt pond to muted tidal marsh habitat (Pond A8) resulted in a short-term (1-2 years) spike (by 70%) of mercury concentrations in Forster's Tern eggs above toxicity benchmarks, but that restored ponds returned to reference levels within 3 years. Together our results indicate that management can have substantial effects on waterbird nesting populations in San Francisco Bay.

Keywords:

Session Title: Species Response to Restoration and Environmental Change

Speaker Biography: Dr. Josh Ackerman is a Principal Investigator with USGS and an Associate in the Department of Wildlife, Fish, and Conservation Biology at the University of California, Davis. His research specialty is in behavioral and community ecology, and his research program focuses on waterbird ecology, avian reproduction, contaminant bioaccumulation, and effects of contaminants on avian reproduction. He received his Ph.D. in Ecology from the University of California, Davis in 2002.

Evaluating Tidal Wetland Restoration: 20 years of Physical and Biological Monitoring at the Sonoma Baylands Restoration

Michelle Orr, Environmental Science Associates, morr@esassoc.com
Eric Jolliffe, US Army Corps of Engineers, Eric.F.Jolliffe@usace.army.mil
Lindsey Sheehan, Environmental Science Associates, LSheehan@esassoc.com
Stephen Crooks, Silvestrum Climate Associates, steve.crooks@silvestrum.com
Gavin Archbald, H.T. Harvey & Associates, GArchbald@harveyecology.com
Max Busnardo, H.T. Harvey & Associates, MBusnardo@harveyecology.com
Annie Eicher, H.T. Harvey & Associates, AEicher@harveyecology.com
Jules Evens, Avocet Research Associates, avocetra@gmail.com

In 1996, a 120-ha (300-acre) site in San Francisco Bay received 1.5 M cubic meters (1.9 M CY) of dredged material, becoming one of the first to beneficially reuse dredged material to create coastal wetlands. We present 20 years of physical and biological monitoring data showing how the site, the Sonoma Baylands Restoration, has evolved and lessons learned that can be applied to current restoration efforts.

Summary of findings:

• The decision not to excavate larger outboard channels meant that tidal exchange to the site was initially very limited. Tidal scour of these channels accelerated after 4-7 years, resulting in a 50-fold increase in channel size (from approx. 2 m^2 to 100 m^2). Monitoring and adaptive management were used to identify and remove erosion-resistant barriers to outboard channel evolution.

• The site has converted from open water to intertidal flats and emergent marsh. With placement of dredged material and 0.3 – 0.6 m of estuarine sedimentation, much of the site is at elevations suitable for colonization by emergent vegetation. Marsh vegetative cover is 72% of the tidal area.

• Tidal channel erosion into the placed dredged material has resulted in an interior channel system similar in extent to natural reference marshes. Channel down-cutting into the former agricultural surface (beneath the dredged material) has been slower.

• 25 species of fish and 83 species of birds use the site; this number increased over time as tidal exchange improved. With open water converting to tidal flats over time, avian use has shifted away from waterfowl towards shorebirds (as expected), which now comprise 87% of avian use of the site.

The Sonoma Baylands Restoration was funded by the U.S. Army Corps of Engineers and the California State Coastal Conservancy.

Keywords: salt marsh restoration, wetland restoration, beneficial reuse, dredged material, monitoring

Session Title: Species Response to Restoration and Environmental Change

Speaker Biographies:

Michelle Orr: Michelle Orr is a water resources engineer with Environmental Science Associates who has been restoring wetlands in San Francisco Bay and along the West and Gulf coasts for over 20 years.

Eric Jolliffe: Eric Joliffe is a senior biologist with the US Army Corps of Engineers, San Francisco District.

Ridgway's Rail Response to Adaptive Tidal Marsh Restoration

Julian Wood, Point Blue Conservation Science, jwood@pointblue.org
Nadav Nur, Point Blue Conservation Science, nnur@pointblue.org
Leo Salas, Point Blue Conservation Science, lsalas@pointblue.org
Megan Elrod, Point Blue Conservation Science, Melrod@pointblue.org

The California Ridgway's Rail, a federally endangered species dependent on tidal marsh habitat in the San Francisco Bay Estuary, is the target of conservation investments designed to increase their population size and their resilience to the impacts of climate change, including increasingly frequent extreme flooding events. To date, there has been no rigorous assessment of the efficacy of these innovative enhancement strategies, designed to directly benefit Ridgway's Rails. Through a multi-agency stakeholder process, working with the U.S. Fish and Wildlife (USFWS) and the State Coastal Conservancy's (SCC) Invasive Spartina Project (ISP), we developed a framework for assessing the impact of novel restoration and enhancement strategies on target populations through field surveys and rigorous analyses. We assessed the impact of two different tidal marsh enhancement strategies: marsh revegetation, planting of native *Grindelia stricta* (gumplant) and construction of high tide, in-marsh refugia mounds. Using a multi-partner, 12-yr dataset, comprising 157 marsh sites, with and without enhancement, we analyzed changes in rail density over time and in response to tidal restoration and innovative marsh enhancement. We compared these changes to the trends in density at different spatial scales and different marsh types. Ridgway's Rail density trends continue to increase in both San Pablo and San Francisco Bays and are similar to densities before the steep decline in 2008. This increase is due in part to evolving restoration sites, such as Sonoma Baylands, providing quality habitat. In the coming years, the results of this ongoing study, the assessment framework being developed, and the ensuing science-based recommendations will lead to improved tidal marsh enhancement strategies that benefit tidal marsh-dependent bird populations.

Keywords: Ridgway's Rail, tidal marsh, adaptive restoration, climate change

Session Title: Species Response to Restoration and Environmental Change

Speaker Biography: Julian is the San Francisco Bay Program Leader at Point Blue Conservation Science. He works to advance wetland-dependent bird conservation by leading innovative research and informing on-the-ground restoration and management. He also assists agencies and organizations in understanding and preparing for the negative impacts of climate change on wildlife and human communities. His current areas of interest include bird response to innovative and adaptive habitat restoration, impacts of human land use and working with stakeholders in developing and using decision support tools to assist with climate change adaptation in San Francisco Bay.

Evaluating Tidal Marsh Benefits through the (Fish) Eye of the Beholder: Understanding How Fish Communities Respond to Wet and Dry Periods in the Upper Estuary

Lenny Grimaldo, ICF, lenny.grimaldo@icf.com
Jillian Burns, San Francisco State University Romberg Tiburon Center, jillian.burns@icf.com
Jason Hassrick, ICF, jason.hassrick@icf.com
Andrew Kalmbach, ICF, andrew.kalmbach@icf.com
Rob Miller, ICF, montana.mykiss@yahoo.com

Management and conservation of listed species requires an understanding of the ecological processes that drive recruitment. Previous research in the San Francisco Estuary emphasized the importance of spring freshwater outflow to support the fish populations, in part, because abundance of many pelagic species increases by an order of magnitude during periods of higher spring outflow to the estuary. Mechanisms underlying why fish respond favorably to higher flow conditions remains unclear for many estuarine species. During 2016 and 2017, we surveyed larval fish communities in tidal marsh and offshore habitats in the upper San Francisco Estuary to determine what factors affect larval rearing distribution and abundance. Our results suggest that marshes in Suisun Bay and San Pablo Bay are important nursery habitats for Pacific Herring and Northern Anchovy during periods of lower outflow into the estuary. In contrast, during wet years with higher outflow, tidal marshes and shallow areas in San Pablo Bay are important rearing habitats for Longfin Smelt and other native fish. Overall, fish abundance was higher in tidal marsh and shallow offshore habitats compared to channel habitats. These changes in community composition appear to be largely driven by differences in water quality, prey availability, hydrodynamics, and ocean conditions. We encourage managers and scientists to consider spatially dynamic ecosystem objectives that span fixed geographic boundaries when designing targeted management and restoration actions for species of concern in the San Francisco Estuary.

