Updating the State of Bay-Delta Science to Reflect Findings Learned about the System Since 2008

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The State of Bay-Delta Science, 2008 (SBDS, 2008), a synthesis of the scientific knowledge of the Bay-Delta system, is currently being updated by the Delta Science Program (DSP). The update to *SBDS, 2008* will be written for a broad audience with different sections of the report addressing diverse needs. The executive summary will target high-level decision-makers, including the Governor, agency secretaries, the legislature, and Congress, while the main document will target decision-makers and agency managers who are familiar with the system, as well as technical specialists and scientists. The key questions to be addressed revolve around the state of scientific knowledge, including changes throughout the system, insights from an integrated synthesis of data and analyses, and prevailing certainties and uncertainties. This living document, which will be revised by scientific experts every four years, will include future web-based updates as new information arises.

Topics may include: a brief summary of *SBDS, 2008*; defining a new baseline for the big issues of water quality, aquatic ecosystems, levee system fragility, water supply and climate change; a systems-scale view; alternative futures; the role of science and other social science perspectives; and the way forward.

Future updates to the document will complement the DSP Science Action Agenda by identifying actions necessary to fill knowledge gaps and address uncertainties of the system. In turn, this document will be shaped by information gleaned from actions performed under the Science Action Agenda. The next update to *SBDS* is scheduled for completion in 2015.

Keywords: SBDS, State of Bay-Delta Science

Poster topic: Integrative Applied Science

California Estuaries Portal: Bringing Science to the Public

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The California Estuary Monitoring Workgroup (CEMW) continues to refine the recently released California Estuary Portal, improve web-based collaboration tools, enhance access to environmental monitoring data, and identify ecosystem health indicators for the Delta that complement those used in the San Francisco Bay as part of the 2015 State of the Estuary report. The Estuary Portal continues to strive to meet the Delta Science Plan's call to "build on existing data management systems to enable the regions' environmental and project-implementation data to be easily accessed, visualized, and processed." The portal continues to focus on the visualization of data that will help inform stakeholder about trends in living resources populations. By incorporating new data sets and query capability the Estuary Portal plays a multifaceted roll in providing the public with detailed and digestible information about the Bay-Delta ecosystem and satisfying state and federal agency reporting requirements. Learn why you should, and how you can, be part of this collaborative effort, involving multiple government agencies and non-governmental organizations, working toward improved estuarine science, restoration, and protection of beneficial uses.

Keywords: Estuary, Data Visualization, Health Indicators, Web Portal

Poster topic: Integrative Applied Science

Enhancing Capacity for Habitat Restoration Project Tracking, Assessment and Reporting

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Currently, evaluating the effects of restoration projects on the extent and conditions of Bay-Delta and Central Valley wetlands is extraordinarily difficult because restoration projects are not tracked in a consistent manner across programs. The Sacramento-San Joaquin Delta Conservancy (Conservancy), in partnership with the State Water Resources Control Board (Water Board), San Francisco Bay Joint Venture, Central Valley Joint Venture and San Francisco Estuary Institute/Aquatic Science Center (SFEI/ASC), is expanding current wetland project tracking capabilities of EcoAtlas to meet the project tracking, assessment, and reporting needs for current and planned habitat restoration in the San Francisco Bay-Delta and Central Valley. An online visualization and data management tool, EcoAtlas was created under the auspices of the California Wetland Monitoring Workgroup, to provide free access to information about the condition and extent of California wetlands, as well as wetland restoration project tracking information. The Conservancy and project partners have met with entities working in the Delta to develop new functionality, which includes a data entry tool, additional information fields, expanded mapping tools, data queries and reporting summaries. SFEI/ASC will soon begin incorporating new features into EcoAtlas with forthcoming interim products for review. In the upcoming months, the Conservancy's database of current and planned restoration projects in the Delta, a product of the Department of Water Resources, FloodSAFE Environmental Stewardship and Statewide Resources Office efforts will be made available through these enhancements to EcoAtlas. The intent of this project is to enable better analyses of changes in wetland extent and condition; landscape-scale conservation planning efforts; prioritization of restoration areas; evaluation of progress toward meeting conservation objectives; increasing coordination among restoration entities; and leveraging of restoration resources on a regional and statewide scale.

