An aerial photograph of a river winding through a green, hilly landscape. The river is dark and flows from the upper right towards the lower left. The surrounding area is covered in dense green vegetation, likely trees and shrubs. In the background, there are rolling hills and a clear blue sky with some light clouds. The overall scene is a natural, rural setting.

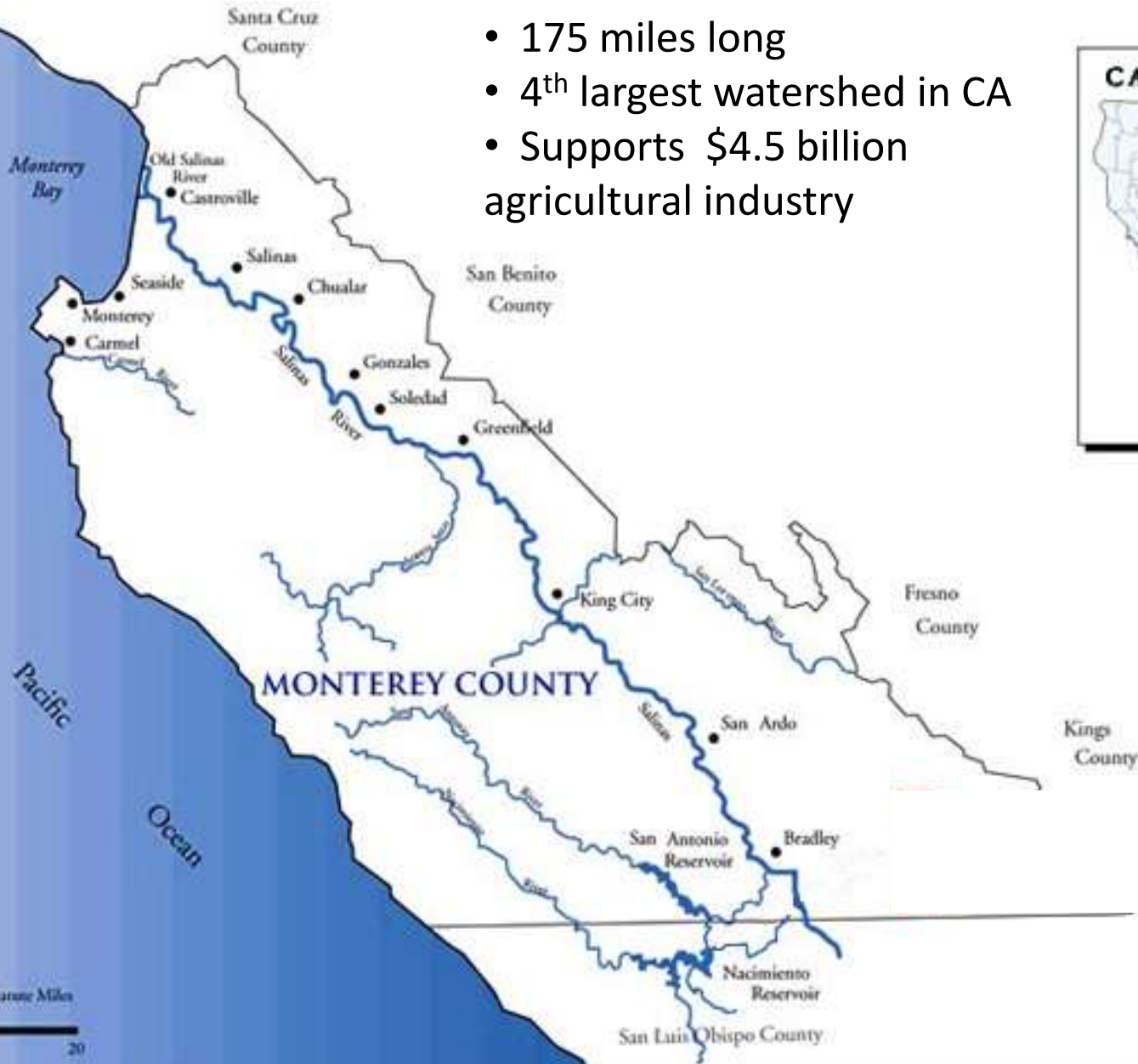
**The Salinas River Watershed**  
***Arundo* control program- lots of**  
**farmers, lots of *Arundo*: 12 miles**  
**in two years**

Emily Zefferman and Paul Robins  
RCD Monterey County

California Invasive Plant Council  
November 3, 2016

# “The Upside-down River”

- 175 miles long
- 4<sup>th</sup> largest watershed in CA
- Supports \$4.5 billion agricultural industry



