

# 11th Biennial Bay-Delta Science Conference



## BUILDING RESILIENCE THROUGH DIVERSITY IN SCIENCE

April 6–9, 2021 ■ Virtual ■ #BDSC2021

### CONFERENCE OVERVIEW:

The Biennial Bay-Delta Science Conference is a forum for presenting technical analyses and results relevant to the Delta Science Program’s mission to provide the best possible, unbiased, science-based information for water and environmental decision-making in the Bay-Delta system. This year’s conference theme is “Building Resilience through Diversity in Science.” Such diversity can indeed take many forms. In the Bay-Delta, it embodies the habitats and species that inhabit the Sacramento-San Joaquin Delta and San Francisco Estuary. It is also reflected in the scientists who seek to understand how the system functions, the agencies striving for sustainable management, and the people living within its watershed. As the Bay-Delta community works towards a goal of “One Delta, One Science” by building resilience in our ecosystem, our institutions, and our collective science enterprise, promoting diversity in its many facets plays a central role. This means moving beyond one perspective or one discipline; we strive to integrate many pieces into a mosaic that depicts the complexity of our systems and enables a collaborative body of science.

### ORGANIZING COMMITTEE:

#### Conference Co-Chairs:

Richard Connon, UC Davis  
Steve Culbertson, IEP Lead Scientist  
Stacy Sherman, CDFW

#### Program Chairs:

Sam Bashevkin, Delta Science Program  
Mike Chotkowski, USGS  
Josh Israel, USBR

#### Conference Coordinators:

Lynn Takata, Delta Science Program  
Maggie Christman, Delta Science Program  
Zynger Events Team

#### Poster Chairs:

Eva Bush, Delta Science Program  
Chris Kwan, Delta Stewardship Council

#### Art Chairs:

Chelsea Batavia, Delta Science Program  
Rosemary Hartman, DWR  
Hildegard Spautz, CDFW

#### Student Mentor Chairs:

Kimberly Clements, NOAA/NMFS  
Ted Flynn, DWR  
Darcy Austin, State Water Contractors

#### Student Judging Chairs:

Chelsea Batavia, Delta Science Program

Annika Keeley, Delta Science Program

#### Professional Societies Chair:

Eva Bush, Delta Science Program

#### Brown-Nichols Science Award Chair:

Lauren Hastings, Delta Science Program  
Michelle Shouse, USGS

#### Media Relations Chair:

Geneva Hutcheson, Delta Stewardship Council  
Brittany Young, Delta Stewardship Council

#### Committee Members:

Charlotte Ambrose, NOAA/NMFS  
Brandon Chapin, Delta Stewardship Council  
Christine Joab, CDFW/IEP



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**TUESDAY, APRIL 6TH, 2021**

