Interagency Ecological Program 2023 Work Plan Element
Submersed aquatic vegetation in the Delta: composition, probability distribution and response to climatic factors

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Annual Costs (thousands) and Funding Sources

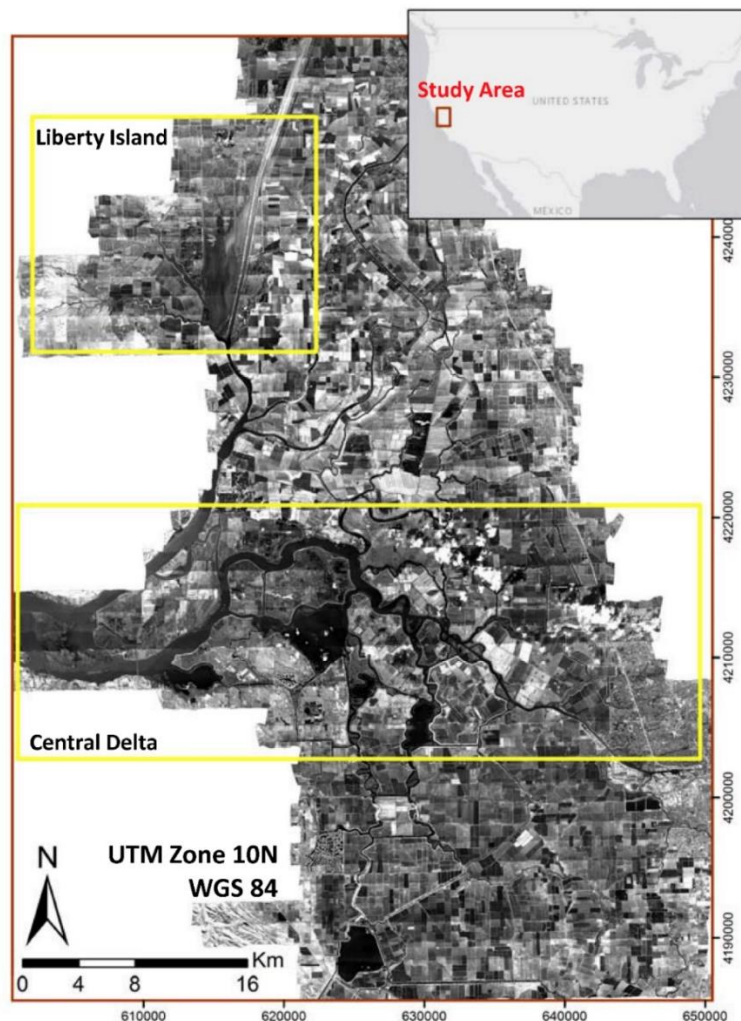% time for 3 IEP senior synthesis scientists and 1 DWR senior scientist

Figure 1: Panchromatic view of the Legal Delta using AVIRIS-NG near infrared band. The yellow boxes show the Central Delta region and the northwest Liberty Island region.

Description

Invasive submerged aquatic species (SAV) greatly impact habitat for endangered species in the Delta. In the past decade, we have seen a huge increase in SAV cover and an influx of new invasive species like ribbonweed. This study will build species distribution models (SDM) for SAV using predictors such as water speed, depth, salinity from the UnTRIM hydrodynamic model, turbidity derived from Sentinel-2 and temperature derived from ECOSTRESS satellite imagery. The SDMs will be used to study the effect of flow management actions and restoration activities on SAV distribution. SAV community data collected in the field (available on EDI) will be analyzed to study if the SAV community composition has changed from 2007-08 to present time. The same dataset will be used to explore if the SAV SDM can be refined based on species presence data to see if there are significant differences in SDMs of individual SAV species.

Need

Invasive aquatic vegetation has been identified as a major concern in the IEP Science Strategy document and a topic meriting more study. Assessing the effects of flow alteration management actions on the Delta is also a recommended key topic of research. This study furthers both these objectives. It complements ongoing projects such as the water primrose ecoengineering project (PEN #348), which is similarly building an SDM for *Ludwigia* spp., determining plant characteristics that enable *Ludwigia* invasion and mapping invasion risk for the remnant Delta marshes. The work also builds off the conclusions of the Sentinel project which mapped the temporal phenological signal of SAV in the Delta. The results of this study will help design restorations to be more resistant to invasion, plan for climate change impacts, and predict invasion risk in Delta regions that are being reconnected tidally to the Delta waterways network through current and future restoration projects.

Objectives

- Which environmental factors and habitat characteristics are associated with SAV?
- What is the SAV community structure and has it shifted since 2007?
- Is there sufficient data to determine SAV species-specific SDM within the SAV community SDM? How different are SDMs of individual species?
- How might climate change alter the distribution of SAV species and assemblages into the future? Will future conditions constrain or expand SAV distribution? Can we simulate SAV distribution under other scenarios such as ecorestore projects?

Schedule of Milestones

- June 2023: Publish the SAV community field dataset (2007-2021) on EDI
- June 2023: Present at Bay Delta conference on the SAV SDM
- December 2023: Present on the SAV community study (maybe AGU)
- December 2023: Manuscript on SAV SDM
- December 2024: Manuscript on SAV community & species-specific SDMs
- December 2024: Present at the aquatic vegetation PWT on climate change SAV predictions