STARS Assessing spread and persistence of Submersed Aquatic Vegetation using hyperspectral remote sensing

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The California Department of Boating and Waterways is the lead agency in the control of a major non-native invasive submersed plant – *Egeria densa*. CDBW acquired hyperspectral image over the Sacramento-San Joaquin river Delta from 2003 to 2008 to map and assess the dynamics of the invaded submersed plant community.

1970's Bariarduster Henesser et al. 1970 Hannesser H

Changes in the Delta aquatic plant community

Mean Reflectance All Species

Since the1970's there has been a massive invasion of the Delta brackish and fresh water with submersed, floating, emergent and riparian non-native plants. Synergistic effects of their presence have likely created a non-stable community.

Goal: Determine the distribution and dynamics of the submersed aquatic vegetation to guide management actions towards the maintenance of navigable waterways

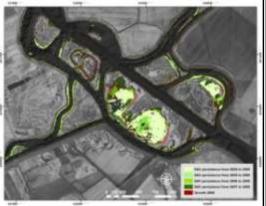
SAV area

Area SAV

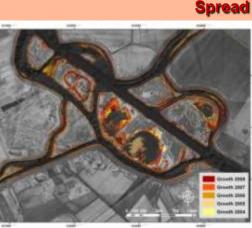
Area SAV not

We used image spectroscopy to produce yearly distribution maps of the submersed plant community and assess the dynamics of its spread and persistence. We considered persistence as the amount of vegetation that remained from year to year and spread as the yearly new growth.

Persistence



Persistence decreased with time in the system



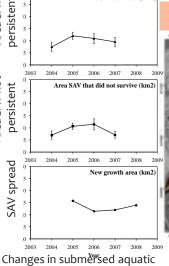
<u>New growth</u> accounted for 40-60% of the yearly distribution

Image spectroscopy

Each plant and their constituents (chlorophyll, mesophyll, cellullose, etc.) interact differently with electromagnetic radiation from the sun, resulting in unique *spectral signatures*. Spectral measurements are quantities that can be used to detect mathematically species and communities distributions.

Wavelength, µm





vegetation area

2004 2005

2006 2007 2008 2009

Area SAV survived (km2)

RELATION CALIFORNIA

LAND, AIR AND WATER RESOURCES