<b>Time</b>	<b>Room 1: Smelt Science For Management</b>	<b>Room 2: Physical Processes</b>	<b>Room 3: Food Web Foundations</b>	<b>Room 4: New Habitat, New Science: Advances in Wetland Restoration</b>	<b>Room 5: IEP Special Session: The Value of Long-term Biological Monitoring in the San Francisco Estuary</b>
9:00am	<b>(Live) Welcome Plenary</b> (General Welcome - Susan Tatayon, Delta Stewardship Council; Conference Introduction - Steve Culberson, IEP Lead Scientist, Laurel Larsen - Delta Lead Scientist, Eric Reichard - USGS Acting Regional Director, Brown - Nichols Award)				
10:00am	<b>Break</b>				
10:15am	<b>Responses of Wild Delta Smelt to Climate Variation</b> <i>Levi Lewis, UCD</i>	<b>A Systematic Evaluation of Empirical X2 Models Published over the Past 25 Years</b> <i>John Rath, Tetra Tech</i>	<b>Nutrient Status of San Francisco Bay</b>	<b>After the Breach - First Year Monitoring of the Tule Red Tidal Restoration Project</b> <i>Ramona Swenson, ESA</i>	<b>The value of long-term monitoring of the San Francisco Estuary for Delta Smelt and Longfin Smelt</b> <i>Trishelle Tempel, CDFW</i>
	<b>Quantifying the Evolutionary Potential for Delta Smelt persistence in a Warming Habitat</b> <i>Joanna Grffiths, UCD</i>	<b>Hydrodynamic Metrics to Evaluate Tidal Marsh Dynamics in the Sacramento-San Joaquin Delta</b> <i>Paul Stumpner, USGS</i>	<b>Loss, and Potential Recovery of Primary Production from the Sacramento-San Joaquin Delta</b> <i>James Cloern, USGS</i>	<b>Dutch Slough tidal marsh restoration monitoring: launching a program to track ecosystem development</b> <i>Scott Jones, USGS</i>	<b>The influence of environmental conditions in long term fish abundance data</b> <i>James White, CDFW</i>
	<b>An Individual-Based Model of Delta Smelt Population Dynamics: A Versatile Tool for Life-Cycle Analyses of Management Actions</b> <i>Kenneth Rose, UMD</i>	<b>Accurate, High Resolution, Measurements of River Surface Velocity and Turbulence Metrics Over Large Areas in the Sacramento River and Its Implications for Water Resource Management</b> <i>Seth Schweitzer, Cornell</i>	<b>Floodplain trophic subsidies support juvenile salmon in a highly altered river network</b> <i>Mollie Ogaz, UCD</i>	<b>Montezuma Wetlands Project: Early Results and Lessons Learned from a Newly Breached Marsh</b> <i>Cassie Pinnell, Montezuma Wetlands, LLC   Vollmar Natural Lands Consulting, Inc</i>	<b>Invasion of the Water Body Snatchers: Tridentiger Trends from the San Francisco Bay Study and Summer Townet Survey</b> <i>Timothy David Malinich, CDFW</i>



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	<p>How can isotopes inform understanding of life history diversity in wild Longfin Smelt <i>Christian Denney, UCD</i></p>	<p>Monitoring elevations of tidal marshes in San Pablo Bay-Delta: Update on Surface Elevation Table (SET) monitoring <i>Anna Kennedy, USGS</i></p>	<p>A Synthesis of Productivity Estimates for the Abundant Copepod <i>Pseudodiaptomus forbesi</i> <i>Wim Kimmerer, SFSU</i></p>	<p>Reconnecting Delta food webs: evaluating the influence of tidal marsh restoration on energy flow and prey availability for native fishes <i>Susan De La Cruz, USGS</i></p>	<p>Zooplankton, Outflow, and Management Implications: The Values of Long-term Zooplankton Monitoring in the SFE <i>Arthur Barros, CDFW</i></p>
	<p>Estimation of Longfin Smelt Hatching Distribution, Abundance and Entrainment using Three-Dimensional Hydrodynamic and Particle-Tracking Models <i>Edward Gross, RMA</i></p>	<p>Sediment Transport Modeling Using Artificial Neural Network <i>Han Sang Kim, DWR</i></p>	<p>Zooplankton community response to extreme environmental events in the Cache-Lindsey Slough Complex <i>Kim Luke, UCD</i></p>	<p>How Do Food Webs Change Following Tidal Restoration? A Preliminary Assessment of Restoration Success in Two Fish Restoration Project (FRP) Wetlands <i>Christy Bowles, CDFW</i></p>	<p>The Value of Long-Term Zooplankton Monitoring for Detecting Impacts of the Suisun Marsh Salinity Control Gate Managed Flow Action <i>Christina E. Burdi, CDFW</i></p>
12:00pm	<b>Lunch Break</b>				
12:30pm	<p><b>Featured Special Session &amp; Panel Discussion: Raising awareness and shifting the paradigm: fostering diversity, inclusion and equity in the Bay-Delta system</b> <i>Dylan Stern, Delta Science Program</i></p> <ul style="list-style-type: none"> <li>• Employee-Led Efforts to Foster Equity and Inclusion at the U.S. Geological Survey (Alexandra Etheridge, USGS)</li> <li>• Making Waves: Piloting Community Engagement in Adapting to Rising Tides (Melissa Jones, TBD)</li> <li>• Youth Advocates: Increasing the voices of the most impacted (Elaine Barut Labson, TBD)</li> <li>• White-led leadership in complex ecological systems (Sarah Myhre, Rowan Institute)</li> <li>• Panel Discussion</li> </ul>				
1:10pm	<p><b>Break Training – Delta Hydrology 101</b> by <i>Ted Sommer</i> available as an on-demand video throughout the conference</p>				
2:30pm	<b>Poster Session</b>				



