Please send a short summary of your proposed project using the following IEP Workplan template to Anke Mueller-Solger, Kelly Souza, and Gregg Erickson as well as the IEP staff person(s) assigned to your project by November 30, 2012.

Point person: [Ted Sommer, Anke Mueller-Solger, Karen Gehrts,]
Lead IEP Agency: [Leave blank]
Questions:

1) What are the timescales of variability – hourly, tidal, daily, and seasonal – of nutrient, suspended sediment, dissolved organic matter, and algal pigments across different seasons and climatic conditions in Liberty Island?
2) What are the relationships between water quality variability and river flow, and between water quality variability and short-term episodes such as wind events, rainfall events and upstream dam releases?
3) What are the broad water quality effects of "first flush" and flooding of Yolo bypass on Liberty Island habitat quality, nutrient supply, sediment transport and potential contaminant loading?

Description:

Understanding the interactions between water quality constituents such as nitrogen and phosphate, suspended sediment, and algal pigments with properties of the setting is critical to predicting and managing "bottom up" effects and habitat quality in the Bay Delta. Yet, most studies rely on water quality data collected at only monthly intervals. A one year "proof-of-concept" study was previously funded by the Bureau of Reclamation to develop methods and test the efficacy of making a broad suite of water quality measurements at Liberty Island continuously and in real-time. The Liberty Island Observatory (LIO) - collecting water quality data at intervals of minutes to hours since December 2011 - has allowed for the development of techniques and methods for sensor deployment and data management with a number of field ready (turbidity, fluorescent organic matter, algal pigments) and state-of-the art water quality sensors (optical nitrate, soluble reactive phosphorus).

In the current project, we will 1) continue the continuous water quality data collection in Liberty Island and 2) build on the core measurements and infrastructure with additional water quality parameters, implement new online tools for real-time data access and exploration, and 3) write an interpretive report. Given the continued interest in Liberty Island, our design is for the LIO to provide consistent, core, and long-term measurements to the broader IEP community and serve as a test-bed for the next generation of tools needed to answer fundamental questions about the Bay Delta.

Time period: January 2013 to December 2013
Resources and permits required:

Cost: $107,000 ($75,000 from IEP, $32,000 in USGS matching funds)
PI(s): Brian Pellerin (USGS), Brian Bergamaschi (USGS), Bryan Downing (USGS)
Contract needed / in place: [Leave blank]
Contract manager: [Leave blank]
Term of contract: [Leave blank]
Personnel: Brian Pellerin, Research Soil Scientist; Brian Downing, Research Hydrologist; Bryan Bergamaschi, Research Chemist; JohnFranco Saraceno, Hydrologist; TBD, Hydro Tech.
Equipment: none

Endangered species take: NA
Endangered species take permit(s) and conservation benefit: NA

Deliverables and dates:

- A technical report / fact sheet on in situ optical sensors for water quality monitoring in the Delta (July 2013)
- Draft journal article about relationships between turbidity, nitrate, algal pigments and dissolved organic matter measured continuously at Liberty Island (October 2013)
- Real-time accessible data through NWIS, CDEC, and/or BDAT (February 2013).

Which priority research topics and questions listed in the 2012 Call for Study Concepts does this project address?

Topic 2: Physical and chemical habitat effects on fish populations.
A. How can existing or new monitoring, modeling, or other methods be applied to better define, monitor, and assess fish habitat in the estuary?

Expected contribution to improving basic scientific understanding: Characterizing Delta habitat quality and nutrient availability to Delta food webs is an essential step for understanding and predicting the success of pelagic organisms. The difficulty is that water quality and nutrient supply change continuously as tidal and wind-driven currents move new water parcels into comparatively static geomorphic settings. Preliminary data from this and other recent in situ data collection efforts in the Bay Delta has revealed high frequency changes in virtually all parameters measured. For example, results indicate the importance of multiple processes including tidal mixing and biological uptake in determining algal and nutrient relationships, as well as nitrate fluxes. These are exactly the kind of observations that will help us understand the relationships between hydrodynamics, abiotic habitat and ecosystem processes such as POD.

Expected contribution to improving the scientific basis for Bay-Delta policy and management: Continuous water quality measurements help establish the magnitude of water quality constituent variability as well as help identify the controlling physical and geomorphic processes. The real-time data from this project will help other researchers place plankton, fish, and sediment data in the milieu of changing water and sediment sources for a given location and demonstrate the capabilities for the Delta region. The continuous data from this study will also permit similar linkages to be made to physical processes in such a way as to allow extrapolation of our current knowledge to other geomorphic settings in the Bay Delta.

Comments: none.