Plan Overview

A Data Management Plan created using DMPTool-Stage

Title: Fish, Fur, Feathers, and some Scales: Applying integrated science across multiple taxa to optimize ecosystem-based management in Suisun Marsh, with application throughout the San Francisco Estuary

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Funder: Delta Stewardship Council & US Bureau of Reclamation

Template: Pacific Southwest Region UTC at UC Davis - Project Data Management Plan

Project abstract:

Land use management strategies in Suisun Marsh, CA have emphasized waterfowl conservation for nearly 150 years. Lands are owned by a mosaic of private hunting clubs, California Department of Fish and Wildlife, environmental and advocacy groups and the National Estuarine Research Reserve. While a few naturalistic wetlands remain, most of the marsh is actively managed by a system of gated and leveed freshwater ponds connected by brackish channel networks, which can be highly productive of food for waterfowl. This system has kept lands protected from urban and agricultural development, preserving one of the largest wetlands on the western coast of North America. It has also maintained some of the best remaining habitat for many threatened and endangered species, including longfin smelt, splittail, salt marsh harvest mouse, and western pond turtles. Relative to other regions of the San Francisco Estuary, which has been highly altered by anthropogenic demands, Suisun Marsh retains a highly productive food web. This project is intended to better understand the unintended benefits of marsh management, especially food web overlaps from ponds. The goal is to produce a Generalized Vertebrate Distribution and Food Web Model, that identifies hotspots of vertebrate concentration, evaluate the food resources at these hotspots, and develop landscape management practices that best support multiple taxa. We will provide management and habitat restoration recommendations to provide benefits for multiple stakeholders, including land owners in the system.

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End date: 01-30-2024

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1. Suisun Marsh fish study includes data on fish catch (including number captured, species and standard length), water quality and location. Data were collected during monthly cruises since 1980 using a variety of sampling tools, including otter trawl, beach seine, handheld water quality meter, Secchi disk, and GPS position finder. The data will be used in this project to determine hotspots of occurrence in the current project. These data are updated monthly.

2. Suisun Marsh ponds aquatic production data were collected for nutrient, water quality conditions, and primary and secondary productivity in managed wetlands, including chlorophyll-a and zooplankton density. Data were collected using EXO multi-parameter water quality sondes, but in transit and at fixed locations, whole water grabs for instrument validation, nutrients and chl-a, and zooplankton trawls. Data were collected periodically during key stages of pond flood up from 2017 to 2020. Comparative evaluation of zooplankton densities across regionally distinct managed wetlands will be collected from 2021-2024, pending funding.

3. Waterfowl food availability and carrying capacity data were collected from soil cores that were processed and evaluated for seed composition, density and energetic value; and data from experimental trials that used bird fecal samples to determine metabolizable energy from seeds. Data were collected during periodic trips to managed wetlands representing regional differences across Suisun Marsh from 2017-2020. Waterfowl data will be incorporated into a Spatially-explicit Waterbird Agent-based Modeling Program which compares waterfowl energy demand with food availability across marsh regions. Data will be assembled from 2021-2024.

4. Western pond turtle data were collected using hoop traps at geo-referenced locations. Data include recapture marks, sex, carapace and plastron length and width, shell height and weight. Blood samples were collected for osmolality. Genetic samples were collected to determine population structure and taxonomy. Water quality data, including salinity, were recorded at each site. Movement data were collected using GPS.GSM tags on select individuals to determine movement in response to seasonal and tidal shifts. Data were collected across regions of Suisun Marsh from 2017-2020, with blood assays, genetic testing and movement data expected in 2021-2024, pending funding.

5. Salt marsh harvest mouse data were collected using traps at geo-referenced sites over short time periods corresponding to tidal incursion. Water level, mouse numbers, identifying mouse characteristics and time period were collected to understand mouse movement. Data for diet studies were collected in cafeteria study trials that showed relative feeding preference. Additional diet data were collected from fecal pellet DNA analysis. Fecal analysis data also were geo-referenced from site of collection as a way of conducting non-invasive distributional information. Data were collected from 2017-2020, with genetic results expected in 2021-2024, pending funding.

6. Synthetic data. Outputs from the SWAMP model will be used to determine waterfowl hotspots of production or consumption. Empirical field data will be used to determine fish, mouse, and turtle distribution, and assembled into GIS mapping layers to determine if waterfowl and aquatic food production overlaps with hotspots of fish, mammal or turtle distribution. These hotspot maps will be integrated with public data on waterfowl habitat management and used as a basis for synthesis. Resulting numerical models and conceptual models will be presented in reports, papers and in GitHub as a way of archiving analytical approach.

Data will be collected using various formats, consistent with a large, multi-pronged study.

Water quality spot measurements, animal observations, and location data are collected on paper and transferred to databases later in either spreadsheet (.xlsx) or Access database format (.accdb).

Water quality continuous recordings are stored as .csv files

Water quality grabs are collected in the field with environmental water quality data and transfered to spreadsheet databases (.xlsx). Grab analyses are returned from analysis in spreadsheet format (.xlsx).

Zooplankton, fecal, blood and genetic samples are collected in the field on paper and transferred to spreadsheet style formats (.xlsx) or Access databases (.accdb).

Spatial data are collected on paper, or using GPS recorders; electronic data are uploaded after field work and stored as coordinate data or transferred to GIS shapefiles (.mxd).

Model outputs (ie, SWAMP) are recorded and preserved as .csv files.

Metadata

Detailed metadata will be embedded directly within each format for data storage before it is made public. Metadata will include summary, data descriptions, dates of collection, authorship and point of contact, field definitions, abreviation definitions, access constraints (if any), and GIS project and datum (as necessary).

Data are crated and stored on local computers and backed up over internal networks to Linux file servers using enterprise backup applications.

Primary storage location is the Center for Watershed Sciences server, Drive X.

Upon completion of project, data will be assigned a DOI, and made publicly available through the project website, https://suisunmarshecosystems.sf.ucdavis.edu/ . It will be available either by request or direct download.

Data may also be be made available in a format as recommended by the Delta Stewardship Council Delta Science Program (such as Environmental Data Initiative, CDEN, or the California Open Data Platform), or on the UC Davis Library's association with Dryad, an open source platform with allow publication and archiving of data.

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