Keywords: Longfin Smelt, Estuary, restoration, larval fish, Herring

Session Title: Species Response to Restoration and Environmental Change

Speaker Biography: Lenny Grimaldo works for ICF in San Francisco, California. He has been conducting fisheries research in the San Francisco Estuary for over 20 years, primarily focused on delta smelt, longfin smelt, and tidal marsh studies. Lenny Grimaldo received his PhD in Ecology from UCD and his M.S. in Marine Science from SFSU RTC.

Does Loss of Estuary Surf Scoters Indicate Declining Subtidal Habitats?

John Takekawa, Audubon California, jtakekawa@audubon.org

In the highly urbanized estuary of San Francisco Bay, the Richardson Bay shoals support dense eelgrass beds (*Zostera marina*) that provide structure and habitat for spawning Pacific herring (*Clupea pallasii*). Adult herring and their roe contribute to the diet of many wintering waterbirds in the estuary including the largest southernmost concentration of surf scoters (*Melanitta perspicillata*) in the Pacific Flyway. However, over the past 3 decades, the extent of historic eelgrass beds have decreased, the herring spawn and its fishery has declined, and the midwinter index for scoters has plummeted 90% from 30,000 to 3,000 birds in the estuary. Threats associated with growth of the human population have included increasing disturbance, contaminants, and oil spills (including the 2007 Cosco-Busan spill when a large number of scoters were killed). Yet, the Bay Area and its conservation community have had little direct response to these alarming declines, primarily because there is a lack of understanding of the underlying ecology of these species and their shoal habitats, including the critical contribution of the shoals to the overall biodiversity of the estuary. Here, I will discuss how Audubon California is seeking to motivate actions to benefit wintering scoters and other sea ducks by recruiting grassroots community involvement through participation in science-based conservation efforts. I will summarize information needed to better understand the eelgrass-herring-scoter relationships, the importance of the shoals, and the potential effects of emerging threats. Finally, I will discuss the challenges of integrating participation by community members in science-based conservation and the critical role participation serves in leading to conservation action.

Keywords: sea ducks, Richardson Bay, Audubon, community

Session Title: Species Response to Restoration and Environmental Change

Speaker Biography: Dr. John Y. Takekawa is Audubon California's Director of San Francisco Bay Programs. His research specialty has been on the ecology of waterbirds with expertise in telemetry to study movement ecology. His research work has included examining wetland habitat preferences and potential effects of climate change and sea-level rise on waterbirds. He has a B.S. in Forestry and Wildlife Science from the University of Washington, a M.S. in Wildlife Ecology from the University of Idaho, and a PhD in Animal Ecology from Iowa State University.

Humpback Whales Foraging in San Francisco Bay

William Keener, Golden Gate Cetacean Research, bill.keener@comcast.net
Isidore Szczepaniak, Golden Gate Cetacean Research, izzyszczepaniak@gmail.com
Marc Webber, Golden Gate Cetacean Research, marcwebber@sbcglobal.net
Jonathan Stern, San Francisco State University, jonneysuave@gmail.com

In spring/summer 2016, we observed an unprecedented influx of humpback whales (*Megaptera novaeangliae*) into San Francisco Bay (SF Bay). In contrast to previous rare sightings in the bay east of the Golden Gate Bridge, including disoriented individuals, in 2016 multiple humpback whales entered the bay to feed on northern anchovy (*Engraulis mordax*). Whales were sighted in SF Bay from 28 April to 24 August, recorded by several observers either in the bay or entrance to the bay on 44 days. Peak numbers were 24 in the entrance west of the bridge to Pt. Bonita (10 July) and 15 inside the bay east of the bridge (12 July). The whales were not resident in the bay during this four-month span, rather they transited to and from the coast in a tidally-dependent pattern, usually entering the bay on the flood and leaving on the ebb. Comparisons of fluke images from SF Bay with the North Pacific catalog matched at least 4 animals. Photos also showed the same individual whales using the bay in successive months. The cessation of humpback whale activity in SF Bay in August 2016 coincided with an increase in their numbers on the continental shelf/Farallon Islands area where they had access to krill. Preliminary results from the 2017 season indicate a return of multiple humpbacks to SF Bay beginning 23 April, including a known whale from the 2016 season, and a whale photo-identified on its breeding grounds in southern Mexico. Conservation implications for the endangered and threatened "distinct population segments" using the bay include the potential for human interactions. As whales enter the narrow congested Golden Gate Strait, the risk of ship strikes increase, in addition to disturbance by recreational users making close approaches. Annual intensive feeding humpback whales may play a significant role in the bay ecosystem.

Keywords: Humpback whale, San Francisco Bay, foraging, endangered species

Session Title: Species Response to Restoration and Environmental Change

Speaker Biography: William Keener co-founded the non-profit Golden Gate Cetacean Research in 2010 to focus scientific research on the porpoises, dolphins and whales in San Francisco Bay and along the Northern California coast. Current projects include a study of the social behavior of harbor porpoises, the feeding behavior of humpback whales in San Francisco Bay, and a photo-ID catalog documenting the northern range extension of coastal bottlenose dolphins. His work with marine mammals began in 1977 at The Marine Mammal Center in Marin County, California, a facility dedicated to the rehabilitation of sick and injured pinnipeds. From 1980-1982, he served as Executive Director of the Center. As a boat-based field observer, he recorded marine mammals and seabirds in support of Cordell Bank's status as a National Marine Sanctuary, and conducted baseline population surveys of harbor porpoises in the Gulf of the Farallones National Marine Sanctuary for Cascadia Research Collective.

Natural Breaks: A New Framework for Place-Based Sea Level Rise Adaptation in SF Bay

Julie Beagle, SFEI, julieb@sfei.org
Laura Tam, SPUR, lauraetam@gmail.com

Many efforts are underway to assess the Bay Area's vulnerability to climate change, but so far there hasn't been a coherent, compelling science-based framework for guiding and evaluating which strategies will be appropriate for our shoreline's many different settings — from wetlands to recreational attractions to industrial sites.

SFEI and SPUR are working together to develop the concept of operational landscape units for the Bay: using defensible science to define different segments or "units" of the shoreline so that we can develop integrated adaptation strategies specific to each one. Operational landscape units are segments of shoreline that work as a system and have the potential to support ecological systems suited to the given place, along with the physical processes needed to sustain them, such as freshwater flows, tidal range and sediment inputs. Operational landscape units may cross jurisdictions and other traditional decision-making boundaries; they are defined primarily by physical setting and drivers such as watershed boundaries, groundwater basins, wave energy and tidal processes, then refined by consideration of social and cultural boundaries such as land use, population and job density, existing flood protection and infrastructure. Each unit is envisioned — eventually — to have a single coherent adaptation strategy that may include both engineered and policy solutions to increase long-term resilience for that place. These strategies could include structural or engineered measures as well as policy and planning tools that address long-term flood risk while protecting people and ecological systems. The final product of this effort will be a framework and guidebook for use in city, county, and regional planning processes that address risk, vulnerability, development, and restoration on the Bay shoreline.

In this presentation, SFEI and SPUR will present methods for defining operational landscape units, along with preliminary maps and a discussion of criteria for pairing these units with adaptation strategies.

Keywords: sea level rise, adaptation, operational landscape units, place-based strategies, planning

Session Title: Science Innovations for Sea Level Rise Adaptation

Speaker Biographies:

Julie Beagle: Julie Beagle joined SFEI in 2010 as a geomorphologist in the Resilient Landscape program. Her work focuses on fluvial and tidal geomorphic processes in Bay Area rivers and wetlands, and she is particularly interested in the physical and biological responses to sea level rise and climate change. Her work also examines how landscapes have changed since European contact, and uses this information to guide landscape-scale restoration strategies in Bay Area watersheds and the Delta. She received a master's degree from UC Berkeley in Environmental Planning in 2010 focusing on geomorphology and watershed management. Previously, Julie

worked at the California Land Stewardship Institute and served as a Peace Corps Volunteer in agroforestry in West Africa. She has a bachelor of arts in history and environmental science from Barnard College, Columbia University.

