

The Cache Creek Resources Management Plan: 20 Years of Applied, Integrated, Science for Adaptive Management

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The Cache Creek Resources Management Plan (CCRMP) is a framework of goals for stewardship and management of Cache Creek. Developed by Yolo County, it is composed of seven elements, covering agriculture, aggregate resources, riparian and wildlife resources, water resources, floodway and channel stability, open space and recreation, and the cultural landscape. Part of the CCRMP is the establishment of a Technical Advisory Committee (TAC) made up of a Geomorphologist, Hydraulic Engineer, and Biologist. Together, the TAC provides the scientific basis on which the adaptive management strategy of the CCRMP is founded. Yolo County Staff and TAC have just completed a retrospective analysis of data collected during the 20-year period of the CCRMP and are applying this knowledge to better management of Cache Creek in the future. Using such data as LiDAR and topographic surveys, aerial imagery, vegetation mapping, long-term water quality analyses, and stream gage and flooding records, the TAC and Yolo County have developed an understanding of how human actions have impacted Cache Creek for both the positive and negative, and are applying this knowledge to balance the multiple economic, ecological, and flood control benefits the creek provides.

Keywords: Cache Creek, Water Quality, Adaptive Management,

Poster Topic: Research Synthesis & Data Management

Text Mining of IEP Articles for Characterizing the Association of Native and Non-Native Fish Species and Water Quality Parameters in the San Francisco Estuary

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Interagency Ecological Program (IEP) newsletter provide highlights and in-depth articles about species conservation, restoration and other important topics in the San Francisco Estuary, a habitat for diverse native and non-native fish species. The increasing number of publications demands in methods for efficient analysis of the large information. Text mining could help resource managers, scientists, and the public derive potentially valuable insight from unstructured data for making better conservation and recovery management decisions. The primary goal of this study is to gain knowledge on the temporal association pattern of selected fish species and water quality parameters in the San Francisco Estuary. Text mining techniques are employed to extract topic of interests from articles in the IEP newsletter, and key-words association analysis conducted between selected fish species (Delta Smelt, Chinook Salmon, Coho Salmon, Longfin Smelt, Striped Bass, Tidewater Goby, White Sturgeon, and Sacramento Perch) and water-quality parameters. Out of 126 articles published and retrieved between 1989 and 2015, about 103 are analyzed using text-mining packages available in R. The documents are clustered based on publication years (1989-1999, 2000-2009, and 2010- 2015) and profiled with cluster of informative terms for the comparison between the variables. The obtained result shows a variability of water-quality parameters and species association with publication year and species type. We noted the term “Sulfur” showing in the articles associated more (0.93) with Coho Salmon, which may indicate the need for further analysis on a specific term-species association. In conclusion, text mining has great potential for supporting species conservation efforts, uncovers valuable information hidden in literatures, reports and integrates with other biological data.

Keywords: Text mining, characterize, fish species, water quality, San Francisco Estuary

Poster Topic: Research Synthesis & Data Management

Enhancing the Vision for Managing California's Environmental Information

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The Environmental Data Summit, convened under the auspices of the Delta Stewardship Council's Delta Science Program in June 2014, witnessed remarkable participation from experts across California, the nation, and even the world. Summit attendees from the public, private, federal, and nonprofit sectors shared their views regarding the urgent needs and proposed solutions for California's data-sharing and data-integration challenges, especially pertaining to the subject of environmental resource management in the era of "big data." After all, this is a time when our data sources are growing in number, size, and complexity. Yet our ability to manage and analyze such data in service of effective decision-making lags far behind our demonstrated needs.

In its review of the sustainability of water and environmental management in the California Bay-Delta, the National Research Council (NRC) found that "only a synthetic, integrated, analytical approach to understanding the effects of suites of environmental factors (stressors) on the ecosystem and its components is likely to provide important insights that can lead to enhancement of the Delta and its species" (National Research Council 2012).

A white paper emerged from the Summit as an instrument to help identify such opportunities to enhance California's cross-jurisdictional data management. As a resource to policymakers, agency leadership, data managers, and others, this paper articulates some key challenges as well as proven solutions that can be implemented to overcome those obstacles. Primarily featured are tools that complement the State's current investments in technology.

