

The background is a map of the Sacramento-San Joaquin River Delta. Key features include the Sacramento River, San Joaquin River, and various waterways. Labels on the map include 'Cosumnes Reservoir', 'Stockton', 'CVP & SWP Pumps' with an arrow pointing to a specific location, 'Delta', and 'Walnut Creek'. Restoration areas are highlighted in green, with labels like 'Yolo-North Delta Suisun Habitat' and 'Yolo Bypass'. The title text is overlaid on the map.

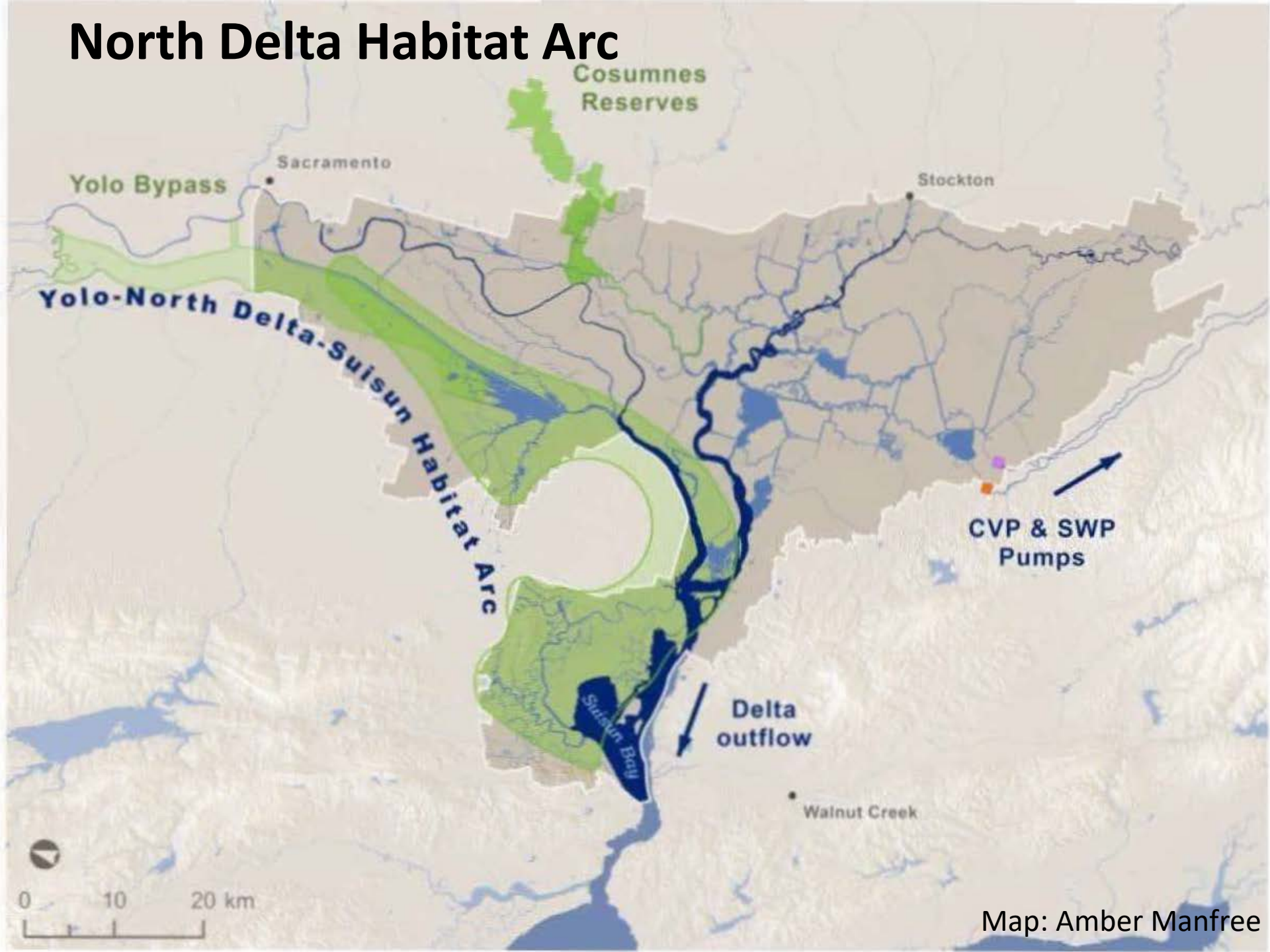
# Problems and Promise of Restoring Tidal Marsh to Benefit Native Fishes