Laura Tam: Laura Tam directs SPUR's work on water, energy, climate change, adaptation and resilience. Since 2007, she has developed and advanced SPUR's policy agenda for sustainability by convening task forces, writing major research reports, presenting research to key audiences, and conducting policy advocacy. Her work focuses on city and regional strategies for sea level rise, water efficiency and reuse, green infrastructure and reducing climate-change emissions. Laura currently serves on the executive board of the Resilient by Design Bay Area Challenge and on the advisory committee of the Bay Restoration Authority. Prior to working at SPUR, she worked for the U.S. Environmental Protection Agency. She has a Master's degree in environmental management from the Yale School of Forestry and Environmental Studies and a BA in geography from Dartmouth College.

Adapting Tidal Marshes for Climate Change: Coarse Material Placement and High Tide Refuge Enhancement for Wildlife

Katharyn Boyer, Romberg Tiburon Center and Dept. of Biology, San Francisco State University, katboyer@sfsu.edu
Julie Beagle, San Francisco Estuary Institute, julieb@sfei.org
Peter Baye, Coastal Ecologist, botanybaye@gmail.com
Roger Leventhal, Marin County Flood Control, rleventhal@marincounty.org
John Takekawa, Audubon California, jtakekawa@audubon.org
Melissa Patten, Romberg Tiburon Center, San Francisco State University, mvpatten@mail.sfsu.edu
Sam Safran, San Francisco Estuary Institute, sams@sfei.org

Recovery of endangered wildlife in SF Bay depends on finding new, feasible methods for large-scale regeneration of failing high marsh habitats and actively enhancing processes that can help to sustain them. This new project is focused on building natural shoreline systems and internal marsh features that emulate and reinforce the processes that can sustain high marsh habitats during accelerated sea level rise and tidal marsh retreat. We seek to test new nature-based methods for 1) establishing resilient and sustainable high marsh vegetation structure, and 2) beachface nourishment along wave-eroded marsh edges to slow erosion and trigger natural high marsh building processes. These methods are based on nearly extinct historical salt marsh features; i.e., connections to streams that delivered riparian woody debris to salt marshes and gravel and sand beaches fringing the bay edges of many salt marshes. This project uses reintroduction of a native endangered salt marsh plant as a tool to enhance habitat for endangered salt marsh wildlife species. California sea-blite (*Suaeda californica*) was extirpated from San Francisco Bay in the 1950s, but has new potential importance for habitat restoration in the context of seal level rise in the 21st Century. Specifically, this project is 1) directly manipulating high elevation salt marsh vegetation canopy structure, exploiting the interaction of added woody debris "arbors" and natural climbing growth habits of both common (pickleweed) and endangered (CA sea-blite) salt marsh shrubs, and 2) developing designs for coarse mixed beach sediment nourishment of erosional bay shorelines (marsh erosion scarps and marsh-fringing beaches with added bay gravel and sand) to support "self-constructing" natural processes that slow marsh retreat and trigger growth of high marsh berms and growth of vegetation providing high tide refuge habitat. Further, the project seeks to increase local and regional awareness of sea-level rise adaptation through engagement of underserved youth.

Keywords: shoreline, resilience, sea-blite, pickleweed, sand, arbor, high tide refuge

Session Title: Science Innovations for Sea Level Rise Adaptation

Speaker Biography: A professor at San Francisco State's Romberg Tiburon Center since 2004, Dr. Katharyn Boyer has pioneered science-informed restoration of seagrass beds and tidal marshes, experimentally evaluating methodologies that can increase restoration success. She is the lead scientist for the first Living Shorelines project in San Francisco Bay, a multi-institution effort to use habitat restoration in the service of shoreline protection. She is actively involved in working groups to advance the science of restoring shoreline features that can buffer wave energy, sequester

carbon, and ameliorate ocean acidification. She is lead author on a chapter in the new book "Living Shorelines: The Science and Management of Nature-Based Coastal Protection". She teaches courses in restoration and wetlands ecology, and has mentored eighteen students to completion of master's theses. She received her B.S. in Zoology at the University of Maryland, her M.S. in Ecology at San Diego State and her Ph.D. in Ecology at UCLA.

The Beneficial Reuse of Dredged Sediments to Construct Ecotone Levees: Challenges and Results from Lower Novato Creek

Roger Leventhal, Marin County Flood Control, rleventhal@marincounty.org

There is a much increased awareness in recent years of the importance of beneficial reuse of dredged sediments to prepare for sea level rise (so called "sediment capital"). Across many vulnerable areas around the Bay there is almost certainly a deficit of sediment to raise shoreline elevations and construct ecotone levees for habitat and sea level rise. However, in practice this goal has been very difficult to achieve given a number of technical, economic and permitting challenges. In Fall 2016, Marin County Flood Control District #1 performed their quadrennial creek dredge from Middle and Lower Novato Creek. Instead of hauling the dredged sediments to the landfill or uplands as typically done in the past, the District worked closely with the RWQCB (especially Christina Toms) as well as other permitting agencies to place these sediments along the alignment of future sea level rise ecotone levees within jurisdictional wetlands in order to prepare these areas for restoration to full tidal conditions. The Districts goal was to place these sediments cost-effectively and without mitigation. The District completed the project construction in November 2016 and placed several thousand yards of dredged sediments both for the levee core as well as the ecotone levee slope.

The challenges and results of this design and permitting process will be show along with the results of several approaches to slurring and hydraulically placing dredged sediments transported by truck to the placement area and a discussion of constructability. This talk will present a very straightforward presentation of the practical obstacles to beneficial sediment reuse from the perspective of a practitioner in local government.

Keywords: sea level rise, dredged sediment, beneficial reuse

Session Title: Science Innovations for Sea Level Rise Adaptation

Speaker Biography: Roger Leventhal, P.E. is a Senior Engineer with the Marin County Public Works Flood Control Division. He has a MS from U.C. Berkeley in Hydraulics and Coastal Engineering and worked for over 24 years as a private engineering consultant specializing in creek/tidal wetlands restoration prior to coming to Marin County. He has particular expertise in the beneficial reuse of dredged sediments by leading the Montezuma Wetlands project and as a technical advisor to the USACE on the Hamilton Wetlands project. He has helped design and build several innovative projects that use natural systems to provide flood protection with habitat; especially tidal wetlands and coarse-grained bay beach systems. He is currently working closely with County planning staff to develop sea level rise adaptation alternatives that use both these "soft" engineering approaches to flood protection, such as wetlands and beaches, with more traditional "hard" engineering measures.

Community-Based Visioning For Resilience in Richmond

Heidi Nutters, San Francisco Estuary Partnership, heidi.nutters@sfestuary.org

There is a growing understanding of the importance of community engagement in building resilience. Lessons from the environmental justice and social science communities provide a broad array of best practices and lessons learned. The N. Richmond Community Visioning process was recently undertaken by a broad coalition of local and regional government, non-profit, and community service agencies. The purpose of the Vision is to integrate climate equity and advanced understanding of shoreline processes in an implementable plan for the N. Richmond shoreline. The project explores innovative practices by uniting an approach dedicated to rigorous shoreline analysis as well as equity-focused community engagement.