Keywords: Big Data, Analyze, Integrated, Decision-making, Data-integration, Data-sharing, Open Data, Transparent

Poster Topic: Research Synthesis & Data Management

Enhancing Regional Capacity for Habitat Project Tracking, Assessment and Reporting

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This project significantly expanded EcoAtlas (www.ecoatlas.org), the state-wide repository for habitat project data, to include hundreds of projects for habitat protection, enhancement, and restoration throughout the Central Valley and San Francisco Bay-Delta regions. Through increased partnership, this effort has enhanced the breadth of information housed in EcoAtlas for natural resource managers, such as acres of distinct habitat types, species benefited, funding sources, and progress towards project targets.

As new projects are developed and existing projects enter new phases, information can be easily updated by project managers through Project Tracker's online forms (ptrack.ecoatlas.org). The ability to view both the landscape context and project-scale details provides information needed for better planning and decision-making. By integrating different data sources, EcoAtlas enables the visualization and spatial querying of project data, and affords improved analyses of changes in habitat extent and condition; landscape-scale conservation planning; prioritization of habitat projects; evaluation of progress toward meeting conservation objectives; partnership building; and leveraging of restoration resources.

By providing the tools needed to track and analyze landscape change and measure success of these efforts, we will improve California's ability to conserve important habitats strategically in the future.

Keywords: habitat project tracking, visualization tools

Poster Topic: Research Synthesis & Data Management

San Francisco Estuary and Watershed Science and The State of Bay-Delta Science Update, 2016

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"The most powerful paradigm structure of our time is the network -- the network of connections among ideas and people." -- Paddy Ashdown, TEDx Brussels, 2011.

San Francisco Estuary and Watershed Science is an academic, online-only, open access journal that strengthens the most important connectivity among people within the scientific community -- the sharing of a network of vetted scientific ideas. *SFEWS* facilitates this sharing in a way that adds value and has a powerful effect on the understanding of the Bay-Delta estuary's natural environment, its inhabitants, and the scientists who study this important region. How? *SFEWS* at its basis facilitates the connection of vetted scientific ideas AND the people behind them. Recently *SFEWS* has published an update of the most penetrating research surrounding the San Francisco Bay and Sacramento-San Joaquin Delta. *The State of Bay-Delta Science 2016 (SBDS)* is a collection of papers that summarizes the scientific understanding of the Sacramento-San Joaquin Delta, emphasizing progress made during the past decade. *SBDS 2016* has been published in at least two issues of the 2016 publication year and will be available as a full set online.

Keywords: SFEWS journal, academic research, scholarly publishing, State of Bay-Delta Science

Poster Topic: Research Synthesis & Data Management

The USGS Research Vessel *Polaris* Retires; We Reflect on What She Taught Us

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Last year the U.S. Geological Survey retired the *R/V Polaris* after 47 years of service. Hundreds of scientific articles and dozens of graduate-student theses have been produced from data collected aboard the *R/V Polaris* and, collectively, they teach much of what we have learned about how the Bay works. After 1100 *Polaris* cruises since 1969, we have documented a remarkable range of Bay conditions. We queried our database to find the extreme high and low observations of salinity, temperature, chlorophyll, water clarity, nutrients, dissolved oxygen and phytoplankton. Here we explore these extreme observations to highlight what we have learned about the Bay, its variability, and the drivers of that variability. For example, statewide air temperatures reached record highs in 2014-15. Synchronously, the *R/V Polaris* data also showed record high water temperatures across the entire Bay system. The highest salinities we've measured were during summer of the 1977 drought, and lowest during the 1998 El Niño when surface salinity was 2 near the Golden Gate. The largest spring bloom in South Bay, by far, also developed during the 1998 El Niño. We just (May 2016) measured our all-time highest chlorophyll in the lower Sacramento River. We will explore these and other record highs and lows within our water quality data and the physical and ecological circumstances surrounding them.

Keywords: San Francisco Bay, long-term data, water quality, nutrients, phytoplankton

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