**John Durand**  
**Center for Watershed Sciences**  
**UC Davis**

**Delta Science Conference**  
**November 19, 2016**



# North Delta Habitat Arc



- Waterbodies
- Tidal wetland
- Diked wetland
- Agriculture
- Reserves

Luco Pond/Potrero Club



**Cache-Lindsey  
Complex**



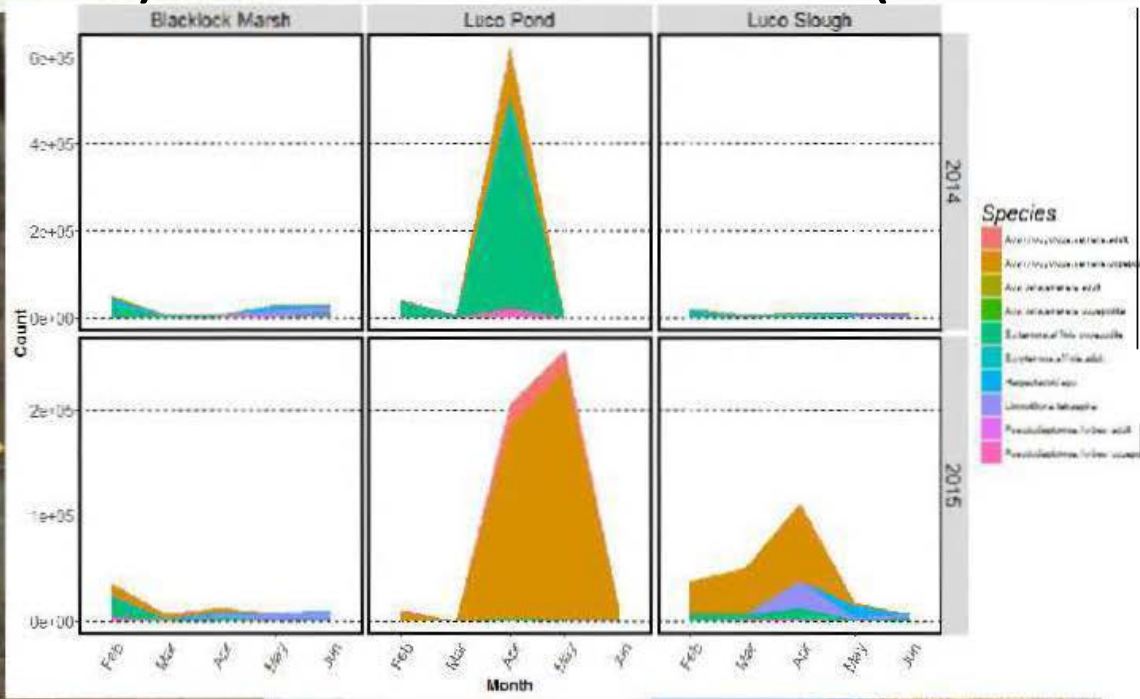
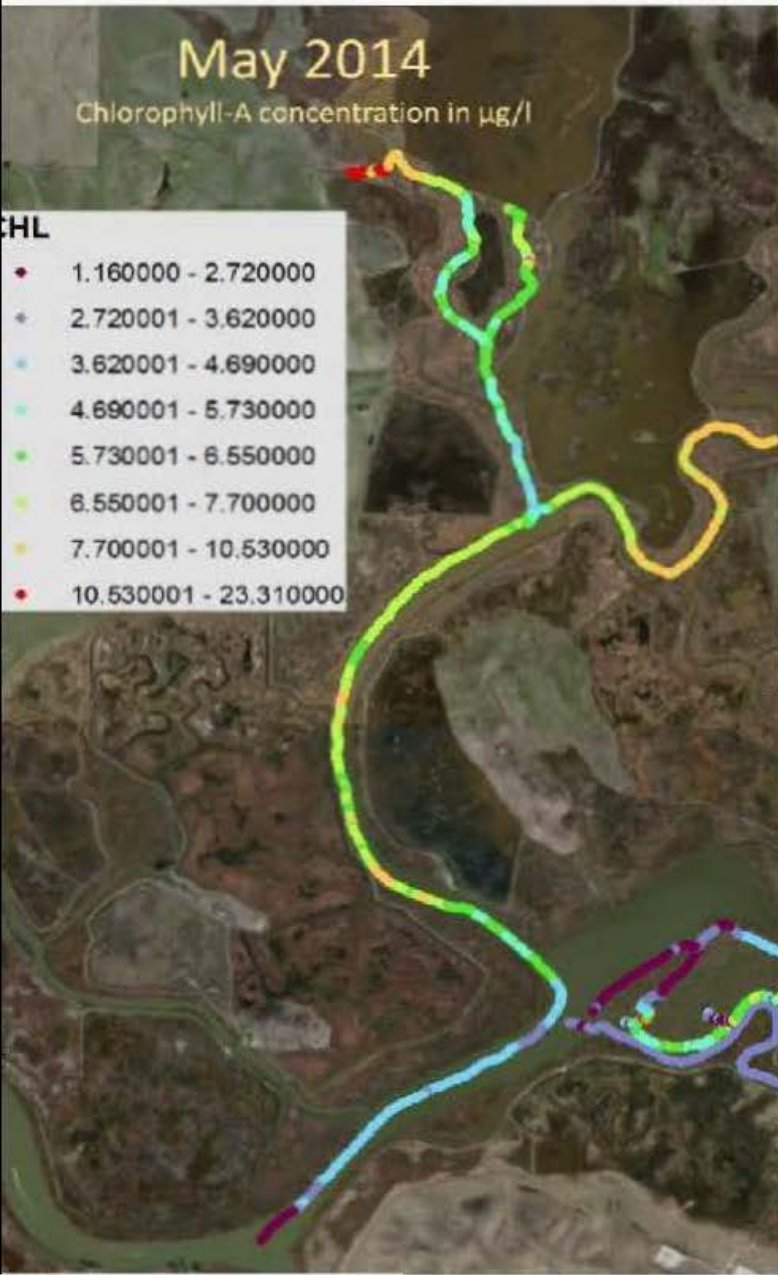
Blacklock Restoring Site