The community of North Richmond is at a critical juncture. Since the 1980's, the community has been in the national spotlight for effective environmental justice organizing. Richmond residents have won significant victories for the safety, protection and conservation of their community. However, residents still face disproportionate exposure to environmental pollutants and toxins. They are now grappling with an uncertain future for their shoreline due to predicted flooding and sea level rise. Since the early 1900's, Richmond, CA (just north of Berkeley, CA) has been an industrial city with several refineries in close proximity to local residents, primarily people of color. A local study completed by the Association of Bay Area Governments ranked the area within the highest "Community Vulnerability" category based on 10 indicators related to housing, transportation, education, and racial/cultural composition.

This presentation will highlight the mapping methodology and community engagement approach as well as overall findings and strategies identified in the Shoreline Vision. It will also cover some of the unique benefits of linking environmental justice in natural shoreline assessments.

Keywords: shoreline resilience, sea level rise, equity, planning, Richmond, transition zone

Session Title: Science Innovations for Sea Level Rise Adaptation

Speaker Biography: Heidi Nutters, Environmental Planner leads the Comprehensive Conservation Management Plan (CCMP) process and supports climate resiliency efforts. Prior to joining the Partnership, she managed the Coastal Training Program for the San Francisco Bay National Estuarine Research Reserve. In her role there, she supported regional collaborative science, communication, training and strategic planning efforts. Heidi was previously a NOAA Coastal Management Fellow with the San Francisco Bay Conservation and Development Commission. She received a B.A. in Cultural and Interdisciplinary Studies from Antioch College and a M.A. in Environmental Studies from Brown University.

Sediment Supply to San Francisco Bay: Today and Into the Future

David Schoellhamer, United States Geological Survey, dschoell@usgs.gov
Lester McKee, San Francisco Estuary Institute, lester@sfei.org
Sarah Pearce, San Francisco Estuary Institute, sarahp@sfei.org
Scott Dusterhoff, San Francisco Estuary Institute, scottd@sfei.org
Mathieu Marineau, United States Geological Survey, mmarineau@usgs.gov

Sediment supply to San Francisco Bay affects the feasibility of marsh restoration, transport of sediment-associated contaminants, water clarity, and navigational dredging. Suspended sediment in the Bay declined beginning in 1999 and there has been a paradigm shift where sediment that previously was considered a nuisance is now considered a resource to be managed. Since then, sediment supply to San Francisco Bay has been studied at several sites. During summer 2017, we updated and synthesized those studies to assist resource managers planning marsh restoration, evaluating marsh and mudflat resilience to sea level rise, planning dredging, maintaining flood control channels, and regionally monitoring and managing sediment. The scope of the synthesis includes fine sediment and sand and addresses 4 questions:

1) What are the magnitudes and sources of sediment transported to San Francisco Bay?
2) What are the present temporal trends of sediment supply to San Francisco Bay?
3) What are the most likely qualitative scenarios for future sediment supply to San Francisco Bay?
4) How can sediment monitoring be improved to fill data gaps and better provide information for resource managers?

We discussed the synthesis with stakeholders on October 5, 2017, and are currently preparing a written report.

Keywords: Sediment, suspended-sediment, San Francisco Bay, sediment transport,

Session Title: San Francisco Bay Sediment – Bringing Clarity to a Turbid Topic

Speaker Biography: Since 1993 David Schoellhamer has studied suspended sediment transport in San Francisco Bay for the US Geological Survey. Recently his studies have focused on the multi-decades decline of suspended sediment in the Bay. He earned a Bachelor and Master degrees in Civil Engineering from UC Davis and a doctorate in Coastal and Oceanographic Engineering from the University of Florida.

Sediment Savvy: Developing a Sediment Strategy for Bayland Resilience

Scott Dusterhoff, San Francisco Estuary Institute, scottd@sfei.org
Letitia Grenier, San Francisco Estuary Institute, letitia@sfei.org
Jeremy Lowe, San Francisco Estuary Institute, jeremyl@sfei.org
Micha Salomon, San Francisco Estuary Institute, micha@sfei.org
Lester McKee, San Francisco Estuary Institute, lester@sfei.org
Sarah Pearce, San Francisco Estuary Institute, sarahp@sfei.org
David Schoellhamer, United States Geological Survey, dschoell@usgs.gov

Sediment is a precious resource that is essential for sustaining tidal wetlands and mudflats (i.e., baylands) around San Francisco Bay that will be resilient under a changing climate. Developing an understanding of anticipated bayland sediment need and associated sediment supply in the coming decades requires sediment science to be integrated across the watershed, bayland, and bay components of the ecosystem, considering scenarios of sea level rise, large storm frequency, baylands restoration, and management choices in both the baylands and watersheds. Such integration is needed for discrete Bay shoreline regions to enable determination of areas with the greatest overall sediment need and development of localized sediment management strategies.

Currently, there is an effort underway to develop a science-based regional sediment strategy to inform decision-making for the resilience of San Francisco Bay wetlands and water quality. The regional sediment strategy is being conducted in close coordination with other regional efforts to: 1) assess projected bayland sediment demand, sediment supply, and associated long-term resilience for discrete shoreline regions for climate change-bayland restoration-land use change scenarios; 2) develop sediment management guidelines for bayland resilience (including key tradeoffs); and 3) develop a monitoring strategy aimed at collecting data to improve our ability to manage sediment delivery to and movement within the Bay. The sediment strategy will also include an assessment of potential sediment sources that could be used locally to improve bayland resilience (e.g., sediment excavated from flood control channels and construction sites). This presentation will provide an overview of knowledge gaps regarding long-term baylands resilience, this project's overall approach for assessing sediment dynamics and bayland resilience, and initial findings related to bayland sediment demand. Funding for this work is being provided by the EPA Water Quality Improvement Fund and the San Francisco Bay Regional Monitoring Program.

Keywords: bayland resilience, sediment management, climate change, tradeoffs

Session Title: San Francisco Bay Sediment – Bringing Clarity to a Turbid Topic

Speaker Biography: Scott Dusterhoff is a senior scientist and geomorphologist at the San Francisco Estuary Institute with a background in fluvial geomorphology, watershed hydrology, and estuarine/tidal wetland dynamics. For 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 has extensive experience using a combination of field-based data, numerical modeling, and geospatial tools to characterize fluvial and coastal hydrologic/hydraulic processes and sediment transport dynamics. Scott currently leads several projects in the San Francisco Bay Area that focus on developing holistic management approaches that support resilient, multi-benefit tidal and riverine landscapes.

Managing Mud, A Valuable San Francisco Bay Natural Resource

Brenda Goeden, SF Bay Conservation and Dev. Comm. (BCDC), brenda.goeden@bcdc.ca.gov
Anniken Lydon, BCDC, Anniken.Lydon@bcdc.ca.gov
Pascale Soumoy, BCDC, pascale.soumoy@bcdc.ca.gov
Alex Braud, BCDC, NOAA Coastal Management Fellow, Alex.Braud@bcdc.ca.gov

Management actions that affect sediment processes in San Francisco Bay requires coordination of regulatory and voluntary actions, and a familiarity of the ongoing scientific research, and scientific-decision making. The San Francisco Bay Conservation and Development Commission's (BCDC) Sediment Management Program has tracked and analyzed sediment management these activities and related sediment science for a number of years, with the goals of identifying methods to improve the health of the Bay system, work with scientists to fill data and knowledge gaps, change management practices, and prepare the system to adapt to future environmental conditions. The Bay sediment system has exhibited a decline in suspended sediment supply from the Delta, its primary source historically, and an increased relative contribution and importance of the local tributaries. Local tributaries are often flood control channels that were historically dammed and altered, thus limiting their sediment supply to the Bay. The restoration community has established ambitious goals of restoring 100,000 acres of tidal wetlands, and in combination with the projected future rising Bay waters and decreased sediment supply there is a large demand for sediment in the system. Understanding the efficient use of limited sediment resources and solutions to future sediment demands requires a complete understanding of the physical processes, supply, demand and management activities which regulate the outcome. Connecting USGS's David Schoellhamer's sediment budget discussion and SFEI's Scott Dusterhoff's recent work on channels and shorelines, this talk will incorporate what is understood about the overall system, the current management activities, and ways the region may reconsider current management practices and activities.

