

Suisun Landscapes: historical ecology, functional metrics, and community priorities for landscape planning

Project background and objectives

As the largest brackish marsh on the West Coast, Suisun Marsh is a unique transitional landscape between the Bay and the Delta portions of the Estuary. The Marsh supports high geomorphic and wildlife diversity and has long been managed for recreational hunting and native species support, yet it is threatened by an uncertain future under climate change. Sea level rise and increasing salinity pose significant threats to the current structure and uses of the Marsh. Likely impacts include conversion of wetlands to open water, changes in species composition, increased flood risk, and drainage challenges in managed wetlands. These challenges are widely recognized, and effective adaptation planning will require coordinated, science-based planning by agencies and private landowners. In this project, the San Francisco Estuary Institute (SFEI) aims to support future planning efforts by providing science support, tool development, and input from local communities about their priorities for how the landscape should function.

The ecological setting of Suisun, its land-use history, and its future management challenges have been evaluated and documented in previous studies of the Marsh. This previous work provides a conceptual foundation and ecological information which SFEI will build upon to develop spatial datasets, quantitative analyses, scientific and manager-oriented reports, and interactive scenario planning tools. The quantitative and spatial approach utilized in this project has been successful in supporting large-scale planning in the Delta, and was used in the development of the Delta Conservation Framework and the Delta Plan Ecosystem Amendment. The *Suisun Landscapes* project will build on a body of science and decision making tools that SFEI has developed for the Delta, but which currently end at Browns Island. These resources include a set of guiding documents based on detailed investigations into the Delta's historical ecology, historical land use change, and landscape potential for future restoration, and the Delta Landscape Scenario Planning Tool (LSPT). This suite of resources has proven valuable for natural resource management planning in the Delta, yet no comparable toolkit for planners currently exists for Suisun. The development of these user-focused tools for Suisun will make existing and new scientific information readily accessible during future planning efforts and support evidence-based, community-driven management decisions.

The LSPT is a GIS-based scenario analysis tool that offers a quantitative, spatially explicit means to assess how proposed projects will affect desired ecosystem functions. The LSPT offers a platform to incorporate ecological, economic, and land-use information. Existing and planned economic and land-use metrics, such as crop types, crop revenues, and potential carbon offsets values, reflect Delta priorities. However, land use and stakeholder interests in Suisun differ from the Delta; for example, there is less crop cultivation in Suisun and waterfowl habitat for recreational hunting is of greater importance. To more thoroughly and equitably include human dimensions into the LSPT analyses available for Suisun, additional place-based community involvement is necessary. A greater focus on community interests will prepare the tool for use in community-based planning efforts by reflecting key community interests and priorities as well as local ecological functions.

The objectives of the Suisun Landscapes project are to:

- Facilitate landscape planning with the best available science so that the future Suisun Marsh is

more resilient and reflects community priorities regarding desired ecosystem functions and services (potentially including support for endangered fish, waterfowl habitat and recreation).

- Generate a spatially explicit and quantitative understanding of Suisun's historical ecology (through maps, metrics, etc.), using in-depth analysis of primary sources.
- Understand community priorities for Suisun Marsh and foster dialogue and buy-in through the process of co-developing planning resources to include current uses of the landscape and perceived future challenges.
- Evaluate how the ability of the Suisun landscape to support desired ecosystem functions and services has changed over time, and lay the foundation of knowledge to evaluate opportunities to restore lost function.
- Support landscape planning and design in Suisun by developing spatially explicit scenario analysis tools (LSPT analyses) that draw from information on historical ecology, community priorities, and past landscape changes, and account for climate change effects (potentially including sea level rise, salinity changes, temperature increase).
- Make information on Suisun historical ecology, environmental history, landscape change, and community priorities accessible to a broad scientific and stakeholder community.

Suisun Marsh faces future threats to important ecological, economic, and social functions. A functioning marsh that supports fish, waterfowl, recreation, and other functions of interest into the future will need thoughtful planning and coordination among landowners, resource managers, and other stakeholders. The *Suisun Landscapes* project will facilitate and support these efforts by expanding the currently available tools for adaptation planning in Suisun to include spatially explicit representations of the historical function and condition of the marsh, priority features and functions for human use, and measurement of change over time. These tools and spatial analyses will support the work of the Suisun Marsh Plan AMAT and others, enhancing capacity to estimate and track effects of projects in Suisun on Delta Plan Performance Measures (particularly analyses of landscape-scale ecosystem attributes, potentially including physical processes, connectivity, complexity, diversity, and scale). A greater focus on community interests will enhance the capacity of the LSPT and Delta-Suisun planning and management as a whole to evaluate potential trade-offs and synergies between social, economic, and ecological benefits. The inclusion of these perspectives while the tools are being developed will increase representation and equity in future planning work, addressing the potential for a conservation bias that neglects the needs of local interests. Developing foundational science to support identification of biophysical and social opportunities for a resilient Suisun landscape enables more effective planning that includes stakeholder values and perspectives and accurately conveys the implications of management decisions.