**Suisun  
Marsh**

Tule Red

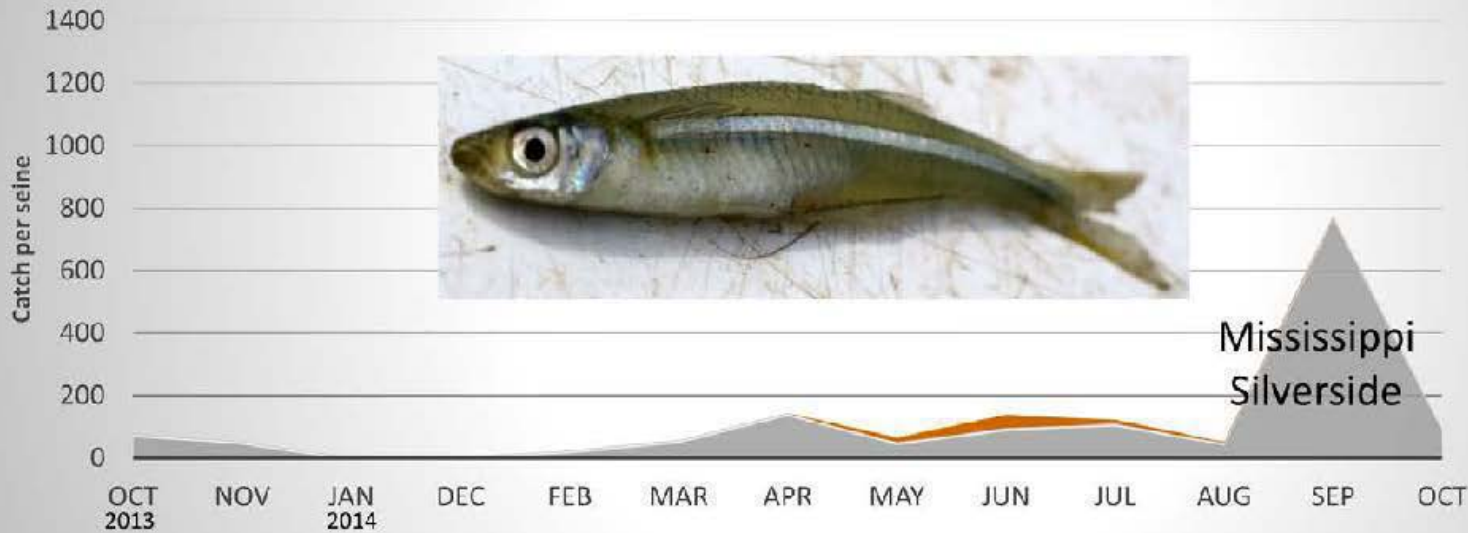
Map: Amber Manfree

# Luco Pond (muted) and Blacklock (2006)

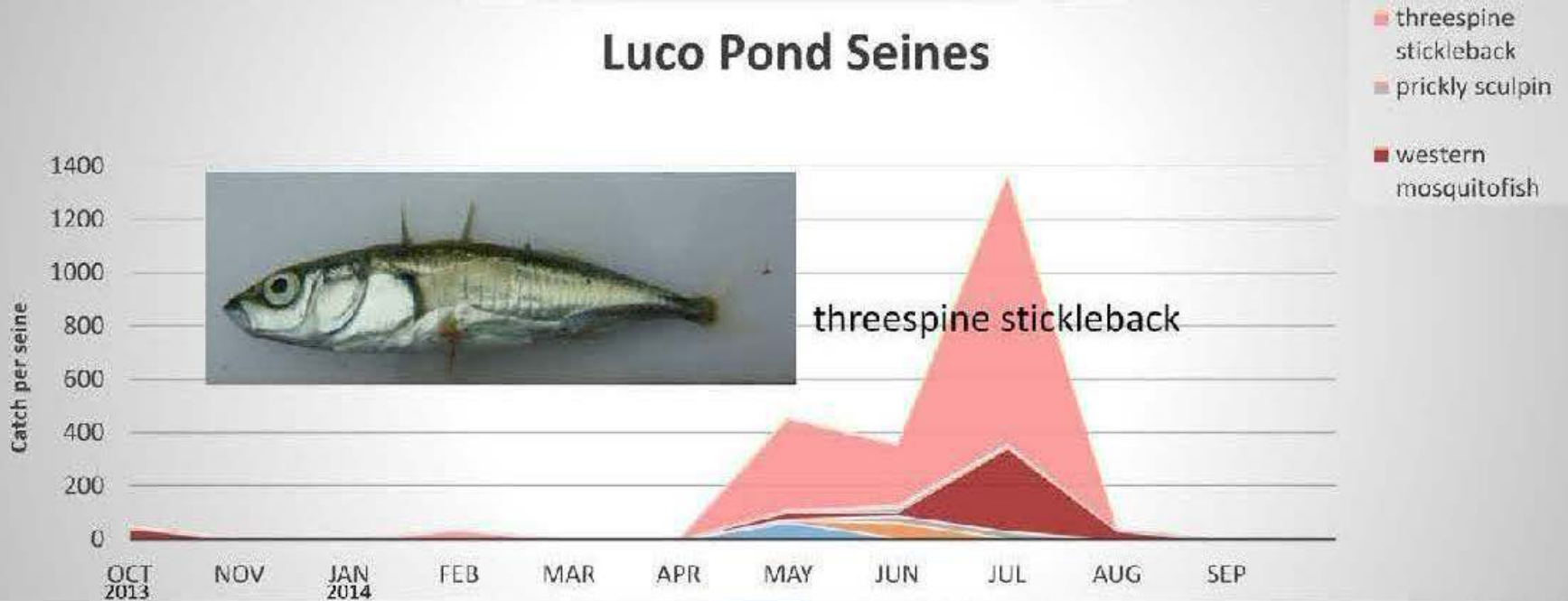


**Brian Williamson**  
 “Comparing fish and invertebrate assemblages in managed, unmanaged and restoring habitats in a tidal wetland complex”