Keywords: Habitat restoration, tracking, assessment, monitoring, mapping, database

Poster topic: Integrative Applied Science

New Insights on Measuring and Up-Scaling Wetland Canopy Leaf Area Index in the Sacramento-San Joaquin Delta

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Canopy leaf area index (LAI; one-sided leaf area per unit ground area) is a key instrumental variable used in models of plant-atmosphere carbon and water exchange, greenhouse gas and energy budgets and canopy-based habitats. Multiple studies have measured LAI in upland terrestrial landscapes and explored methods to up-scale field values to regional extents using remote sensing data. However, in wetland ecosystems globally, much uncertainty still exists on magnitude of LAI, its spatial and temporal variation and on robust approaches to measure this index in the field or from remote sensing. We assessed LAI in natural and man-made wetlands of the Sacramento-San Joaquin Delta, California, USA (the Delta) during the growing seasons of 2013-2014 and tested its empirical relationships with spectral indices of vegetation function derived from Landsat satellite imagery. Peak-season site-average LAI ranged from $3.3 m^2 m^{-2}$ in a diked marsh to $6.5 m^2 m^{-2}$ in a young engineered wetland. Results also indicate high within-site dispersion of LAI (coefficient of variation from 0.13 in rice to >0.5 in engineered marshes) attributed to complex surface composition, variable canopy height and non-uniform contribution of litter. Field LAI significantly correlated ($p<0.001$) with several Landsat-based indicators of vegetation greenness; however, the strongest univariate relationships explained only 45-50% of LAI variance due to variable canopy characteristics and sub-pixel wetland complexity. Improving model strength requires use of multiple variables and corrections for non-green biomass and sub-pixel green canopy fraction. Results indicate that, unlike in terrestrial biome-scale studies, single “mean” LAI values may not sufficiently characterize complex Delta wetland canopies, and models of wetland ecosystem function and greenhouse gas fluxes must incorporate within-site spatial variation in canopy properties. Landsat satellite imagery is very promising for regional-scale modeling of LAI, however, instead of simple univariate relationships with spectral indices, multivariate spatial models should be employed with sub-pixel corrections for site heterogeneity.

Keywords: wetland, LAI, canopy, vegetation, carbon, remote sensing, leaf area index

Poster topic: Integrative Applied Science

Optimizing Secondary Treatment for Energy Savings & Nutrient Removal

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At the San José-Santa Clara Regional Wastewater Facility (Facility) power generation and reducing energy demand have been issues of concern since nitrification and filtration were installed in 1979. In 1997, the Facility began configuring its secondary treatment process to Biological Nutrient Removal (BNR). It was known at the time that BNR treatment should reduce energy demand compared to sequential secondary and nitrification treatment steps. Over subsequent years, the facility additionally experimented and adapted aeration enhancements that reduced energy demand and continued to provide effective nutrient removal. This poster attempts to quantify the energy savings that were gained since major Facility expansion in 1979.

Since electric and engine driven blowers consume most of the energy in the secondary wastewater treatment process, the number of blowers operating at any given time is the simplest, albeit crude, method of quantifying changes to energy consumption. Measurement of electricity in kilowatt hours (kWh) and methane gas in British thermal units (Btu) is accurate, but limited by availability of data over the decades. Pump replacements with newer more efficient models require consideration of their specific energy use. The analysis of overall energy savings is further complicated by seasonal wastewater loads and constant changes in numbers of on-line aeration basins and clarifiers.