Keywords: sediment, wetlands, restoration, ecology, management, regulation, beach nourishment, estuary

Session Title: San Francisco Bay Sediment – Bringing Clarity to a Turbid Topic

Speaker Biography: Brenda Goeden is the Sediment Program Manager for the San Francisco Bay Conservation Development Commission, where she has been working on issues related to sediment supply, management and use in San Francisco Bay for the past 17 years. She manages the Long Term Management Strategy for the Placement of Dredged Sediment (LTMS) in the Bay Region for the Commission, the planning and regulatory framework for all dredging projects in the Bay. This program produces between 2.5 and 4 million cubic yards of sediment annually and strives to maximize beneficial reuse of the sediment. She has expertise in dredging, aggregate mining, wetland restoration, sediment transport, and region's regulatory framework. She has been expanding sediment management and planning beyond dredging and sand mining to include needed sediment for habitat projects, flood control management and watersheds. She is an avid birder, wildlife rehabilitator and naturalist, focusing on the marine and estuary environment.

Maximizing the Benefits of Green Stormwater Infrastructure

Joshua Bradt, San Francisco Estuary Partnership, josh.bradt@sfestuary.org

With the latest municipal regional stormwater permit requiring permittees to develop watershed-based Green Stormwater Infrastructure (GSI) plans, the Bay Area is poised to enter a new era of street design, engineering, and maintenance. The anticipated long-range improvements to the public realm will have transformative effects within our urban communities. The session will key on the status and future of municipal GSI planning efforts; strategies for understanding and meeting community needs; and highlight efforts to better quantify the co-benefits of urban greening.

Keywords: Greening, infrastructure, stormwater, community, planning, watershed, benefits

Session Title: Maximizing the Benefits of Green Stormwater Infrastructure

Speaker Biography: Josh Bradt is an Environmental Planner and Project Manager at the San Francisco Estuary Partnership. His work primarily focuses on the promotion of Green Infrastructure practices and policies at the local and regional levels. Josh's current projects range from design & construction of site specific stormwater retrofits to developing planning tools and funding streams to ensure widespread implementation. Josh is brings watershed planning and urban stream restoration expertise to the Partnership from his previous career stops at the City of Berkeley, the Urban Creeks Council of California, and the Contra Costa Countywide Clean Water Program. He is enthused by place-making, community engagement, and opportunities to be in the field.

Municipal Green Stormwater Infrastructure Planning Overview

Jill Bicknell, Santa Clara Valley Urban Runoff Pollution Prevention Program, jcbicknell@eoainc.com

To promote increased use of green stormwater infrastructure in urban areas and assist with compliance with TMDLs, the current Bay Area Municipal Regional Stormwater Permit (MRP) includes a requirement that Permittees complete and implement Green Stormwater Infrastructure (GSI or GI) Plans. The GI Plans must show how the Permittee will incorporate low impact development (LID) drainage design into public and private streets, parking lots, building roofs and other facilities to achieve water quality, flow reduction and other environmental and community benefits. Implementation of the Plans is intended to, along with other actions, achieve quantitative load reductions for PCBs, mercury, trash, and other contaminants over the long term.

Around the same time that the GSI requirements were issued, the California Water Code was amended per SB 985 to require that, as a condition of receiving State bond funds for construction, GSI projects must be prioritized projects within a Stormwater Resource Plan (SWRP). Through Proposition 1 stormwater planning grants and other funding sources, SWRPs (or equivalent) have been or are being developed in at least five Bay Area counties (San Mateo, Santa Clara, Contra Costa, Marin, and Sonoma). Development of a SWRP includes tasks to identify, evaluate benefits, and prioritize local and regional GSI projects that capture and treat stormwater within a watershed. These projects can be incorporated into GSI Plans and will help achieve the pollutant load reductions called for in the Mercury and PCBs TMDLs for the San Francisco Bay, as required by the MRP.

This presentation will review the requirements for and status of municipal GSI planning efforts in the region and the role of Stormwater Resource Plans in evaluating benefits, prioritizing projects, and getting stakeholder input.

Keywords: green infrastructure plans, stormwater resource plans, project benefits

Session Title: Maximizing the Benefits of Green Stormwater Infrastructure

Speaker Biography: Jill Bicknell, P.E., is a water resources engineer and manager at EOA, Inc. in Sunnyvale, CA and has served as the Assistant Program Manager for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) since for over 20 years. Jill has been a leader in the Bay Area in development of green infrastructure and LID requirements for new and redevelopment projects. She is currently leading SCVURPPP's efforts to develop a Stormwater Resource Plan for the Santa Clara Basin, prepare countywide tools for green infrastructure planning, and assist member agencies with development of local green infrastructure plans.

The Watershed Planning Game: Engaging Community Members in Assessing Infrastructure Tradeoffs

Rosey Jencks, Brown and Caldwell, rjencks@brwncald.com

Watershed managers are constantly faced with competing challenges and stakeholders who have difficulty seeing beyond their own issue area. Playing games can be an effective tool for community engagement with the potential to help players encounter tough tradeoffs in a friendly context. The Watershed Planning Game is an award-winning and innovative community engagement tool that was used as part of the San Francisco Public Utilities Commission's Sewer System Improvement Program. The multi-year planning process included an interactive watershed planning game to generate ideas for green and grey infrastructure investments for the next 20 years for the City's eight watersheds. The design "game," played six times by more than 300 people, brought together technical and non-technical participants to understand system challenges and to grapple with tradeoffs in budgets and the performance goals. Through playing the game, the teams developed project ideas consisting of multi-purpose green and grey infrastructure concepts to be further evaluated for technical feasibility and cost effectiveness. The game won the award for Outstanding Public Involvement/Education Program by the Association of Environmental Professionals in 2013. This presentation talk will address lessons learned and suggestions for improving the process.

Keywords: watersheds, planning, stormwater, community engagement, games

Session Title: Maximizing the Benefits of Green Stormwater Infrastructure

Speaker Biography: Rosey Jencks, Vice President, Brown and Caldwell, specializes in urban watershed planning and stormwater management. Prior to joining BC, Rosey served as a program manager at San Francisco Public Utilities Commission (SFPUC), where she provided strategic direction to local practices and supported regional and local initiatives that advance innovation in the field. She was responsible for overseeing the award-winning Living Machine at the SFPUC headquarters -- the first building-scale sewage treatment system in San Francisco. Also at SFPUC, Rosey recently led the Urban Watershed Assessment, a multi-disciplinary watershed and collection system planning project focused on integrated flood management, combined sewer overflow reduction, and integration of stormwater management in urban design and city policies.

Environmental Justice Benefits and Consequences

Nahal Ghoghaie, The Environmental Justice Coalition for Water, nahal@ejcw.org

California environmental practitioners are increasingly turning toward an inclusive and equitable planning process to ensure resilience to climate change. While it is encouraging that we live in a state that mandates community involvement, it is rare for such efforts to result in truly *equitable* processes. There is a deep history to Social and Environmental Justice and myriad lessons that must be considered in order to make substantial and sustainable strides towards advancing inclusivity and equity, especially in our climate change reality. Shifting towards a planning model that is more collaborative and empowers those not typically engaged in [climate] planning builds a larger and more lasting impact than simple project-focused engagement. Meaningful community input and decision making is required to prevent the often unintentional negative effects of planning such as gentrification. We will address what is required to make this a truly inclusive movement, and how we can work together to building lasting relationships and powerful coalitions through our climate and environmental planning process.