# Blacklock Wellpad Seines



# Luco Pond Seines



Luco Pond



# Blacklock Restoring Site



# Blacklock Restoring Site





# Meins Landing

Cosumnes Reserves

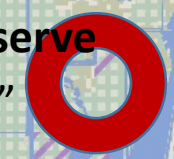
Sacramento



- Waterbodies
- Tidal wetland
- Diked wetland
- Agriculture
- Reserves

# Liberty Island Conservation Bank and Preserve

"Baby Marsh"



## Cache-Lindsey Complex

## Suisun Marsh

Tule Red

Map: Amber Manfree

# North Liberty Is. Conservation Bank (2010)



WILDLANDS

Liberty Island Conservation Bank

Figure 6  
Conceptual Plan

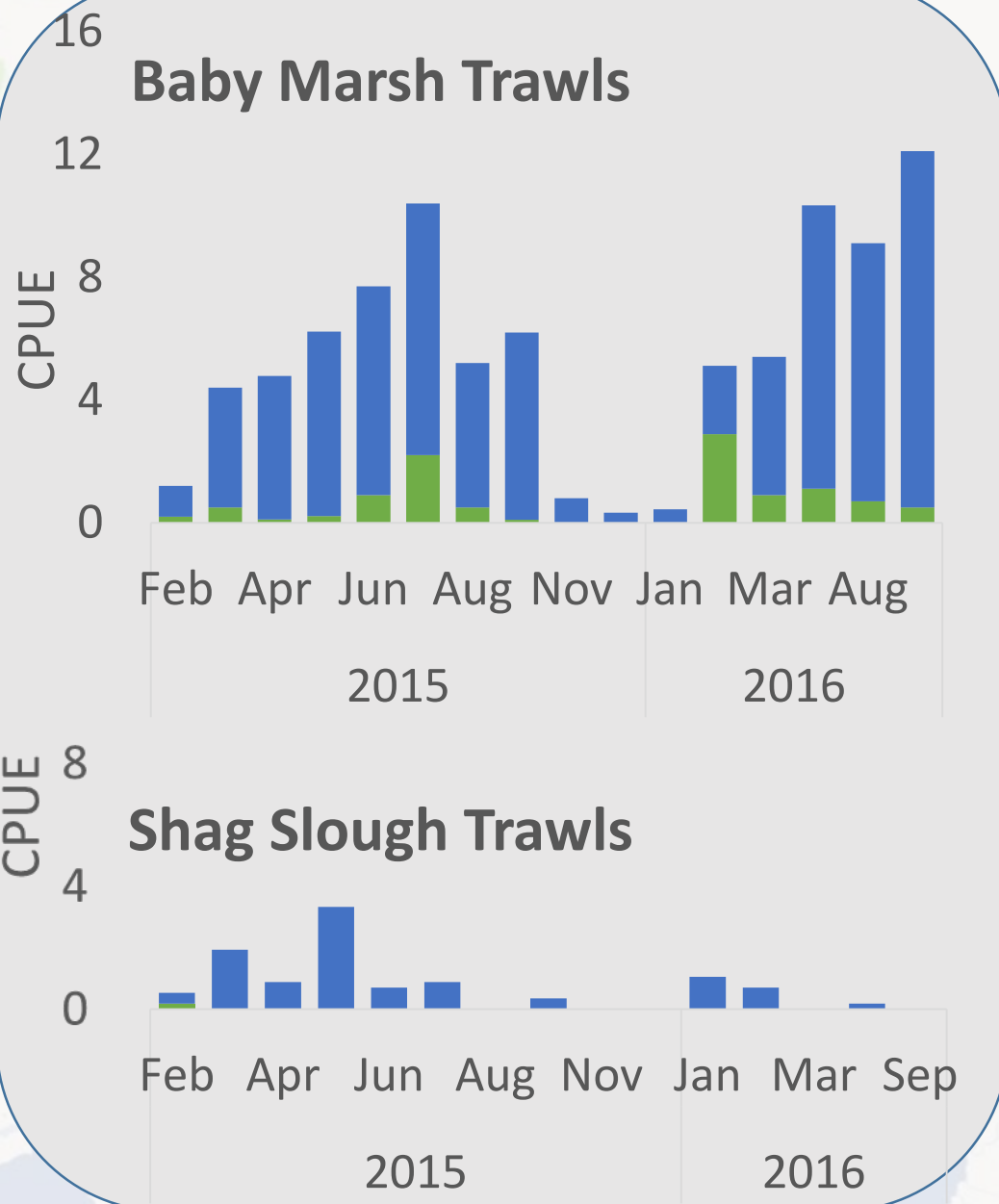


# North Liberty Island Conservation Bank

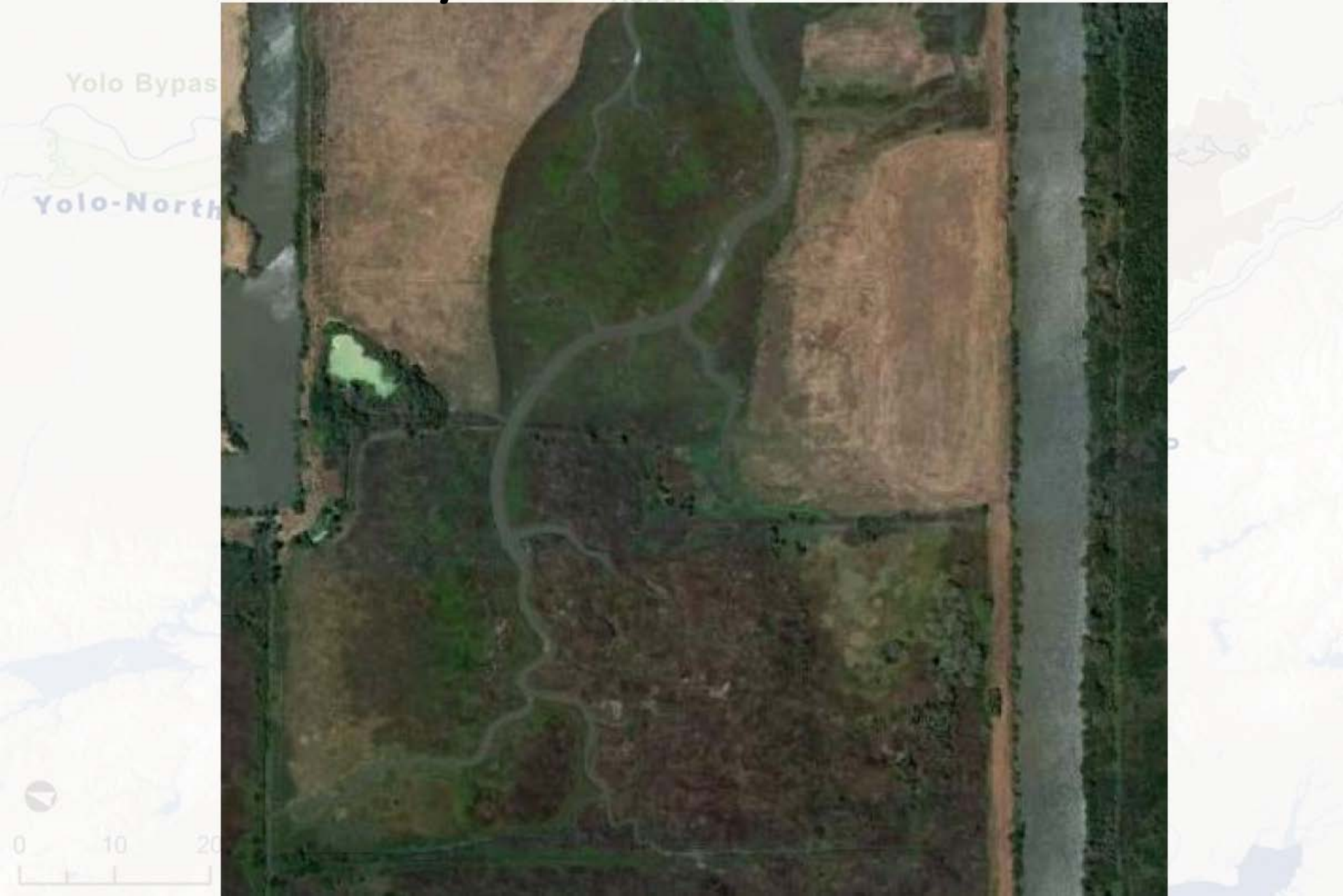