Regional Location

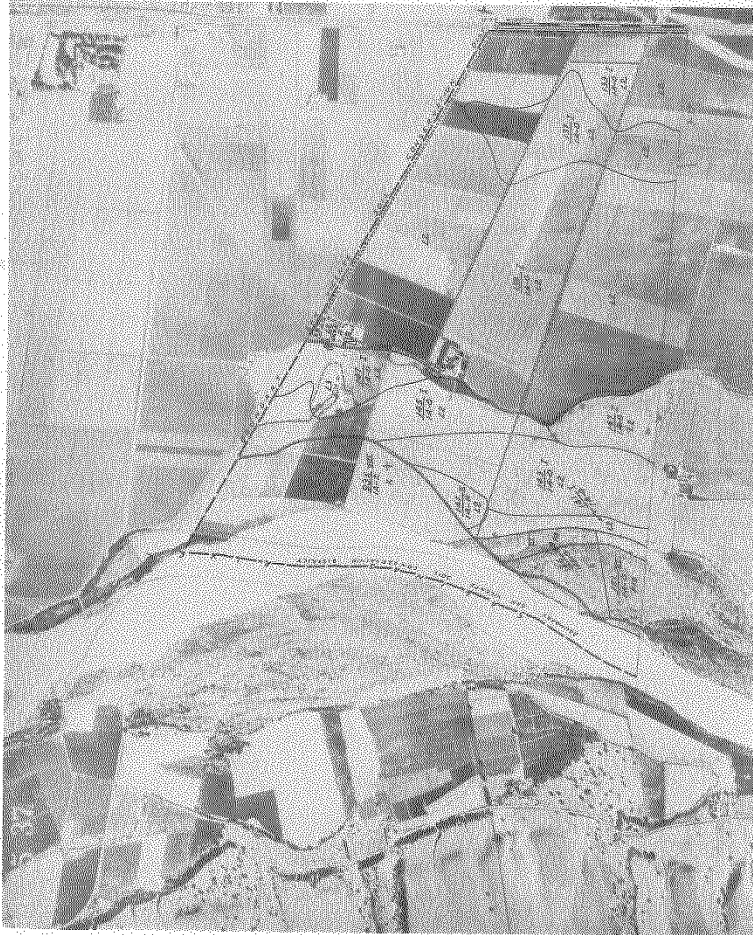
October 1998

Source: EDAW, Inc., 1998



“In the winter of wet years, the streams...swelled the river until sometimes it raged and boiled, bank full, and then it was a destroyer. The river tore the edges of the farm lands and washed whole acres down...Then when the late spring came, the river drew in from its edges and the sand banks appeared. And in the summer the river didn't run at all above ground.” - John Steinbeck, *East of Eden*