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**WEDNESDAY, APRIL 7TH, 2021**

<b>Time</b>	<b>Room 1: Salmon Science For Management</b>	<b>Room 2: Global Climate Change at the Estuary Scale</b>	<b>Room 3: Getting into the Weeds: Aquatic Vegetation</b>	<b>Room 4: Social Science &amp; Human Dimensions</b>	<b>Room 5: IEP Session: Success at different trophic levels: gaining insight from nutrients to otoliths</b>
9:00am	<b>(Live) Welcome &amp; Introduction of Plenary Speaker: Stacy Sherman, CDFW and TBD</b>				
10:00am	<b>Break</b>				
10:15am	<b>Mechanisms, impacts, and mitigation for thiamine deficiency and early life stage mortality in Central Valley salmon</b> <i>Rachel Johnson, NOAA</i>	<b>Integrated modeling of climate and land change impacts on future dynamic wetland habitat in California's Central Valley</b> <i>Tamara Wilson, USGS</i>	<b>Using Sentinel-2 to Provide Open-Access Tools for Plant and Water Mapping in the Sacramento Bay-Delta</b> <i>Julia Burmistrova, UC Merced</i>	<b>Hunters as Stakeholders in the Bay-Delta Watershed</b> <i>Virginia Matzek, Santa Clara Univ.</i>	<b>A View from the Landscape Scale: Using Spatial Variation of Nutrients and Phytoplankton Across the Delta to Identify Underlying Biogeochemical Processes</b> <i>Brian Bergamaschi, USGS</i>
	<b>Insights into the life history and habitat use of historical salmon in the Bay-Delta Watershed</b> <i>Malte Willmes, UCSC</i>	<b>Mapping Social Vulnerability to Climate Change in the Delta and Suisun Marsh</b> <i>Annie Merritt, DSC</i>	<b>Invasive aquatic vegetation detection using hyperspectral remote sensing from UAV</b> <i>Erik Bolch, UC Merced</i>	<b>From California's Water Wars to America's Culture Wars: A Media Analysis of the Delta Smelt Controversy</b> <i>Caleb Scoville, Tufts Univ.</i>	<b>Nine Years of Flow Pulses: A Synthesis of Water Quality, Plankton Subsidies and Fish Communities in the North Delta</b> <i>Brittany Davis, DWR</i>
	<b>Using Multiple Years of Data to Link Environmental Covariates to Juvenile Steelhead Population Dynamics in the South Delta</b> <i>Adam C. Pope, USGS</i>	<b>Results of integrated modeling of the physical systems of the San Francisco Bay-Delta Estuary and watershed for future scenarios</b> <i>Noah Knowles, USGS</i>	<b>The potential of satellite remote sensing time series to uncover wetland phenology under unique challenges of tidal setting</b> <i>Lisamarie Windham-Myers, USGS</i>	<b>Wings Landing Tidal Habitat Restoration Project Environmental Education Program</b> <i>Ryan Lopez, Natural Resources Group Inc.</i>	<b>I'm Not That Shallow - Surprising Similarity in Zooplankton Communities Collected at Different Depths near Wetland Restoration Sites</b> <i>Rosemary Hartman, DWR</i>