**Nicole Aha**

“Comparing Restoration Sites  
in the Cache Slough Complex”



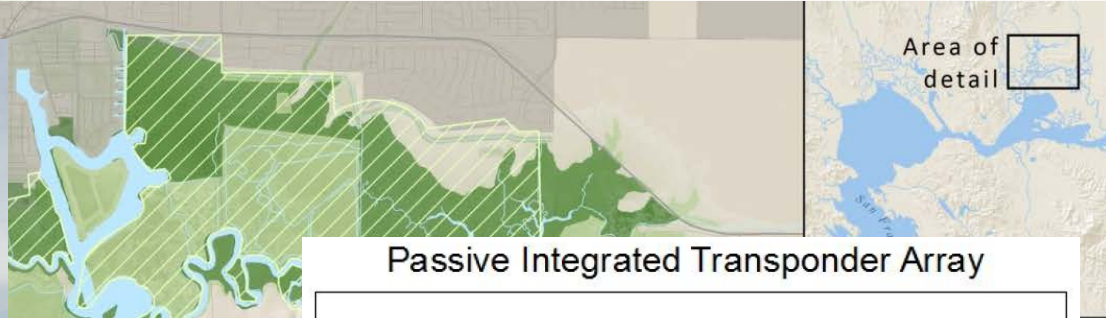
# North Liberty Island Conservation Bank



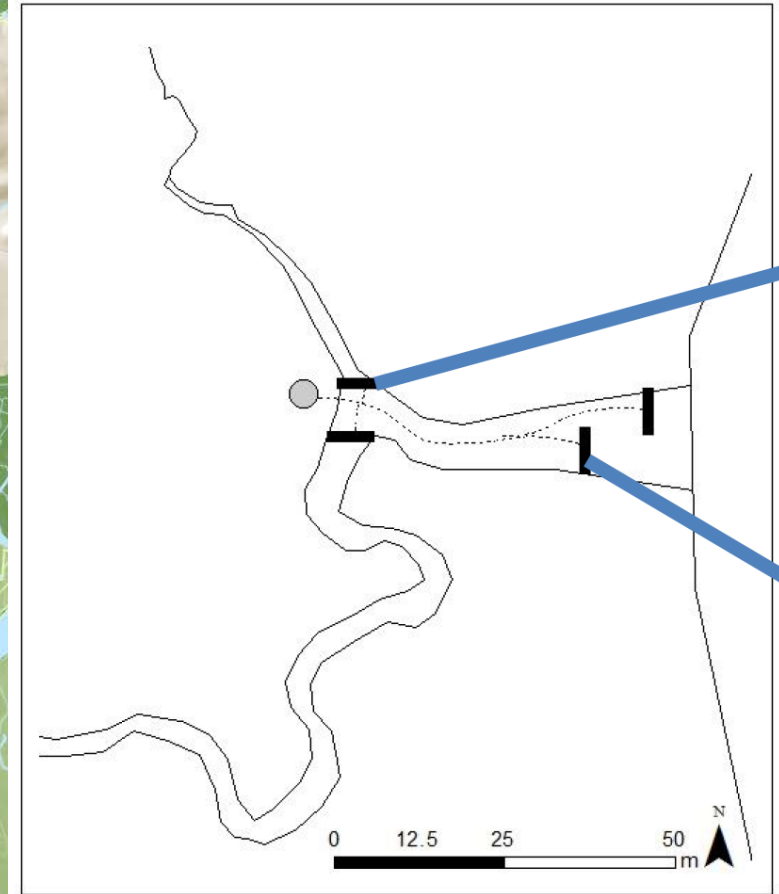
# First Mallard, Suisun Marsh



Denise DeCarion Colombano  
“Fish nursery areas and migratory  
corridors in Suisun Marsh”