Overall, several changes to the secondary wastewater process at the Facility appear to have shaved off almost a megawatt (MW) of peak demand. The typical number of on-line blowers during peak times has dropped from 6 to 8 down to 2 to 3 today. Over the same period, the facility has increased the percentage of nutrients removed.

These findings demonstrate that denitrification can be added to an existing secondary-nitrification treatment process and still result in energy savings.

Keywords: Secondary Wastewater Treatment, Energy, Sustainability, Nitrification, Nutrients

Poster topic: Integrative Applied Science

Subsidence Reversal through Marsh Re-establishment on Twitchell Island

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Worldwide, freshwater marshes and their rich peat soils have been lost as a result of the conversion to agriculture. In the Sacramento-San Joaquin Delta the converted land has since subsided due to peat oxidation, requiring maintenance of perimeter levees to prevent flooding. Marsh re-establishment through gradual flooding is one restoration strategy that has shown great potential for reversing this subsidence and transforming current carbon sources into carbon sinks. This technique involves flooding the land to a level suitable for marsh vegetation and allowing the biomass to naturally accrete over time. As the main metric for these systems, vertical accretion is essential to evaluating the success of this strategy.

In this study, we updated previous measurements of accretion in the west wetland of Twitchell Island; the west wetland is a 3-hectare re-established marsh built by the USGS in 1997. The area was extensively studied and managed from 1997 to 2008 and continues to be used for research, but there are no other known accretion measurements since 2008. One sediment elevation table (SET) benchmark out of the original eight was located and measured in October 2013. Results from Miller et al. 2008 report an accretion rate of 4.18 cm/yr from 1997 to 2005 at this location. Our results show an increased rate of 7.96 ± 1.1 cm/yr from 2005 to 2013. Throughout the original study period, water levels were maintained at 25 cm; however, data since that time shows variable levels. Thus, even without strict management, high rates of accretion continued. These results help inform carbon balance models and future restoration efforts.

Miller RL, Fram MS, Fujii R, Wheeler G. 2008. Subsidence reversal in a re-established wetland in the Sacramento-San Joaquin Delta, California, USA. San Francisco Estuary and Watershed Science 6(3): article 1.

Keywords: wetland restoration, carbon sequestration, subsidence reversal, Twitchell Island, freshwater marsh

Poster topic: Integrative Applied Science

Assessing Regional Digital Elevation Model Suitability for Tidal Wetland Restoration Planning in Suisun Marsh

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Tidal wetland restoration planning requires accurate ground elevation data for proposed sites, as elevation in relation to the tides determines the habitats that would be created following restoration (subtidal, intertidal, supratidal). Regional-scale efforts require reasonably approximate topographic data to support site selection and make predictions of restoration outcome. Site-scale efforts require more accurate data to support design and outcome projections. Prior to using a regional digital elevation model (DEM) for regional or site-specific restoration planning, DEM suitability for that use must be assessed. In Suisun, two marsh-wide DEMs are available, both derived from Light Detection and Ranging (LiDAR) data collected by: (1) the Department of Water Resources in 2005 (2005 DEM - currently in use), and (2) the California Coastal Conservancy from 2009-2011 (2011 DEM) covering much, but not all of Suisun. Tall, dense wetland vegetation and standing water, common in Suisun Marsh, interfere with LiDAR return signals, yielding inaccuracies up to several feet.

We developed a methodology for quantitatively assessing DEM suitability for regional and site-scale tidal wetland restoration planning in Suisun Marsh, using limited ground-based topographic survey data, statistical analyses of elevation differences, and a set of suitability criteria. We applied this methodology to six properties across Suisun Marsh to assess suitability of the 2005 and 2011 DEMs. The 2011 DEM better represented elevations at all sites. Where vegetation was less dense, the 2011 DEM was within acceptable tolerances. For sites with more dense vegetation and/or extensive standing water, neither DEM was within tolerance. Results indicate the 2011 DEM is better suited for regional planning and should be used, where coverage exists, in place of the 2005 DEM. Individual restoration projects should assess DEM suitability with this method, and sites flooded during LiDAR data acquisition, or covered in dense, tall wetland vegetation will likely require additional topographic data.

