Remote Sensing for Mapping Plant Species and Invasive Weed Coverage in North Bay Waterways and Marshlands

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Delta waterways (foreground) and native wetlands (background) infested by Water Hyacinth, surrounding abandoned farming equipment in 2014. / Chris Potter

Landsat image comparison of the change in coverage of late-summer floating aquatic vegetation biomass between 2005 and 2013 near the Delta-Mendota Canal, showing the increase in Water Hyacinth coverage in 30-meter resolution (as blue shaded) pixels

Visible (RGB) and Near Infrared Reflectance of the Earth's Land Surface











Supervised Classification



Blacklock Restoration Area is a 70 acre passive restoration project conducted by the DWR adjacent to Little Honker Bay.



The image at right is a supervised classification of NAIP 4-band (RGB-NIR) 60 cm resolution imagery from May of 2016, showing the highest probability of *Phragmites* cover in the darkest green shades. Versions can be generated for 2009, 2012, 2014, and 2018.



Dutch Slough Tidal Marsh Restoration Project – Example 2 Mapping and Monitoring Native Habitat Restoration

The Dutch Slough Tidal Marsh located in an area formerly slated for urban development, will be restored to tidal, riparian, and upland habitats, and provide critical habitat for native fish and wildlife in the Sacramento-San Joaquin Delta. The project location is near the mouth of the San Joaquin River and Suisun Marsh.



Left: The Dutch Slough Tidal Restoration Project prior to construction (2016). Right: An example of restored tule marsh

The image at right is an unsupervised classification of NAIP 4-band (RGB-NIR) 60 cm resolution imagery, showing the major vegetation communities, circa May 2016.



Goat Island Tidal Marsh Restoration is an 80 acres site, adjacent Suisun Hill Restoration and Lower Spring Branch Creek Restoration.



The image at right is an unsupervised classification of NAIP 4-band (RGB-NIR) 60 cm resolution imagery from May of 2016, showing seven major VEGCAMP species association class matches. Versions can be generated for 2009, 2012, 2014, and 2018.



Digital camera extension arm for imaging of floating aquatic species cover on North Bay waterways







Collection		
Segmentation		
F 7		
Classification		

Class 1 (Flower)	215 ≤ R ≤ 256
Class 2 (Dead or Detritus)	124 ≤ R ≤ 250 AND 0.5 ≤ G:R ≤ 0.8
Class 3 (Black/shadow/water	R ≤ 100 AND G ≤ 65
Class 4 (Primrose)	$200 \le R \le 256 \text{ AND } 0.85 \le G:R \le 1.20 \text{ AND Roundness} \le 0.35$
Class 5 (Water Hyacinth)	$200 \le R \le 256 \text{ AND } 0.85 \le G:R \le 1.20 \text{ AND Roundness} $ ≥ 0.35
Class & (Undefined)	Everything else



Drone imaging for high spatial resolution mapping of marshland plants and invasive weeds





Vegetation Index Remote Sensing for Evapotranspiration and Plant Height



A simple method to estimate actual evapotranspiration from a combination of net radiation, vegetation index, and temperature Kaicun Wang,¹ Pucai Wang,¹ Zhanqing Li,² M. Cribb,² and Michael Sparrow³

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 112, D15107, doi:10.1029/2006JD008351, 2007



Height of pickleweed, alkali heath, Baltic rush plants = f(NDVI) at cm scales (In support of yearly habitat assessment for salt marsh harvest mouse)

Pika L Airborne System

Complete hyperspectral remote sensing system.

Spectral Range	400 - 1000 nm 2.1 nm	
Spectral Resolution		
Spectral Channels	281	

Standard kit components:



Pika L hyperspectral system in flight on a multicopter UAV.

٠	Pika L Hyperspectral Imaging Camera	\$10,492
•	17 mm Objective Lens – 17.6° FOV	\$907
•	Data Acquisition Computer & Software	\$7,134
•	GPS/IMU	\$5,389
•	Georectification Software	\$3,162
•	System Mount for UAV's or Manned Aircraft	\$3,314
•	Radiometric Calibration	\$607
•	Calibration Tarp	\$1,880
•	Travel Case	\$196

RESONON

Complete system price: \$33,081.00