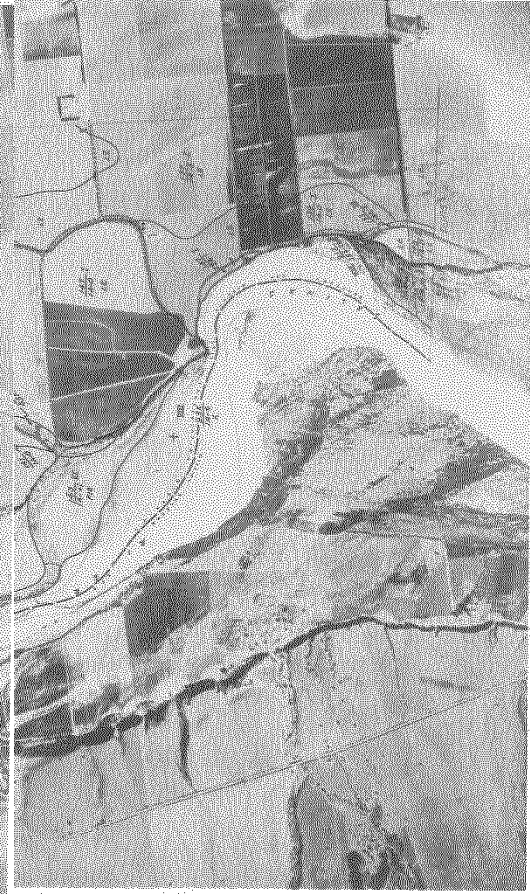
- 64 -



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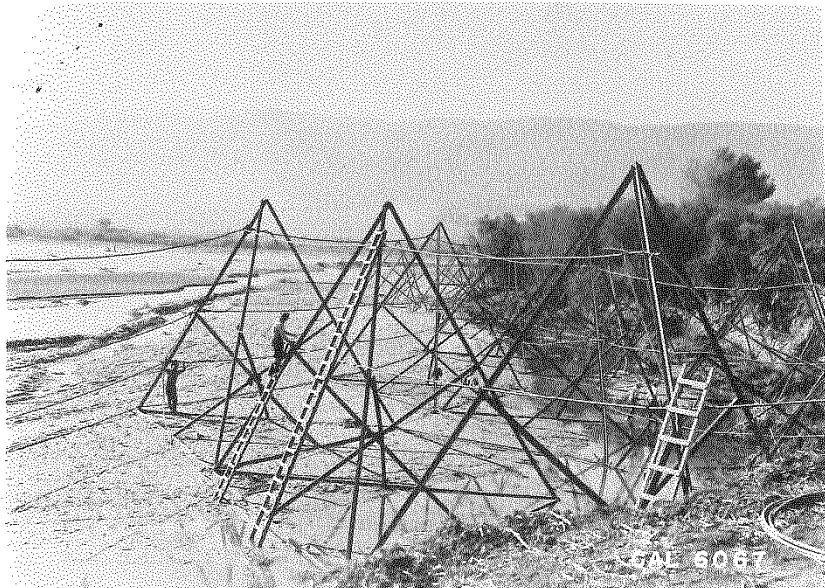


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Cal-6400



CAL 6087



CAL 6391

Plate 2. Tetrahedrons being installed to protect the river bank on the Salinas River. Photograph taken in October, 1941.

Plate 3. Same site as plate 2 but taken in August, 1942. Note the silt deposition behind the tetrahedrons, and that the area is beginning to be revegetated. Note also settling of the tetrahedrons indicating the unstable condition of the stream channel.



# Bank protection: “Detroit riprap” + *Arundo*!



# Current Situation

- **Modified flow regime → vegetation encroachment**
  - Summer releases
  - Lack of scouring
- **Estimated 1470 acres infested along the river (Cal-IPC mapping data)**
  - Poor quality habitat
  - Worsens erosion and flood risk





Figure 1: Entire project area.