Keywords: Wetland Restoration, topography, DEM, LiDAR

Poster topic: Integrative Applied Science

The Bay Delta Science Conference Interacts with a Conceptual Model of Sacramento River Salmonid Biology and Management- Make Your Connection!

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Conceptual models are a great tool for collaborative brainstorming of linkages between physical and management drivers and biological outcomes. Recent interagency efforts through the Management Assessment and Synthesis Team and the South Delta Salmon Research Collaborative work teams have focused on developing conceptual models to construct and evaluate hypotheses relevant to management, prioritize and document critical data gaps, and guide adaptive management. We drafted a conceptual model which nests a generalized salmon life cycle within tiered levels that promote explicit attributes that influence and/or drive transitions within the life cycle. Such a model may be useful for water management over appropriate time and spatial scales for aforementioned reasons, but requires iterative brainstorming, review, and revision to achieve collective agreement on its functionality. This poster provides an opportunity for conference participants to make their own connection with the ideas through use of interactive materials that allow participants to suggest changes and make comments. To interact with the conceptual model, we recommend people record their responses to the following questions at this poster:

1. Do the model's tiers provide sufficient specificity to capture fish and water management drivers on life stage biological responses and transition drivers? What drivers would you add?

2. Do the model's salmonid responses reflect the ontogenic processes influenced by life history and water management drivers? What responses would you add?

3. Do the model's habitat attributes reflect the elements influencing salmonid life stages and responses? What habitat attributes would you add?

4. Are the life stages too specific? Should parr and smolt be combined? What distinguishes these stages?

5. Would this conceptual model be useful in any fish and water management efforts you participate in?

We hope to present a next iteration of the model and review of input received at an upcoming science workshop or meeting.

Keywords: conceptual model, salmonid, driver-linkage-outcome, transition drivers, interactive
Poster topic: Integrative Applied Science

Regional Data Exchange: From Concept to End User Data Tools

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How data exchanges and presentation can be leveraged to demonstrate the efficacy of key analyses; tools to make the data more understandable to target audiences, and using good design in fostering information consumption.

A partnership between Portland State University and Oregon Department of Environmental Quality was formed to develop a web based data system for both surface water and lake data through a single web portal. Disparate systems housing water quality and lakes data was evaluated to provide the end user a 'one stop shop' to access multiple data systems. Using new technologies, such as data exchanges, web services and geo databases were incorporated to create the Atlas of Oregon Lakes data exchange.

In addition to merging disparate data sets, statistical coding was embedded to allow real time metrics for the end user. This step allows the data user quick access to statistical results based on a customized query. The final results include access to databases from different organizations, real time metric calculations, web services to communicate data efficiently and a map based web site.

Keywords: Data exhchanges

Poster topic: Integrative Applied Science

Where Are Our Wetlands and How Are They Doing?

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The California Water Quality Monitoring Council recently released a completely redesigned internet portal to connect decision makers and the public with ecosystem health information. The theme of this new portal is "Are Our Wetland Ecosystems Healthy?" Go to California's "My Water Quality" website (www.MyWaterQuality.ca.gov) and click on "Are Our Aquatic Ecosystems Healthy?" The California Wetlands Portal includes interactive graphics, maps and monitoring data that focus on the location, extent and health of our state's wetland resources. A home page photo carousel provides insight into the many types of wetlands found around California. The goal is to make this information as timely and user-friendly as possible. Data presented in the portal are housed in another new web-based tool called EcoAtlas (www.ecoatlas.org), which provides an online resource for compiling maps and data about wetlands produced by numerous state and federal agencies and non-governmental organizations.