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	<p><b>The drought and the deluge: daily and reach-specific estimates of survival, travel-time and routing probabilities through the Sacramento River Delta and Yolo Bypass for winter-run Chinook salmon from 2014-2018</b> <i>Dalton Hance, USGS</i></p>	<p><b>Re-calibrating Sacramento and San Joaquin Water Year Types in a Changing Climate</b> <i>Romain Maendly, DWR</i></p>	<p><b>Ecosystem engineering impacts of invasive submerged aquatic vegetation in the Delta</b> <i>Judith Drexler, USGS</i></p>	<p><b>Surfacing Areas of Consensus and Disagreement Across Diverse Practitioner Groups to Inform Science &amp; Restoration Priorities for Salmonids in the Bay Delta</b> <i>Natascia Tamburello, ESSA Technologies</i></p>	<p><b>Every cog and wheel: Understanding the importance of genomic diversity in Central Valley Chinook salmon</b> <i>Mariah Meek, Michigan State Univ.</i></p>
	<p><b>Counting the Needles in the Haystack: Estimating Juvenile Production of Endangered Winter Run Chinook Salmon Leaving the Delta</b> <i>Brian Pyper, Fish Metrics Inc.</i></p>	<p><b>Spatial, Seasonal, and Climate Change Signals in Water Temperatures in the Upper San Francisco Estuary from 11 Discrete Monitoring Programs</b> <i>Samuel Bashevkin, DSP</i></p>	<p><b>Floating wetlands for food-web, greenhouse gas benefit and potential subsidence reversal</b> <i>Steven Deverel, HydroFocus Inc.</i></p>	<p><b>Governing multiple forms of connectivity in the Bay-Delta</b> <i>Annika Keeley, DSP</i></p>	<p><b>Years in their ears: what can fish earbones tell us about spring-run Chinook salmon success in an increasingly volatile climate?</b> <i>Flora Cordoleani, UCSC/NOAA</i></p>
12:00pm	<b>Lunch Break</b>				
12:30pm	<b>Art Panel</b> ( <i>Organizers Chelsea Batavia &amp; Rosemary Hartman</i> )				
1:30pm	<b>Break</b>				
2:30pm	<b>Art Exhibit/Social Science Networking Event: Building a collaborative Delta social science community to integrate social science into the Delta science, management and policy landscape.</b> <i>(Organizer Jess Rudnick)</i>				



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**THURSDAY, APRIL 8TH, 2021**

<i>Time</i>	<i>Room 1: Special Session: Advances In Understanding Thermal Effects On Salmon And Temperature Management For Salmon In The Central Valley</i>	<i>Room 2: Floods And Other Hazards</i>	<i>Room 3: Special Session: Multiple Perspectives On Sediment In The Bay And Delta: Supply, Transport, And Sink In A Complex Environment</i>	<i>Room 4: Special Session: Linkages Among Physics, Chemistry, And Biology In The Sacramento Deep Water Ship Channel</i>	<i>Room 5: IEP Session: Fish Habitat Spatial Arrangements: Experience From Across The Estuary And Beyond</i>
9:00am	<b>(Live) Welcome &amp; Introduction of Plenary Speaker:</b> <i>Gary May (UCD)</i>				
10:00am	<b>Break</b>				
10:15am	<b>Physiological variation in thermal traits among eight populations of Chinook Salmon from the West Coast</b> <i>Kenneth Zillig, UCD</i>	<b>Delta flood risk under climate change: Key Findings from the Delta Adapts flood risk analysis</b> <i>Andrew Schwarz, DSC</i>	<b>How dams have inverted the Sacramento River sediment budget, with implications for the downstream estuary</b> <i>Scott Wright, USGS</i>	<b>Sacramento Deepwater Ship Channel science and Delta ecosystem rehabilitation</b> <i>Erwin Van Nieuwenhuysse, USBR</i>	<b>Four Decades of Juvenile Fish Responses to Hydroclimate: Advancing a State-Space Modeling Approach in the San Francisco Estuary</b> <i>Denise Colombano, UCB</i>
	<b>Survival thresholds for Chinook salmon smolts in the Sacramento River</b> <i>Cyril Michel, UCSC/NMFS/NOAA</i>	<b>Delta Adapts: Assessing Ecosystem Vulnerability to Climate Change</b> <i>Dylan Chapple, DSP</i>	<b>How Do Physical and Biological Properties of Bed Sediments Influence Erodibility?</b> <i>Jessca Lacy, USGS</i>	<b>Phytoplankton and zooplankton dynamics in the Sacramento Deep Water Shipping Channel</b> <i>Adrienne Smits, UCD</i>	<b>Space Jam: A Spatially Explicit History of Estuary Fish Species</b> <i>Dylan Stompe, UCD</i>
	<b>Exploring the drivers of river temperature below a large dam, an example from the Sacramento River</b> <i>Miles Daniels, UCSC/NOAA</i>	<b>Earthquake Event Selection for Regional Seismic Hazard Analysis of Levee Systems</b> <i>Scott Brandenburg, UCLA</i>	<b>Variations in microcosm measured bed erodibility in Grizzly Bay and San Pablo Bay, summer 2019 and winter 2020</b> <i>David Hart, USGS</i>	<b>Hydrodynamics Drive Pelagic Communities and Food Web Structure in a Tidal Environment</b> <i>Matthew Young, USGS</i>	<b>Suisun Marsh on the edge of resilience in an era of rapid change</b> <i>*TBD, UCD</i>