- Arundo donax (giant reed)
- Riparian areas and adjacent lands



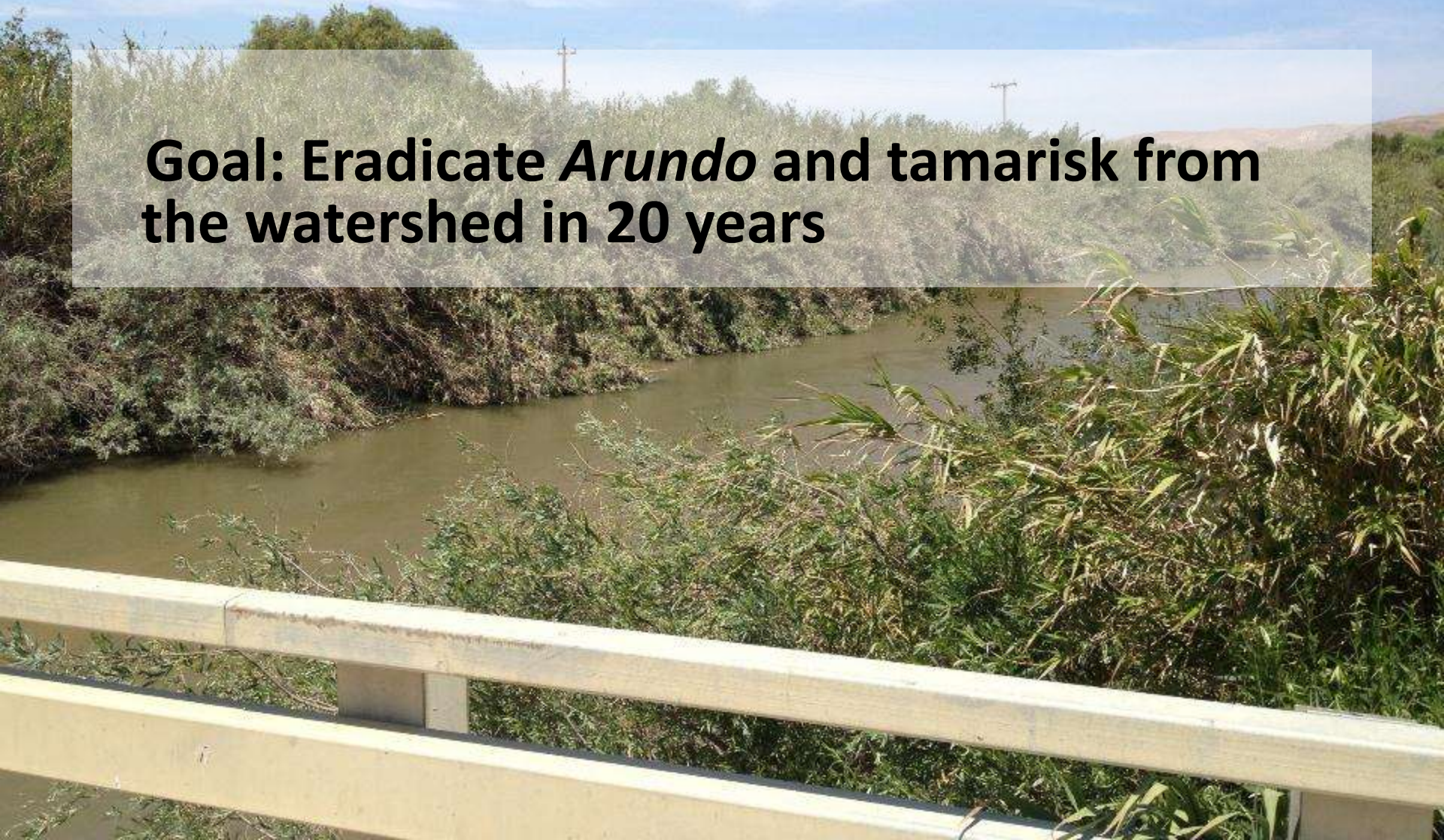






# Salinas Watershed Invasive Non-native Plant Control and Restoration Program

**Goal: Eradicate *Arundo* and tamarisk from  
the watershed in 20 years**





# Approach

- Upstream to downstream treatment
  - SLO County infestations under management
  - Upstream of King City treated once
- Large stands: Mow first, follow up with multiple herbicide treatments
- Small stands: Remove and/or spray by hand
- Revegetate when appropriate
- Conduct work during dry season- fewer biological impacts



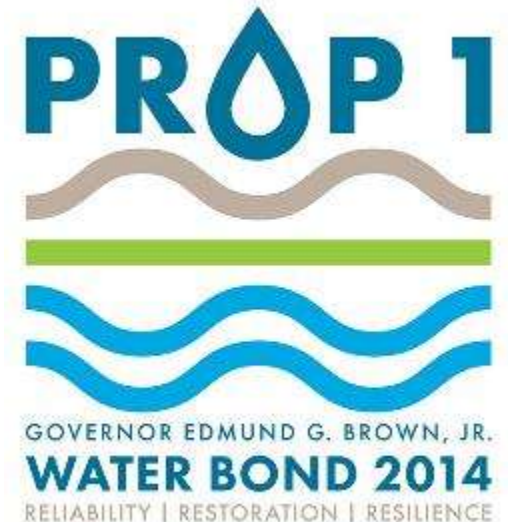
# Planning/Permitting process

- Began in 2011
- Permits received in 2014
- Programmatic permits cover whole river
  - CEQA Mitigated Negative Declaration
  - CDFW Streambed Alteration Agreement (1600)
  - USFWS Technical Assistance Letter
  - NOAA/NMFS Technical Assistance Letter
  - SWCB NPDES permit
  - ACOE consultation



# Funding

- Wildlife Conservation Board
  - \$1.1 million, 2014, Habitat Conservation Fund
    - First 150-200 acres
  - \$3.3 million, 2016, Prop 1 Streamflow Enhancement Program
    - Second 350 acres
  - Funding through 2020
- Leveraged with additional \$1.8 million from Monterey County Agricultural Commissioner and private landowners



# Permissions

## RCD-Landowner Agreements

- ~350 parcels adjacent to or intersecting Salinas River, mostly private
- Landowners hate *Arundo* too!
  - ...but... some have concerns:
    - Biologists on property
    - Taking over treatment after 5 years
    - Destabilizing banks



# Year 1: Biomass reduction

Barco mowers with fixed tooth attachment





Post-mowing





Post-mowing







**Year 2: First herbicide treatment after mowing  
Aquatic-formulated glyphosate herbicide mix**



Pulling *Arundo* away from tree for  
herbicide application





# Treating *Arundo* and tamarisk with backpack sprayer in upper watershed





# Dead tamarisk, one month after spraying







## Progress to date

- Total *Arundo* mowed: ~260 acres
- Re-growth sprayed twice: ~110 acres
- *Arundo* and tamarisk field-mapped between King City and San Ardo: ~4000 acres (8 acres tamarisk and *Arundo*)
  - 324 small *Arundo* patches sprayed
  - 391 Tamarisk plants sprayed