Formed in 2007 through cooperative agreement between California's Environmental Protection and Natural Resources Agencies, the California Water Quality Monitoring Council brings together water quality and ecosystem health information from a variety of organizations with special expertise in wetland monitoring and assessment, coordinated through the California Wetland Monitoring Workgroup. This collaborative workgroup facilitates dialogue and coordination among twenty-four state, federal, and local agencies and non-governmental organizations that monitor and assess our state's wetlands. Their portal provides a way to make the information more readily accessible so that it can inform policies and management decisions. Furthermore, it allows the general public to access information about local and statewide resources that were compiled by public agencies with public resources.

Wetlands are an important component of the San Francisco Bay-Delta ecosystem. The California Wetlands Portal and EcoAtlas make wetland information relevant to scientists, decision makers and the general public, improving accessibility while increasing the transparency and accountability of monitoring and assessment programs.

Keywords: internet portal, wetlands, data management, Monitoring Council, Wetland Workgroup, EcoAtlas

Poster topic: Integrative Applied Science

What Does a Pigment-Based Analysis Tell us about the Phytoplankton Community Composition in San Francisco Bay?

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San Francisco Bay is a nutrient-enriched estuary, but has not shown the typical symptoms of nutrient overenrichment, such as high phytoplankton biomass and low dissolved oxygen. However, excess nutrients can also adversely affect estuaries by supporting increases in the abundance of harmful algal species, and can lead to other potential shifts in community composition such as changes causing altered or reduced food quality. Developing an improved understanding of the phytoplankton community-nutrient linkage is among the highest priority nutrient management issues for the Bay, but will require a substantial increase in the spatial and temporal resolution of phytoplankton community data collection. Microscopy is the classic method for phytoplankton taxonomy and biomass quantification, but it is labor-intensive and cost-prohibitive. An alternate method to quantify phytoplankton uses high-performance liquid chromatography (HPLC) pigment analysis, an objective and fast method for identifying the composition of phytoplankton communities, albeit at reduced taxonomic resolution. We present HPLC pigment analysis of approximately bi-monthly samples collected throughout San Francisco Bay from November 2011 - December 2013, and describe spatial, seasonal, and interannual variability of phytoplankton composition using CHEMTAX (a factor analysis program using chemical markers to estimate phytoplankton class abundance) and biomass phytoplankton proportion factors. The pigment-based abundance estimates compared well with parallel microscopy biovolume class abundance measurements. In addition, from the pigment analyses, we were able to infer seasonal and inter-subembayment variability in community composition, and capture small or rare phytoplankton classes commonly missed by microscopy. Initial work suggests that the pigment-based approach provides a cost-effective yet sensitive method to monitor and explore factors regulating phytoplankton composition for the purpose of environmental management strategies.

Keywords: pigments, HPLC, CHEMTAX, phytoplankton community composition, nutrients

Poster topic: Integrative Applied Science

Understanding Stem Strength and Flood Tolerance of *Schoenoplectus californicus* for Enhanced Restoration Success

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Schoenoplectus acutus and *S. californicus* are freshwater macrophytes that are native to California and commonly utilized in wetland restoration efforts due to their ability to encourage sediment accretion, stabilize sediment, and provide faunal habitat. Despite their prominence in portions of the Sacramento-San Joaquin Bay Delta, limited information is available on the environmental tolerances of these species. Results from a tidal mesocosm study on the responses of *S. acutus* and *S. californicus* adults and seedlings to a variety of flooding regimes revealed that longer durations of flooding significantly reduced survival of seedlings of both species and adults of *S. acutus*, but not *S. californicus*. Longer durations of flooding significantly reduced biomass production, reproductive capacity, and stem strength of *S. acutus* adults. However, *S. californicus* adults maintained stem strength across flooding treatments and displayed greater biomass production with increased flooding. These findings help to explain vegetation patterns at a freshwater tidal restoration site (Liberty Island, CA) that is dominated by expanding stands of *S. californicus*. A field study conducted at Liberty Island examined *S. californicus* expansion and stem strength in a variety of zones that differed in elevation, edaphic properties, hydrology, and wave energy. In zones characterized by longer durations of flooding and higher wave energy, *S. californicus* exhibited slower rates of expansion, shorter stem heights, and lower stem density. However, differences in stem strength of *S. californicus* were minor regardless of environmental conditions, indicating that *S. californicus* is an excellent species for establishment in these high energy environments. These results demonstrate the influence of multiple factors on vegetation colonization and expansion, which should be considered in the context of informing management decisions and ecosystem restoration. Additionally, this research may have implications for improving the science and practice of mitigating wave erosion of earthen levees with vegetation that also provides marsh habitat.
Keywords: Hydrology, Restoration, Schoenoplectus spp., Stem Strength, Wave Attenuation

