980 Ninth Street, Suite 1500
Sacramento, CA 95814
www.deltacouncil.ca.gov

Lead Scientist's Report

Summary: This report covers six items:

Collaborative Science Activities: (1) 2015 Long-term Operations Biological Opinions Annual Science Review, (2) Addendum to the Delta Science Plan: Funding Mechanisms and Conflict of Interest, (3) Delta Primary Productivity Workshop

Science Communication: (4) Research articles on Bay-Delta primary production from San Francisco Estuary and Watershed Science (SFEWS) journal, (5) Two posters from the 2015 State of the Estuary Conference, (6) "By the Numbers" summary.

Collaborative Science Activities

2015 Long-term Operations Biological Opinions (LOBO) Annual Science Review

The 2015 annual LOBO science review, held on November 5-6, focused on the implementation of the LOBO Reasonable and Prudent Alternatives (RPAs). The biological opinion actions that are addressed in these reviews regulate the State and Federal water projects for the protection of endangered fish. The review topics included: 1) progress on Shasta Reservoir and Sacramento River temperature monitoring, modeling, and management, 2) a report on enhanced particle tracking modeling, and 3) a U.S. Fish and Wildlife Service (USFWS) report on past, present, and future approaches to incidental take of Delta Smelt. The findings of the independent review panel will be synthesized in a report in the coming months. The goal of the review is to inform National Marine Fisheries Service (NMFS) and USFWS as to the efficacy of the prior year's water operations and regulatory actions, with the goal of developing lessons learned, incorporating new science, and making appropriate, scientifically-justified adjustments to the implementation of the RPAs to support real-time decision making in future water years.

Addendum to the Delta Science Plan: Funding Mechanisms and Conflict of Interest

One of the strategic objectives of the Council's Delta Science Program is to "fund research that will fill critical gaps in our understanding of the current and changing Bay-Delta system" to provide the best available scientific information for water and environmental decision-making in the Bay-Delta system. To achieve this objective, we have consistently used a set of funding mechanisms to support relevant research efforts. Attachment 1 was developed as a way to formalize this process and to facilitate future funding and implementation of research; the document provides a well-defined methodology for each of the funding mechanisms including an outline of the review process and estimated timeline of implementation. This document establishes a standard set of research funding procedures.

To ensure the best possible scientific information is provided to guide management and policy decisions, the Science Program also has developed a linked document that summarizes the procedures addressing conflict of interest (Attachment 2). The purpose of this document is to clearly define measures to ensure that funding decisions are unbiased and fair.

Delta Primary Productivity Workshop

A workshop funded by the Delta Stewardship Council and hosted by the San Francisco Estuary Institute on Delta primary productivity (PP), was held on October 28-30. A day of presentations on relevant research was followed by a day of breakout group discussions and a day of group discussion. The focus of the workshop was to present and discuss current understanding and data gaps pertinent to the following questions:

1. What approach can be used to estimate the magnitude of PP in the modern and historical Delta?
2. Which habitat conditions and attributes exert the most influence on the amount of PP?
3. What is the current level of understanding of transport and connectivity of PP to locations available for primary consumers of interest (e.g. the Delta fish community) historically and today?
4. What is the bioavailability of PP and how much of the production is routed through the food web?

Science Communication

September 2015 Issue of the SFEWS Journal

The September issue of the SFEWS Journal is currently available online.This open access journal, funded by the Council, is a key venue for publishing the latest research addressing Delta scientific questions. This edition includes three essays and three research papers. The three essays on groundwater and research paper on Delta Challenges, not listed below, were discussed in the October Lead Scientist Report. We highlight the final two research articles as they address the Delta aquatic food web

Research Articles:

A Conceptual Model of the Aquatic Food Web of the Upper San Francisco Estuary
Durand, John R.

The Aquatic Trophic Ecology of Suisun Marsh, San Francisco Estuary, California, During Autumn in a Wet Year
Schroeter, Robert E.; O'Rear, Teejay A.; Young, Matthew J.; Moyle, Peter B.

The article by UC Davis researcher John Durand details a conceptual model of the Delta aquatic food web. The model, created as part of the Delta Regional Ecosystem Restoration Implementaion Program, sythesizes 35 years of scientific research and highlights key uncertainties for future restoration. Historic changes to Delta hydrology and geomorphology coupled with pressures from water export, alien species introductions, and nutrient loading have disrupted the food web and increased the vulnerability of pelagic and juvenile fishes. Future actions to benefit fishes that depend on the open-water food web (e.g. Delta smelt) should focus upon management of clams, nutrient ratios, off-channel habitat, and restoration.

In the second article, researchers from the UC Davis Department of Fish, Wildlife, and Conservation Biology and the Center for Watershed Sciences used geochemical measurements to better understand the Suisun Marsh estuarine food web comprised of native and non-native species. These researchers found that the food web is based primarily upon carbon from phytoplankton and emergent-aquatic and terrestrial vegetation with lesser contributions from submerged aquatic vegetation and phytobenthos (photosynthetic organisms living on the sediments). Non-native species altered food-web pathways but also occupied different niches in the food web than native species.

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.

A System of Autonomous Fixed Station Measurements Together with Synoptic Spatial Characterization Provides Insights on the Dynamics of Organic Matter, Nutrients, and Algal Pigments, in the San Francisco Bay-Delta
Workers from the U.S. Geological Survey (USGS) California Water Science Center report upon a system of fixed and mobile water-quality observation tools. The current array of USGS-operated fixed water-quality stations provide continous observations on numerous water quality parameters including: chlorophyll-a concentrations, nitrate, dissolved organic matter, dissolved oxygen, and salinity. These observations, however, are spatially restricted to the fixed station locations. A new "flow-through" water quality probe mounted to a vessel at speeds of up to 20 mph is utilized to collect multiple water quality parameters throughout the Delta. The "flow-through" water quality probe data when combined with fixed-station data may provide new insights pertinent to water management in the Delta. These water quality data are available at: http://waterdata.usgs.gov/ca/nwis/sw

The State of Bay-Delta Science, Chapter 11. Anadromous Salmonids in the Delta: New Science 2006-2015
Workers from the USGS, CDFW, U.S. Bureau of Reclamation, and University of Washington provide a preview of the 2016 State of Bay-Delta Science chapter on anadromous salmonids in the Delta. Miniaturization of acoustic transmitters and wide-spread adoption of acoustic telemetry observations in the Delta have allowed researchers to gain insights on salmonid dispersal, migration pathways, residence times, and route-specific survival probabilities. In addition novel statistical approaches allow estimation of the proportion of tagged-salmonids emigrating through different outmigration pathways including the Sacramento River, Cache Slough, Delta Cross Channel, and Georgiana Slough. One key finding from these data is that fall-run juvenile Chinook salmon emigrating from the Sacramento River have a 35% chance of survival to Chipps Island compared to a less than 10% chance of survival for juveniles emigrating along the San Joaquin River. Although understanding has significantly increased for juvenile-sized Chinook salmonids, significant knowledge gaps remain for fry and smaller-sized Chinook salmon as these life stages currently are too small for acoustic tagging.

By the Numbers
Delta Science Program staff will give a summary of current numbers related to Delta water and environmental management. The summary (Attachment 3) will inform the Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

List of Attachments

Attachment 1: Addendum to Delta Science Plan: Directed Actions, Requests for Proposals, Proposal Solicitation Package
Attachment 2: Addendum to Delta Science Plan: Conflict of Interest Policy
Attachment 3: By the Numbers Summary *(report to be provided at the Council Meeting)*

Contact

Dr. Cliff Dahm
Lead Scientist
Phone: (916) 445-0463