

Demonstrating the California Wetland Status and Trends Program: A Probabilistic Approach for Estimating Statewide Aquatic Resource Extent, Distribution and Change over Time

Pilot Study Results

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INTRODUCTION

Motivation and Goals for California's Wetlands Status and Trends Program

Tracking the extent, distribution and change over time of wetlands (and other aquatic resources) statewide is a foundational element of California's wetland monitoring and assessment programs (CWMW 2010). It not only provides the basic information to report on wetland status and trends, but is also crucial for accurately assessing the Federal and State "no net loss" policies in terms of wetland quantity and evaluating the effectiveness of current regulatory and management programs (e.g., Porter-Cologne Water Quality Control Act, Clean Water Act §401, CA Fish and Wildlife Code §1600). Furthermore, monitoring trends and tracking net change provide a foundation for monitoring the long-term effects of climate change and other natural disturbances (e.g., fires, floods, and droughts) on wetland resources, and the effect of these trends on habitat and species conservation efforts.

Despite being a national leader in investment in wetland protection, management, and monitoring, California agencies cannot reliably answer essential questions about the extent and distribution of wetlands, streams, lakes, and estuaries and how these resources are changing over time (CNRA 2010). This knowledge gap precludes our ability to accurately evaluate the effectiveness of statewide investments in aquatic resources restoration, regulation, and management.

There are many factors that contribute to California's inability to answer fundamental questions about wetland status and trends, and principal among them is cost. Complete survey mapping of a state the size of California on a regular basis is cost-prohibitive and logistically challenging. A cost estimate to update mapping of streams and other aquatic resources is \$3,000 per USGS quadrangle, and California has 2,800 quadrangles (CWMW 2010). Not only does the state of California lack the \$8.5 million for comprehensive mapping, but also this cost would need to be incurred every 5 to 10 years in order to assess change over time.

The National Wetland Status and Trends (S&T) Program, administered by the U.S. Fish and Wildlife Service (USFWS), has addressed this challenge by adopting a probabilistic approach to wetland change assessment. Probabilistic mapping uses statistical estimation methods to produce extent and trend information in a practical, cost-effective manner. Because probability-based mapping requires significantly fewer resources, it allows for more frequent estimates of wetland extent and trends. Ideally,

probability-based mapping would be combined with comprehensive mapping and project-based accounting to provide a robust understanding of wetland change over time and of the factors influencing changes. In addition to providing the foundation for a comprehensive status and trends program, probabilistically selected maps can contribute updates to the California Aquatic Resources Inventory (CARI), a standardized statewide map of wetlands, streams, and riparian areas that is used for Level 1 landscape assessment. The maps can also serve as a sample frame to support Level 2 or Level 3 condition assessments through the selection of locations for condition assessment from the status and trends plots.

Although sufficient for a national assessment, the National S&T plots by themselves are insufficient for assessing status and trends of California's wetland and riparian resources. The USFWS National S&T Program includes only 257 plots in California, covering approximately 0.6% of the land area, mostly concentrated along the coast. Furthermore, the national program is focused on wetlands and does not include streams, lakes and other aquatic resources. Even for wetlands, plots are selected based on older, vintage National Wetlands Inventory maps that omit many of the wetland and riparian areas of California.

California's wetland status and trends program builds on the national program by intensifying the number of plots and the type of resources mapped within each plot in order to provide statistically robust, statewide estimates of all aquatic resource types. The objectives of California's program are to:

- Report extent (status) and changes in extent (trends) at regular intervals.
- Include estimates for all surface aquatic resources, including wetlands, streams, and deepwater habitat.
- Support regional intensification through design flexibility.

Unlike the national program, the California status and trends program includes freshwater and tidal wetlands and streams (regardless of whether or not the streams include wetland areas) and is not limited by the seasonality of the resources (i.e., perennial, intermittent, and highly ephemeral resources are included). Furthermore, all natural and anthropogenic upland areas are also mapped within each plot to provide information about proximal influences on wetlands and aquatic resources that may affect trends, and to allow other resource mapping and monitoring programs to take advantage of the plots to fulfill part of their needs.

Full text: [859_StatusAndTrendsDemo.pdf](#)