Session Title: Maximizing the Benefits of Green Stormwater Infrastructure

Speaker Biography: Nahal Ghoghaie is the Bay Area Program Lead for The Environmental Justice Coalition for Water (EJCW), as well as the Policy Chair for the Bay Area's Resilient Communities Initiative Coalition (RCI). She holds a Master's Degree in Environmental Studies with an emphasis on Tribal Leadership in Watershed Management and Climate Change Adaptation. She has devoted close to a decade to fostering alliances for a resilient planet through her roles at the Washington State Department of Natural Resources, Earth Economics, Sound Ecosystems, The California Resiliency Alliance, Alameda County Waste Management Authority, and now with EJCW and RCI. Nahal leads EJCW's work as the Bay Area Proposition 1 Disadvantaged Community Involvement Program Manager, and serves as an Advisory Committee member for the San Francisco Bay Restoration Authority, as well as for the Resilient by Design Bay Area Challenge.

Urban Infrastructure Innovations for Environmental Health

Brent Bucknum, Hyphae Design Lab, brent@hyphae.net

Brent will focus on two public-health-outcome-driven greening plans he has worked on in West Oakland and Louisville, Kentucky.

Brent will advocate for how green infrastructure can go beyond stormwater management, to provide multi-benefit that improves air, soil, water and human health.

1) In partnership with local environmental justice group West Oakland Environmental Indicators Project (WOEIP), and funding from the Governor's Office of Research & Planning, Brent's non-profit Urban Biofilter, recently launched *Adapt Oakland* (adaptoakland.org). It is a 1) multi-benefit greening plan for West Oakland, as well as a 2) a toolkit for Oakland and other neighborhoods with high impact Port, TOD, and industrial land uses and 3) a framework for health based adaptive management plans.
2) In partnership with the University of Louisville, Environmental Cardiology Department led by Dr. Aruni Bhatnagar, Urban Biofilter, recently launched *Greenheart*, a clinical trial, studying cardiovascular, psychological and other health benefits from vegetated buffers and urban greening. The project was initiated by the Institute for Healthy Air Water & Soil and supported by The Nature Conservancy.

Keywords: green infrastructure, public health, environmental justice, multi-benefit infrastructure, air quality

Session Title: Maximizing the Benefits of Green Stormwater Infrastructure

Speaker Biography:

Brent Bucknum: Brent is the founder of Hyphae Design Lab, a design and engineering firm as well as Urban Biofilter, a research and policy focused nonprofit, both based in Oakland. Brent has worked on high profile infrastructure projects like the Academy of Sciences and living wall at sfMOMA, as well as a lot of more low profile work in environmental justice. As an urban ecologist, Brent's work aims to improve the health and diversity of all species in the urban environment. He pays particular focus to the city's dominant megafuana, humans. Brent's work brings together academic research, innovation, environmental justice, green infrastructure engineering and public health policy.

Stormwater Trash Reduction Success Stories and Remaining Challenges

Napp Fukuda, City of San Jose, napp.fukuda@sanjoseca.gov
Liz Neves, City of San Jose, liz.neves@sanjoseca.gov

SF Bay Area communities are mandated by the Municipal Regional Stormwater Permit to significantly reduce the amount of trash that enters local water bodies through their storm drainage systems. Municipalities were required to achieve a 70% reduction of trash by July 2017. The City of San Jose has developed and implemented a number of trash control programs since the mandate was set in 2009 by the SF Bay Regional Water Quality Control Board. These innovative programs include the:

Installing 21 large trash capture systems and over 100 smaller systems into the City's storm drainage system that collectively treat over 8,000 acres of land;

Implementing a Direct Discharge Trash Control Program (DDTCP) that is aimed at reducing the homeless population living along the City's network of urban creeks and removed 6,697cubic yards of trash from creeks in 2016-17;

Conducting creek and shoreline cleanups via City staff, non-profit agencies, and community groups that removed an additional 2,000 cubic yards of trash during 2016-17; and

Designing and implementing the groundbreaking San José Bring Your Own Bag and Foam Food Container ordinances that reduce the levels of these litter-prone items in the environment.

Through the implementation of these and other programs, the City of San José has attained a 79% trash load reduction to-date, complying with the load reduction mandates in the stormwater permit. The lessons-learned by the City during the planning and implementation of these programs, and the challenges that the City is encountering with achieving the ultimate goal of "no adverse impacts" of trash discharged from its storm drainage system will be discussed in the presentation.

Session Title: Managing Trash Impacts in the SF Estuary

Speaker Biography: Napp Fukuda is the Deputy Director of the City of San José Environmental Services Department and has provided leadership in environmental compliance programs for San José for more than 23 years. Napp leads the City's Watershed Protection Division which provides programmatic services that protect water quality in local creeks and the San Francisco Bay, protecting and enhancing public health and the environment. These services are integral to the City's management of both wastewater and stormwater and are comprised of four key functions: Stormwater Management, Environmental Enforcement, Laboratory Services, and Pretreatment oversight. In addition to overseeing compliance programs, Napp with his terrific team helped design and implement the groundbreaking San José Bring Your Own Bag and Foam Food Container ordinances and anti-litter initiative. Napp has a Bachelor's Degree in Mechanical

Engineering from Santa Clara University and over 26 years of environmental compliance experience.

A New Trash Monitoring Program for Bay Area Receiving Waters

Chris Sommers, EOA,Inc., csommers@eoainc.com

Over the past two decades, trash has been identified as a pervasive problem near and in receiving waters, including local creeks, rivers, the San Francisco Bay Estuary and the Pacific Ocean. Although trash monitoring was conducted in creeks and shorelines around the Bay Area in the early 2000's and used by the San Francisco Bay Regional Water Quality Control Board to determine that local water bodies are impacted, an organized regional trash monitoring program was lacking in the Bay Area. In recent years, public and volunteer resources focused more on trash management - preventing the generation of trash within the watershed, intercepting this material before it reaches receiving waters, and cleaning up debris once it reaches local creeks and shorelines. In 2016, municipalities throughout the region joined together to develop a new *Trash Receiving Water Monitoring Program* for Bay Area. The program was developed based on the results of an extensive literature review and input from stakeholders and scientific peer reviewers. The program includes a robust statistically-based monitoring design, new trash assessment protocols, and quality assurance/control procedures. Beginning in the winter of 2017-18, the program will be implemented at a total of 225 creek, river and Bay shoreline sites where trash levels and sources will be monitored. Results from the initial two years of this innovative monitoring program will help test trash assessment protocols and provide valuable knowledge to Bay Area municipalities and water quality regulators on the magnitude and extent of trash in local receiving waters. Additionally, lessons learned will help other regions in California establish similar programs where trash monitoring is currently not conducted.

Keywords: Trash, litter, marine debris, stormwater, illegal dumping, monitoring, assessment

Session Title: Managing Trash Impacts in the SF Estuary

Speaker Biography: Chris is a Managing Scientist at EOA, Inc. He has over 20 years of experience in designing and implementing stormwater monitoring and management programs in California. He currently manages the countywide creek monitoring program for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and is high regarded as one of the leaders in stormwater trash management in California. Chris is a co-author of the new Bay Area Trash Receiving Water Monitoring Program and is currently focused on developing cost-effective trash monitoring programs that can help detect improvements in trash levels in urban environments, including local creeks and the San Francisco Bay.

Developing Trash Monitoring Methods for California

Tony Hale, San Francisco Estuary Institute, tonyh@sfei.org
Shelly Moore, Southern California Coastal Water Research Project (SCCWRP), shellym@sccwrp.org

In the wake of the passage of the Trash Amendments in 2015 that prohibit discharge of trash larger than 5 millimeters to state waters from stormwater systems, there is a need to develop tools to measure the amount of trash in the environment. The Ocean Protection Council (OPC) has supported the State Water Board's adoption of the Trash Amendments and is interested in the development and use of scientific measures to track and verify program effectiveness. Currently there is no agreed-upon scientific method to monitor for trash in water and receiving stormwater channels. This makes assessing permittees' compliance and general progress on reducing trash in state waters difficult.