Poster topic: Integrative Applied Science

Integrating Surface and Shallow Subsurface Hydrologic and Water Quality Interactions for Developing Management Practices for Rice in the Sacramento-San Joaquin Delta, CA

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The Sacramento-San Joaquin Delta conveys water to over 25 million Californians and three million agricultural acres in California's Central Valley. Throughout the Delta, subsidence from peat oxidation, over 7 meters in some areas, threatens water delivery because of increasing failure risks to levees. Strategic implementation of rice fields in the Delta is being proposed to create a more sustainable environment with regards to water conveyance and its agrarian culture. Water quality indicator dynamics (e.g. dissolved organic carbon, disinfection byproduct precursors, mercury, and nutrients) are an important consideration because rice fields export greater constituent loads due to continuous discharges during the irrigation season and greater subsurface flows. Understanding constituent transport and potential management opportunities requires an understanding of surface and shallow subsurface flow pathways. Surface and shallow subsurface interactions were modeled on two subsided Delta islands and six rice fields using a Plug Flow Reactor (PFR) model, separating evaporation and transpiration from evapotranspiration. Rice transpiration demand was met by surface irrigation and ground water. Transpiration played a dominant role in subsurface solute transport during summer irrigation. A mass balance was conducted to test drain ditch level effects on drainage ditch water quality and flow. High-managed ditches reduced total seepage by 95% compared to low-managed ditches, and significantly changed the drain water source. High managed ditches received 15% of their water from groundwater seepage in comparison to 56% for low-managed ditches. These results suggest high-managed ditches reduce surface water demand, flow and constituent exports. Constituent loads were consistent with these hydrologic trends. Ditch management is thus one tool that can be implemented to manage potential water quality impacts from rice. These findings are being integrated into recommendations for strategic implementation of rice to create a more sustainable Delta and protect California's water security.

Keywords: Water Quality, Hydrology, Subsidence, Rice, Wetlands, BMPs, Budget, Transpiration, Seepage

Poster topic: Integrative Applied Science

Effectiveness Monitoring for Adaptive Management of the Lower Yolo Restoration Project

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Large-scale restoration of tidal wetlands is planned for the Delta and Suisun Marsh, and is an important component of the current Biological Opinions and proposed Bay Delta Conservation Plan. Monitoring at multiple spatial and temporal scales will be necessary to evaluate the effectiveness of these projects and their contribution to the Delta ecosystem and recovery of protected fish species. The Lower Yolo Restoration Project will restore and enhance approximately 1,749 acres of tidal wetlands in the southern Yolo Bypass. The Project, by the State and Federal Water Contractors Agency, is designed to provide foodweb support for delta smelt and rearing habitat for juvenile salmonids. Projects such as the Lower Yolo provide opportunities for collaborative study to reduce uncertainty and test restoration techniques. Tide gates will allow managers to test the effect of residence time and tidal pumping on productivity and food export. We defined a suite of physical and biological indicators to measure restoration outputs and ecological outcomes. Some metrics can be readily measured on site, such as vegetation and water level in the wetlands. Other metrics are more difficult to sample, such as export of productivity from the site, and fish sampling that requires permits. The proposed sampling program will include continuous monitoring of selected hydrological parameters, with intensive sampling of water quality and foodweb elements (nutrients, chlorophyll a, phytoplankton, zooplankton) that is timed seasonally with spring tides. Consistent methods and integration among restoration projects will be necessary in order to put these results in a regional context. We are coordinating with regional initiatives such as the California Wetland Monitoring Workgroup, the IEP Monitoring Workgroup, the Fish Restoration Program, and studies by USGS and UC Davis.