# ArcGIS Mapping System

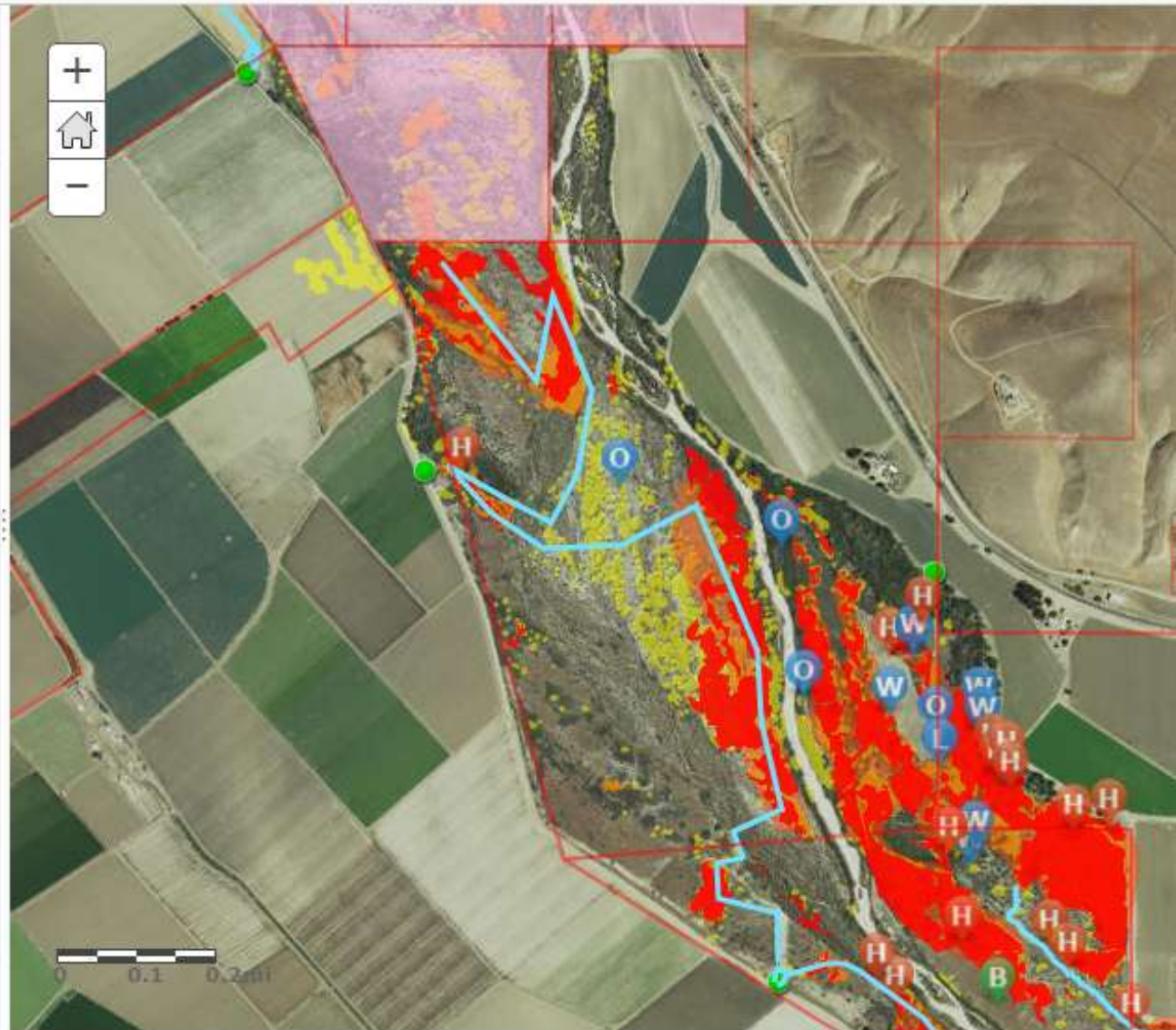
Home ▾ Salinas River Biomonitoring 2016

Details Add ▾ | Edit Basemap Analysis Save ▾ Share Print Directions Measure

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- SalinasRiver GateInfo 2016
- Mowed Arundo 2016
- Salinas mowing areas 2016
- SalinasRiver ArundoAreas 2011
- SalinasRanches 20160801





# Acknowledgements

- Wildlife Conservation Board
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- ACS Habitat, Washburn Grove Management
- Dawn Reis Ecological Studies
- Landowners



# Thank you!

Contact:

[Emily.zefferman@rcdmonterey.org](mailto:Emily.zefferman@rcdmonterey.org)

[paul.robins@rcdmonterey.org](mailto:paul.robins@rcdmonterey.org)

