Mapping Eelgrass, Surface Geology and Bathymetry Concurrently Utilizing High Frequency Side-Scan Sonar

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Recent increased requirements for the monitoring of Eelgrass stands in California waters have put a spotlight on the need to accurately and efficiently map areas that contain this valuable resource. Traditional means of mapping Eelgrass and other benthic habitat types have proved to be inefficient and time consuming resulting in maps that are incomplete and expensive to produce.

Environmental Data Solutions (San Rafael, CA) has taken advantage of recent advances in high-resolution Side-Scan Sonar and combined this technology with bathymetric surveying and precise Real-Time Kinematic GPS on one survey platform. The result is the ability to concurrently map bathymetry, benthic habitat types, and seafloor geology in one pass of the survey vessel.

Keywords: Eelgrass, Bathymetry

Poster Topic: Integrative Applied Science,

The State of San Francisco Bay 2012: Updated Indicators for Freshwater Inflows and Fish

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Ecological indicators, which integrate large amounts of data and synthesize scientific understanding of ecosystem function, are essential tools for managing the San Francisco Estuary. Indicators are useful to characterize conditions and trends, develop and evaluate adaptive management, and report management and protection results to scientists, resource managers, decision makers and the public. In this presentation I provide updated results for the freshwater inflow and fish indicators from the San Francisco Estuary Partnership's *State of the San Francisco Bay 2011* report. The freshwater inflow index uses six indicators to evaluate 82 years of data on the amounts and patterns of inflows from the estuary's Sacramento-San Joaquin watershed, comparing actual inflows to estimated unimpaired inflows that would have occurred without the effects of dams and water diversions. The fish index evaluates 31 years of data for fish abundance, diversity, species composition and distribution for different regions in the estuary, from Central Bay near the Golden Gate to Suisun Bay. Results show that inflow conditions declined since1960s, with substantial reductions in the amounts and variability of annual and seasonal inflows. Overall inflow conditions have been mostly "poor" for the past several decades and, in essence, the estuary is now being subjected to chronic drought conditions. The condition of the Bay's fish community has declined since the 1980s in most regions of the estuary, with the most severe declines in Suisun Bay reflecting degraded habitat and ecological conditions in the upstream reach of the estuary. These results show that current management of the estuary is not meeting goals that have been adopted by either the local National Estuary Program or the state legislature. However, these indicator metrics and their results can, and should, inform ongoing efforts to develop restoration and management plans to reconcile state-mandated co-equal goals for ecosystem restoration and reliable water supplies.

Keywords: indicators, ecological health, freshwater flows, fish, San Francisco Bay

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CHaMP in California: Applications of a Standardized Fish Habitat Monitoring Protocol

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Changes in stream channels that affect fish production have been difficult to document using standard habitat monitoring techniques even though detecting such changes is critical to status/trend and restoration project effectiveness monitoring. The Columbia Habitat Monitoring Program (CHaMP) is developing and implementing a standard set of fish habitat monitoring methods for status, trend, and project effectiveness monitoring. CHaMP includes standardized and customizable study designs, habitat monitoring protocols, data capture and management tools, and data quality control and quality assurance tools. The CHaMP protocol utilizes a total station to conduct precise topographic surveys of the stream channel from which digital elevation models (DEMs) can be produced. DEMs are analyzed using the River Bathymetry Toolkit and other models. The topographic surveys are supplemented by other habitat data including invertebrate drift, large woody debris, solar input and water temperature, stream discharge, substrate composition, fish cover, and riparian structure which help to characterize features of channel units that may affect site-scale fish production.

Results from sampling at over 700 wadable stream sites in 2011and 2012, the first two years of implementation, will be discussed, including application by the California Department of Fish and Game and Campbell Timberlands Management in three streams in Mendocino County using a spatially balanced random sampling design (for status/trend monitoring)and BACI design for effectiveness monitoring. We also discuss the utility of the River Bathymetry Toolkit, DEM of difference, and net rate energy intake models for long term regional monitoring and applications in wetlands/estuary channel habitat monitoring and in restoration project effectiveness monitoring, all of which are relevant to Bay-Delta managers seeking to restore stream and estuary channel habitat for salmonids and other fishes.

Keywords: fish habitat monitoring, restoration project effectiveness, topographic surveying, watershed, salmonids

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