Keywords: adaptive management, indicators, monitoring, foodweb, wetlands

Poster topic: Integrative Applied Science

Response of Sacramento River Phytoplankton Community Composition to Ammonium-Rich Effluent in Mesocosms

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Concentration and form of nitrogen can influence the composition of phytoplankton communities. In the lower Sacramento River, a notable source of nitrogen comes from ammonium (NH_4)-rich effluent released by a large municipal wastewater treatment plant (WWTP). Excess nitrogen has been associated with nuisance phytoplankton blooms and eutrophication in estuaries. Long-term monitoring in the upper San Francisco estuary where NH_4 is elevated has shown decreased primary productivity and low chlorophyll concentrations and some studies suggest that the NH_4 supply has shifted the community from diatoms to flagellates. Our aim was to understand how NH_4-rich effluent influences the development of phytoplankton communities in the Sacramento River.

Mesocosm (10 L enclosure) experiments were conducted in conjunction with the USGS California Water Science Center study (Nitrogen Dynamics along the Sacramento River and Links to Phytoplankton Dynamics), a large scale field manipulation in which WWTP effluent discharge was halted for extended periods (15-20 hours) in October 2013 and May of 2014. Mesocosm treatments included varieties of nitrogen sources (effluent-NH_4, NH_4Cl and NO_3) that were incubated directly in the river to ensure natural light conditions and water temperatures. Development of phytoplankton communities in each mesocosm treatment was monitored by measuring Chlorophyll-a biomass, and nutrient draw-down. Major phytoplankton groups were identified using microscopy and flow cytometry.

This project is highly relevant to water quality stakeholders in the San Francisco Bay Delta because it aims to understand the impacts of NH_4-rich effluent on phytoplankton communities. Effluent manipulation experiments on this scale are rare, and provide an opportunity to study whole river processes, including the response of phytoplankton in situ. Corresponding mesocosm experiments allow for more controlled conditions, yet remain coupled with river measurements.

Keywords: phytoplankton, ammonium, effluent, mesocosm

Poster topic: Integrative Applied Science

Communicating Science: The South Bay Salt Pond Restoration Project

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The South Bay Salt Pond Restoration Project (www.southbayrestoration.org) is unique not only for its size-- over 15,000 acres—but for its location adjacent to one of the nation's largest urban areas, home to over 3 million people. The Project is intended to restore and enhance wetlands in South San Francisco Bay while providing for flood management and wildlife-oriented public access and recreation.

An Adaptive Management Plan has guided the Project Science Program since its inception. To date, 10 years after the acquisition, the Project has spent $11.7 million on research and applied studies covering topics as diverse as sediment dynamics, habitat evolution, water quality, nesting birds, wintering and migratory birds, response of birds to human activity, impacts of legacy mercury, and response of fish communities to the restoration. Over 20 principal investigators from diverse disciplines representing academic, government, and private, and non-profit organizations have contributed to the knowledge base of the project.

One of the challenges of the project is how to communicate these varied and often complex results to managers, among scientists, to stakeholders, and to the general public. This talk will describe how the largest wetland restoration project on the West Coast of the U.S. establishes and maintains communications and connections between scientists, managers, and the public.

Keywords: Adaptive Management, Communicating Science, Outreach

Poster topic: Integrative Applied Science