

Hyperspectral Mapping of Invasive Species in the San Francisco South Bay Salt Ponds
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Video Transcript

Hello this is the invasive species team located at Ames Research Center. This project investigates the hyperspectral mapping of the invasive species pepperweed and the development of a habitat suitability model. Team members include Andrew Nguyen, Alexander Gole, Jarom Randall, Glade Dlott, and Sylvia Zhang. Our science advisors are Brian Alfaro, Cindy Shmidt, and Dr. Jay Skiles.

The community concerns addressed in this project were pepperweed threatening the ecosystems of restored wetlands, understanding changes in vegetation colonization, providing and sustaining habitat for endangered animals and plant species, and creating educational and recreational opportunities.

Our study area was comprised of the Alviso Salt Ponds in the South San Francisco Bay. Our project goals were to map pepperweed using NASA earth observing satellites and to create a habitat suitability model to predict pepperweed spread.

The sensors used for our project were the Hyperion sensor on the Earth Observation 1 satellite and the ASTER sensor on the TERRA platform. Hyperion is a hyperspectral sensor with 220 bands and a 30-meter spatial resolution. ASTER is a multispectral sensor with 14 bands and 15-meter spatial resolution.

Pepperweed spectra were collected in the field using a GER 1500 Spectroradiometer. The spectra were used to create a spectral library of pepperweed. This spectral library was used in the Spectral Angle Mapper classification that was performed on the Hyperion image. A supervised classification was performed on the ASTER image.

For the GIS habitat suitability model, it was necessary to acquire presence and absence points and determine variables that contribute to pepperweed spread. GPS points were collected of both pepperweed presence and absence, and were recorded. The four variables used in the model were: 1) distance to channels or distance to water sources - this included sloughs and historical tracts; 2) distance to salt ponds with extreme salinity - these ponds were unbreached ponds or ponds that had not been restored; 3) distance to areas of disturbance - disturbance factors included roads, levees, man-made structures and electrical towers; 4) curvature, which measures how concave or convex the Earth's surface is in an area.

The map displayed shows the results from the habitat suitability model. Green = high risk, yellow = moderate risk, and red = low risk.

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