

Lead Scientist's Report

Summary: This report covers 5 items:

Collaborative Science Activities: (1) Mercury in the Bay-Delta workshop series; (2) Brown Bag Seminar – “Adaptive Management in Action in the South Bay Salt Pond Restoration Project”

Science Communication: (3) Journal article on predicting sea level rise; (4) Two posters from the 2015 State of the Estuary Conference; and (5) “By the Numbers” summary.

Collaborative Science Activities

Mercury in the Bay-Delta Workshop Series

The first of three of these workshops are being held Jan. 26-28, 2016. The purpose of this workshop series is to create a shared understanding of the current knowledge of mercury sources and effects, critical uncertainties, and priorities for research and monitoring to address the challenges of mercury in the Delta ecosystem. The workshop series, focusing on research and management needs, will be completed later this year with plans for publication in a peer-reviewed article.

Brown Bag Seminar – Adaptive Management in Action in the South Bay Salt Pond Restoration Project

This seminar, one of the Delta Science Program’s regularly scheduled lunch time seminars, was held Jan. 11, 2016. The South Bay Salt Pond Restoration Project, one of the largest wetlands restoration programs in the West, is unique for its size (more than 15,000 acres) and its proximity to an urban area of more than 3 million people. Its intent is to restore and enhance wetlands in the South San Francisco Bay while providing for flood management as well as wildlife-oriented public access and recreation. The lessons learned will provide working examples for an adaptive management framework in other large habitat restoration projects such as those currently planned and in-progress in the Delta and Suisun Marsh.

The South Bay Salt Ponds restoration plan will allow for scientific information, gained from earlier phases and applied studies, to be incorporated as management objectives and designs of future actions are revised and implemented. In her presentation, Dr. Laura Valoppi summarized the results of some key studies and how managers revised management actions and restoration designs in response to scientific research.

Science Communication

On The Rocks – An article about Predicting Sea Level Rise

This is a summary of an article by David and Denise Holland that was published in the Nov. 15, 2015 edition of the American Geophysical Union’s *Eos* journal. Over the past two centuries until the 1990s, tide gauges showed that sea levels rose slightly more

than one millimeter per year (~0.4 inches per decade). Since the 1990s, both satellite imaging and tide gauges have recorded a sea level rise of about three millimeters per year (~1.2 inches per decade). This increase in both level and rate of sea level rise is potentially devastating to the more than 70 million people who live one meter or less above sea level. The Delta Plan projects 31 to 69 inches of sea level rise (790 to 1750 millimeters) by 2100, and improving projections with better scientific knowledge is a critical science need for the future of the Delta.

One major cause of sea level rise and potential for future rise is collapse of West Antarctica's ice sheets. These ice sheets are expanses of glacial ice that rest on the ocean floor and are susceptible to melting by nearby, circulating warmer ocean waters. Research over the past year suggests that the Thwaites Glacier in West Antarctica has begun to collapse for several reasons including 1) marine ice sheet instability that leads to irreversible ice loss; and 2) a mass of warmer water circulating nearby that may be weakening the ice shelf at its base. Further research on the collapse of the Thwaites Glacier, and other glacial-ocean interactions throughout the world, is paramount to furthering our understanding of how global warming affects sea level rise. Conducting these studies, however, is challenging for a number of reasons including 1) uncertainties in modeling glacier-ocean interactions; and 2) difficulties in improving sea level projections. Collaboration among scientists in different fields including climatology, glaciology, and oceanography is critical to better understand rates of glacial ice melt and the consequences of global warming on sea level. This level of cooperation, including international and space agencies, has begun. Given the potential consequences of accelerated sea level rise, an even more accelerated and continuous effort on understanding the mechanisms behind sea level rise is warranted.

Poster Summaries from the 2015 State of the Estuary Conference

The biennial State of the Estuary Conference is a forum focusing on the management and ecological health of the San Francisco Bay-Delta Estuary. Results from the conference are 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. The following posters from the last conference are a sampling of the 161 posters presented at the conference and were selected because they are relevant to topics before the Council this month and to recent symposia held by Delta Science Program staff.

Changes in Zooplankton Composition and Abundance during the 2014 Microcystis Bloom

Sara Lesmeister, Peggy Lehman, Alice Tung, and Rhiannon Mulligan

In 2014, one of the driest years on record in California, increased residence times and water temperatures in the Delta resulted in favorable conditions for harmful algal blooms. Harmful algal blooms of cyanobacteria such as *Microcystis* negatively impact the Delta food-web. Workers from the Department of Water Resources utilize an array of Delta water sampling stations occupied from July to December of 2014 to investigate how the 2014 drought and harmful algal blooms impacted zooplankton, a foundational component of the Delta food web and a food item for many Delta fishes. For most stations cyanobacteria concentrations

were below detection limits. Zooplankton, namely copepods and cladocerans (crustaceans), biovolume peaked in July and September, with increased turbidity having a slight negative effect on zooplankton biovolume. In general, zooplankton increased with chlorophyll concentrations but were differently affected by water temperature with copepods biovolume increasing with water temperature and cladocerans showing little to no response to water temperature.

High-Resolution Remote Sensing of Water Quality in the California Bay-Delta using the Portable Remote Imaging Spectrometer (PRISM)

Cedric Fichot, David Thompson, Michelle Gierach

Water quality monitoring within the Delta is primarily conducted using fixed water quality monitoring stations resulting in temporally rich but spatially limited water quality data. Workers from NASA and the USGS utilize the portable remote imaging spectrometer (PRISM) to assess how imaging spectroscopy can enhance current water quality monitoring strategies, improve understanding of the spatio-temporal variability of key water quality indicators (turbidity, dissolved organic carbon, chlorophyll-a), and inform water management decisions. The PRISM aerially-collected data was calibrated using in-situ water quality data collected from the United States Geological Survey. The calibrated PRISM data and in-situ water quality data show excellent agreement showing that PRISM can be utilized to produce maps of key water quality indicators for the Delta. High-resolution maps of key water quality indicators are presented. These data will be helpful in remote detection of point- and non point-source pollution, assessing the impact of wetland restoration and climate on water quality, and understanding the factors controlling the distribution of Delta fishes such as the Delta Smelt.

By the Numbers

Staff will give a summary of current numbers related to Delta water and environmental management. The summary (Attachment 1) will inform the Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

List of Attachments

Attachment 1: By the Numbers Summary *(to be provided at the Council meeting)*

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