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	<p>The biophysical basis of thermal tolerance in salmon eggs and the implications for Sacramento River Winter-Run Chinook salmon *Ben Martin, UCSC/Univ. of Amsterdam</p>	<p>Integrating climate driven hydrologic and subsidence models and geophysical data to predict Delta Levee failure risks Sandra Bachand, Bachand &amp; Associates</p>	<p>Evaluating the effect of realignment of Coyote Creek on sediment supply to Bothin Marsh, Marin County, California Michael MacWilliams, Anchor QEA LLC</p>	<p>Dispersion and Stratification Dynamics in the Upper Sacramento Deep Water Ship Channel Leah Lenocho, USGS</p>	<p>Differences between surface and bottom temperatures in the upper San Francisco Estuary: Implications for temperature refugia *Brian Mahardja, USBR</p>
	<p>Quantification of thermal impacts across freshwater life stages to improve temperature management of anadromous salmonids Alyssa FitzGerald, UCSC</p>	<p>Modeling High Water Events to Inform a Multi-Hazard Levee Risk Assessment Stephen Andrews, RMA</p>	<p>Sediment deposition and marsh accretion properties in San Pablo Bay-Delta Karen Thorne, USGS</p>	<p>Whole ecosystems experiments unravel effects of nutrients, light, and hydrodynamics on productivity in the upper Sacramento-San Joaquin Delta Luke Loken, USGS</p>	<p>Investigating Longfin Smelt Utilization of Coastal Estuaries North of the San Francisco Estuary Colin Brennan, ICF</p>
12:00pm	<b>Lunch Break &amp; Student Membership Lunch</b>				
1:15pm	<b>Implicit Bias Training</b>				
2:15pm	<b>Break</b>				
2:30pm	<b>Dedicated interactive time with prerecorded (on-demand) speakers</b>				