With funding from the OPC, the Southern California Coastal Water Project (SCCWRP) and the San Francisco Estuary Institute (SFEI) have begun a project to develop a suite of methods to monitor State receiving waters for trash, aligning those methods with addressable management questions. The methods selected, described, and tested must be applicable to many parts of the State, and not exclusive to a single region.

By leveraging their extensive knowledge of and outreach to regional and local partners, SCCWRP and SFEI will collaborate with other interested parties in field-testing trash monitoring methodologies that will be useful to stakeholders required to monitor into the foreseeable future. In addition, SCCWRP and SFEI, because they are located in different parts of the state, will field test these methodologies to measure trash in water in different habitats, topographies, and flow conditions, ensuring their use throughout California.

The overall goal of this project is to provide the research needed to develop scientific measures to monitor trash. For this presentation, project representatives, Shelly Moore from SCCWRP and Tony Hale from SFEI, will provide an update on this new effort.

Keywords: Trash, Monitoring, Methods, Habitats, California

Session Title: Managing Trash Impacts in the SF Estuary

Speaker Biography: As Program Director for Environmental Informatics at the San Francisco Estuary Institute (SFEI), Dr. Tony Hale represents five technical teams: Geographic Information Systems, Application Development, Data Services, IT Systems, and Design & Communications. He also helps to steward positions of statewide influence to promote technology initiatives, environmental stewardship, and meaningful, collaborative innovations. Early on, Dr. Hale served as IT Director for Mills College. He then joined the California Ocean Science Trust and led the development of OceanSpaces, an online community to foster new knowledge of ocean health. Currently he is co-chair of the Data Management Workgroup affiliated with the California Water Quality Monitoring Council, and a steering committee member for the San Francisco Estuary Geospatial Workgroup. Since joining SFEI, Dr. Hale has advanced the Institute's communications

practices, overseen the development of new data visualization technologies, and partnered with state and federal agencies to address complex data management challenges.

The Future of the San Francisco Bay-Delta Science Enterprise: How Can Science Best Inform Policy-Makers and Long-Term Planning Efforts?

Jessica Law, Co-moderator, Delta Stewardship Council, jessica.law@deltacouncil.ca.gov
Mike Chotkowski, Co-moderator, USGS, mchotkowski@usgs.gov
John Callaway, Delta Lead Scientist
Josh Collins, San Francisco Estuary Institute
Randy Fiorini, Delta Stewardship Council
Jason Peltier, San Luis and Delta Mendota Water District
Richard Roos-Collins, Water and Power Law Group
Carl Wilcox, California Department of Fish and Wildlife
Leo Winternitz, GEI Consultants

The San Francisco Bay-Delta science enterprise refers collectively to the many government agencies, universities, resource stakeholders, and private entities that are conducting scientific research and monitoring in the Estuary. In 2016, the Delta Stewardship Council and USGS hosted the Science Enterprises Workshop, at which experts representing multiple regional science enterprises came together with scientists and managers in the Bay-Delta to discuss ways in which a regional science enterprise might be improved to better serve the interests of its stakeholders and the public. In this panel, local policymakers and experts will share impressions from that workshop and the dialogue that has followed it. What lessons do we think we have learned from other systems like the Everglades, the Chesapeake Bay Watershed, and the Great Lakes where large State/Federal collaborative programs exist? What have we learned from smaller systems that do not have large formalized programs? Panel questions will explore panelist views on Bay-Delta application of future enterprise-level goals derived from the cross-regional discussion at the Science Enterprises Workshop:

(1) Expanded effort to communicate scientific process and findings to resource constituencies and the public
(2) Strengthening leadership and decision-making that coordinates the various parties
(3) Enhanced use of integrated modeling and forecasting to support policy decision making
(4) Enhanced integration of social sciences with the natural sciences and engineering
(5) Enhancement of fundamental science processes to ensure credibility and legitimacy across constituencies
(6) Expanded use of competitive funding to bring the best and brightest to address important questions
(7) Increased commitment to making the difficult decisions required to successfully implement adaptive management

The discussion will be managed to allow audience members to pose questions to the panel, and for the discussion to follow paths of interest to the panelists and audience.

Keywords: Bay-Delta, management, governance, funding, integrated modeling, science-policy

Session Title: The Future of the California Bay-Delta Estuary Science Enterprise

Speaker Biographies:

Jessica Law: Jessica Law is the Chief Deputy Executive Officer at the Delta Stewardship Council. Prior to joining the Council, Ms. Law worked in the private sector consulting for state, regional, and local agencies on an array of land-use and environmental programs, with a special focus in public outreach and communications. The majority of her work focused on the Central Valley and the Sacramento-San Joaquin Delta. Since March of 2016, Ms. Law has successfully planned and executed three semiannual Delta Plan Interagency Implementation Committee meetings for the Council, with focused discussions on interagency priorities for high-impact science actions, adaptive management, ecosystem restoration, integrated ecosystem modeling, and other State-Federal agency priorities that support implementation of the Delta Plan and the Delta Science Plan.

Mike Chotkowski: Dr. Mike Chotkowski is the Bay-Delta Science Coordinator, Pacific Region at the USGS. Dr. Chotkowski started his federal career as a fish biologist with the Bureau of Reclamation, and he joined the USGS in 2015. He advises regional USGS science leadership in developing and maintaining an effective, efficient, and integrated scientific portfolio in the San Francisco Bay-Delta. Dr. Chotkowski also works with USGS Science Centers and partners on collaborative efforts to address scientific uncertainties that are critical to water management in the Bay-Delta region and in California.

John Callaway: Dr. John Callaway, an internationally recognized expert in wetland restoration, specifically wetland plant ecology and sediment dynamics, was unanimously appointed by the Council as Lead Scientist at the July 2017 Delta Stewardship Council meeting. His research includes projects in San Francisco Bay and Tijuana Estuary. This work has been funded by the National Science Foundation, the Environmental Protection Agency, California Sea Grant, and other agencies. Dr. Callaway received his PhD in Oceanography and Coastal Sciences from Louisiana State University in 1994. Prior to his position at USF, he was the Associate Director of the Pacific Estuarine Research Laboratory (PERL) at San Diego State University.

Josh Collins: Dr. Josh Collins is the Lead Scientist at San Francisco Estuary Institute (SFEI) where he oversees the development and integration of SFEI's scientific work. Dr. Collins is a landscape ecologist and regional ecological planner with special expertise in mapping and assessing stream and wetland ecosystems. He has extensive practical experience as a leader for a variety of efforts in the West to set long-range ecological goals and assessment methods. Among his current advisory roles, he chairs the technical team supporting California's new wetland and riparian area protection policy. Josh's experience and current work afford him a clear view of San Francisco Bay science and management efforts.

Randy Fiorini: Chair of the Delta Stewardship Council. Randy Fiorini was born in Turlock, CA, where he was raised on his family's tree fruit and wine grape farm. After graduation from Cal Poly San Luis Obispo in 1975, Mr. Fiorini returned to Turlock and assumed managing partner responsibilities for Fiorini Ranch. Interested in agricultural industry affairs, Mr. Fiorini was

elected to serve as the Chairman of the California Canners and Growers, Chairman of the California Cling Peach Advisory Board, and was appointed by two Presidents to serve on the US Agricultural Technical Advisory Committee for Fruits and Vegetables. In March 2010, Governor Arnold Schwarzenegger appointed Mr. Fiorini to serve on the Delta Stewardship Council. Mr. Fiorini was elected by his colleagues as Vice-Chair at their initial meeting and in 2014 he was elected Chair. He was reappointed to his position by Governor Jerry Brown in May 2016.