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**FRIDAY, APRIL 9TH, 2021**

<b>Time</b>	<b>Room 1</b>	<b>Room 2</b>	<b>Room 3</b>	<b>Room 4</b>	<b>Room 5</b>
	<b>Special Session: Integrating data and population models: understanding factors that affect sensitive fish populations</b>	<b>Contaminants and Toxins</b>	<b>Birds and their Habitats in the Bay-Delta</b>	<b>Special Session: Greenhouse Gas Exchange and Wetland Accretion in the Bay-Delta System: Implications for Science, Policy, and Management Modeling in the Sacramento-San Joaquin Delta, Suisun Marsh, and San Francisco Bay</b>	<b>IEP Session: Using aquatic surveys for estimation and communication: bias, quantification, and display</b>
9:00am	<b>(Live) Welcome &amp; Introduction of Plenary Speakers:</b> <i>Richard Connon, UC Davis, Levi Lewis (UCD) and Priya Shukla (UCD &amp; Forbes), Louise Conrad, Delta Science Program</i>				
10:00am	<b>(Live) Final Day Remarks</b>				
10:15am	<b>Break</b>				
10:30am	<b>Life Cycle Modeling Using State-Space Models for Data Integration to Identify Factors Affecting Delta Smelt Recruitment, Survival and Population Growth Rates</b> <i>Leo Polansky, USFWS</i>	<b>What's HAB-enig to our water and how can we best manage it?</b> <i>*Rachel Lamb, Univ. Of Maryland</i>	<b>Breeding Waterbird Population Declines in South San Francisco Over the Past Two Decades</b> <i>Alex Hartman, USGS</i>	<b>Carbon greenhouse gas fluxes and water biogeochemistry in a restored wetland with managed hydrology in the Sacramento-San Joaquin Delta</b> <i>Ariane Arias-Ortiz, UCB</i>	<b>Relative Catchability Bias Among Sampling Gears for Fish Species within the San Francisco Estuary</b> <i>Brock Huntsman, USGS</i>
	<b>Decision Analysis to Identify Optimal State-Dependent Restoration Policies for Chinook Salmon</b> <i>Adam Duarte, USFS</i>	<b>Bioaccumulation Potential of Chlorpyrifos in <i>Hyalella azteca</i>: Implications for the Bay-Delta Region</b> <i>*Kaley Major, Univ. of Massachusetts</i>	<b>Seasonal resource partitioning among demographic groups of western sandpipers: Implications for shorebird ecology and conservation in the San Francisco Bay estuary</b> <i>Laurie Hall, USGS</i>	<b>The Delta Blue Carbon and Wetland Resilience Project: Data Synthesis and Scenario Evaluation for the Past, Present, and Future Delta</b> <i>Lydia Smith Vaughn, SFEI</i>	<b>Let's stop guessing: Using quantitative tools developed during long-term monitoring review to evaluate survey regime alterations</b> <i>Jereme Gaeta, CDFW</i>
	<b>Applying the Winter-run Life Cycle Model to Pressing Hydromanagement Questions in the Central Valley</b> <i>Noble Hendrix, QEDA Consulting</i>	<b>A new model to address legacy Gold Rush mercury in the Delta</b> <i>Jamie Anderson, DWR</i>	<b>Coordinated Mapping to Assess Local, Regional and Coast-wide Change in Wetlands and Related Habitat Types</b> <i>Cristina Grosso, SFEI</i>	<b>Advancing the Wetland Accretion Rate Model of Ecosystem Resilience (WARMER-2): Improved Parameterization for San Francisco Bay-Delta</b> <i>Kevin Buffington, USGS</i>	<b>Quantifying changes in gear efficiency to reduce bias in estimating long-term abundance trends</b> <i>Bryan Matthias, USFWS</i>



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	<b>The enhanced Particle Tracking Model: bridging science and management</b> <i>*Vamsi Krishna Sridharan, UCSC</i>	<b>3D modeling of methylmercury as a conservative tracer in the Sacramento-San Joaquin Delta</b> <i>Lisa Lucas, USGS</i>	<b>Identifying high priority areas for bird conservation in the Delta</b> <i>Kristen Dybala, Point Blue Conservation Science</i>	<b>Integration of science and implementation of land-use change for increased sustainability</b> <i>*Steven Deverel, HydroFocus Inc.</i>	<b>Real Time Tidal Excursion Mapping and Constituent Tracking, Fishery Surveys and Tools to Support Tidally Influenced Pelagic Habitat Identification</b> <i>*Speaker TBD</i>
	<b>Merging computational fluid dynamics and machine learning to reveal fish migration strategies</b> <i>*Mike Gil, Univ. of Colorado</i>	<b>Current-use Pesticides in Zooplankton, Water, and Suspended Sediment Collected from the Sacramento-San Joaquin Delta</b> <i>James Orlando, USGS</i>	<b>Resilient Staten Island: Pilot Application for Landscape Scenario Analysis</b> <i>Alison Whipple, SFEI</i>	<b>Quantifying carbon benefits of tidal wetland restoration in the Delta: Decision support using a robust, integrated and data-driven model</b> <i>Patty Oikawa, CSU East Bay</i>	<b>Web based approaches to fisheries data communication</b> <i>Tom Pham, NOAA/UCSC</i>
12:15pm	<b>Lunch Break</b>				
1:45pm	<b>Implicit Bias Training</b>				