Jason Peltier: Jason Peltier is the Executive Director and Board Chair at the San Luis and Delta Mendota Water District. Prior to that, Mr. Peltier was the Chief Deputy General Manager of Westlands Water District. Mr. Peltier also served for six years as the Deputy Assistant Secretary for Water and Science at the Department of the Interior in Washington D.C. In this position, he was a part of the management team responsible for the Bureau of Reclamation and the U.S. Geological Survey. The bulk of his professional career has been spent as the manager of the Central Valley Project Water Association, an organization representing the interests of the eighty water districts serving three million acres of irrigated farm land and four million households..

Richard Roos-Collins: Richard Roos-Collins is Principal in the Water and Power Law Group. He specializes in settlements in complex cases involving multiple parties, interests, and laws. He has drafted and negotiated more than 50 such settlements. These include: Klamath Basin Restoration and Hydropower Agreements, Mono Lake Cases, and the Land Conservation Commitment Stipulation for the bankruptcy reorganization of Pacific Gas and Electric Company. Mr. Roos-Collins is Adjunct Professor at the University of San Francisco Law School. He is serves as general counsel to the Hydropower Reform Coalition (Washington, D.C.), which represents more than 2 million people interested in balancing power and environmental benefits. He is chairman of the Board of Directors for the Low Impact Hydropower Institute (Portland, ME), the nation's only program to certify the environmental performance of such power assets.

Carl Wilcox: Carl Wilcox is the Delta Policy Advisor to the Director of the California Department of Fish and Wildlife, which included directing the Department's involvement in the Bay Delta Conservation Plan. Prior to his assignment as Policy Advisor, he managed the Department's Bay Delta Region and was responsible for fisheries and wildlife management, lands management, and habitat conservation planning and permitting programs. Mr. Wilcox has a Master of Science in Biology from New Mexico Highlands University and a Bachelor of Science in Biological Conservation from California State University Sacramento.

Leo Winternitz: Leo Winternitz provides expert advisory services on waterways restoration, conservation programs, water resources, and flood management at GEI Consultants. As a former senior advisor at The Nature Conservancy, Mr. Winternitz is focused on building strategic, scientific and technical capacity in the field to implement major nature restoration projects. Mr. Winternitz has been actively involved with the Bay Delta Conservation Plan, the Delta Stewardship Council's Delta Plan, and activities associated with the Delta Conservancy, Delta Protection Commission, and the State Water Resources Control Board. He is also a former deputy director of the CALFED Bay-Delta Program.Throughout his 39-year career, Winternitz has written numerous articles and reports on topics related to water quality, water resources and natural habitats, and has been honored with a Distinguished Service Award from the Sacramento Regional Water Authority, as well as two Outstanding Professional Accomplishment

commendations from the California Department of Water Resources (DWR). He holds a bachelor's degree in biology from Gonzaga University, and a master's degree in environmental management with an emphasis on water resources from the University of San Francisco.

Hope or Hype: How does Onsite Water Reuse Fit into the Future of the San Francisco Estuary?

Heather Cooley, Moderator, Pacific Institute, hcooley@pacinst.org
Scott Wiener, California State Senate, jeff.sparks@sen.ca.gov
Josiah Cain, Sherwood Design Engineers, jcain@sherwoodengineers.com
Sebastien Tilmans, Codiga Resource Recovery Center at Stanford University, stilmans@stanford.edu
Ian Wren, San Francisco Baykeeper, ian@baykeeper.org

Whether referring to the capture of stormwater runoff in a rain barrel or to the SFPUC's 280,000 sq. ft. "Living Machine" headquarters, which treats and reuses gray- and black-water, the concept of onsite water reuse has grown in popularity over the past several years, particularly as a result of the drought. These types of efficiencies are often framed as being 'better for the environment,' but can we ensure that implementation translates to environmental benefits for the San Francisco Estuary, such as improved water quality and reduced reliance on imported water sources? If we can, how do we do it and how do we go about quantifying the benefits? If not, are there other environmental justifications for using these systems?

This session will use these questions to catalyze a lively panel discussion, moderated by Heather Cooley of the Pacific Institute, that highlights the opportunities and challenges presented by onsite water reuse, which encompasses the capture and reuse of stormwater, grey- and black-water, and in some cases, even groundwater captured by sump pumps. The session will look at multiple scales of onsite water reuse, from individual residences to large mixed-use developments to new and retrofitted commercial buildings and campuses. Panelists Josiah Cain (Sherwood Design Engineers), Sebastien Tilmans (Codiga Resource Recovery Center), Senator Scott Wiener (California State Senate), and Ian Wren (San Francisco Baykeeper) will bring both extensive experience and diverse perspectives to the discussion.

Keywords: water reuse onsite benefits challenges

Session Title: Hope or Hype: How does Onsite Water Reuse Fit into the Future of the San Francisco Estuary?

Speaker Biographies:

Heather Cooley: Heather Cooley is Director of the Water and Sustainability Program at the Pacific Institute, where she conducts and oversees research on a range of issues related to the sustainable water use and management, the connections between water and energy, and the impacts of climate change on water resources. She has served on several boards and committees and authored numerous publications on water resource management. In 2009, she received the Outstanding Achievement Award from the U.S. Environmental Protection Agency for her work on agricultural water efficiency.

Scott Wiener: Elected in November 2016, Senator Scott Wiener represents District 11 in the State Senate, which includes San Francisco, Broadmoor, Colma, Daly City, and portions of

South San Francisco. Prior to his election to the State Senate, Senator Wiener served as a member of the San Francisco Board of Supervisors, where he authored a number of first-in-the-nation laws, including mandating fully paid parental leave for all working parents, requiring water recycling and solar power in new developments, and banning public spending in states with LGBT hate laws.

Josiah Cain: Josiah Cain serves as Sherwood's Director of Innovation. A student of design, ecology, and technology, his deep sustainable design experience and multi-disciplinary approach provides insight and opportunities for optimization of site and structure. His inherent drive for enhanced systems performance and integration has led to first of a kind permits in over a dozen jurisdictions; his work has provided advancement in the areas of rain harvesting, graywater, blackwater reuse, living roofs and walls, native plants, sustainable stormwater management, food systems, and sustainable materials. In addition to his efforts managing Sherwood's Innovation Program, Josiah provides strategic design on a variety of influential projects, with a focus on campus and large-scale urban projects. His project credits include the design of on-site wastewater treatment wetlands and water reuse systems for a high-density corporate campus as well as living architecture applications at the California Academy of Sciences, University of California, and Duke University.

Sebastien Tilmans: Dr. Sebastien Tilmans is the Director of Operations at the Codiga Resource Recovery Center at Stanford University, a test-bed facility dedicated to accelerating the scale-up of innovative wastewater treatment and resource recovery systems. Prior to joining Stanford, he worked in the Process Engineering group at Oceanside Wastewater Treatment Plant for the San Francisco Public Utilities Commission. He has also designed and implemented several decentralized anaerobic wastewater treatment systems in Panama, and a waterless sanitation service in Haiti. He holds a PhD in Environmental Engineering from Stanford University, and a B.E. in Civil Engineering from Cooper Union. He was a Fulbright scholar, an NDSEG fellow, and an EPA STAR fellow.

Ian Wren: Ian is the Staff Scientist for San Francisco Baykeeper. Ian manages advocacy and research efforts, provides technical hydrology services on Baykeeper's enforcement actions, and represents Baykeeper on a number of regulatory and technical issues.
Prior to joining Baykeeper, Ian was as a Habitat Restoration Specialist in Southern California and a Hydrologist in London, UK. Ian has worked with a range of public, private and non-profit organizations in California, Europe, and the Middle East. He is experienced in urban water quality, coastal nutrient pollution, endangered species, wetland restoration, and the use of low impact technologies to mitigate water quality impacts and flood risk. He studied biology and ecology at UC Berkeley, holds an M.S. in Hydrology and Sustainable Development from Imperial College, London.