Passive Integrated Transponder Array

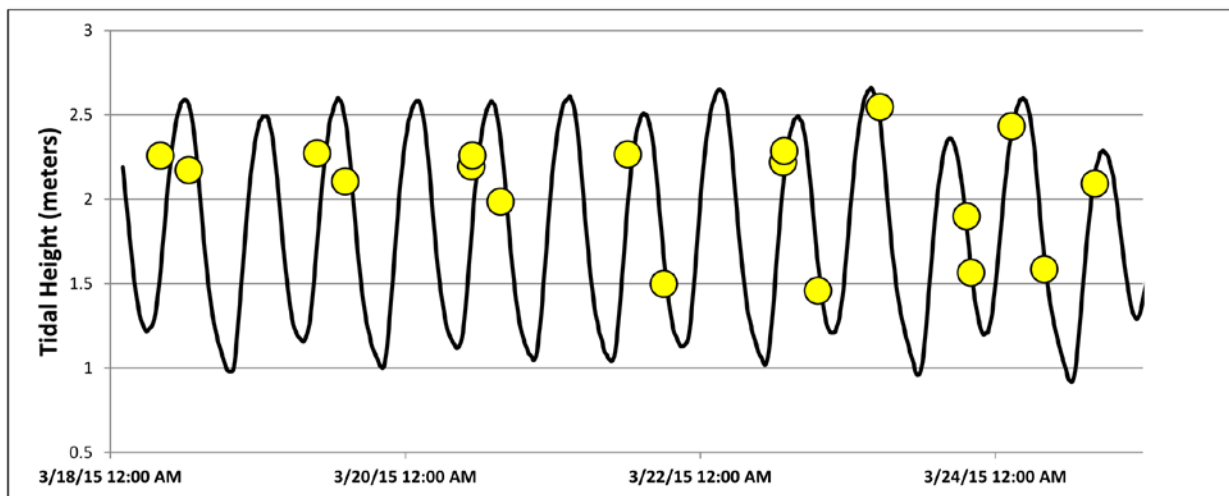
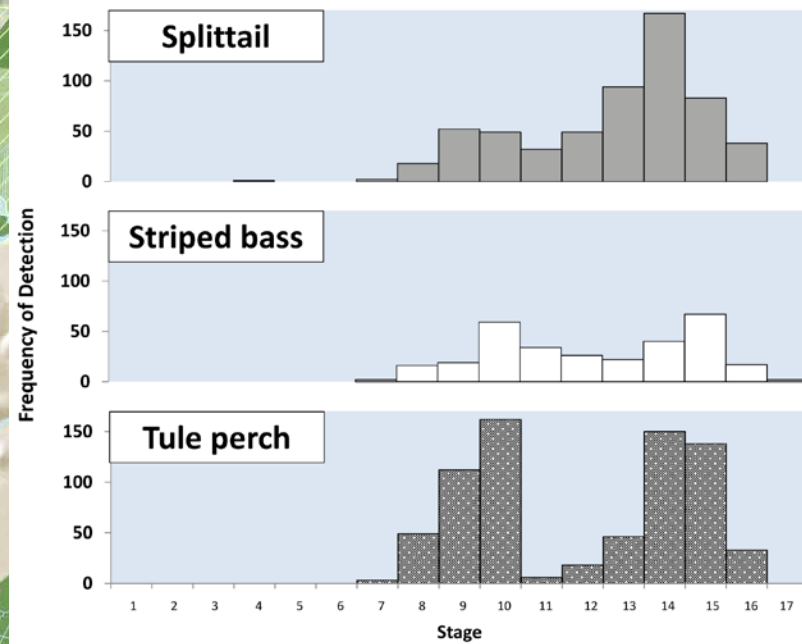


© Amber Manfree

# First Mallard, Suisun Marsh



Denise DeCarion Colombano  
 “Fish nursery areas and migratory  
 corridors in Suisun Marsh”



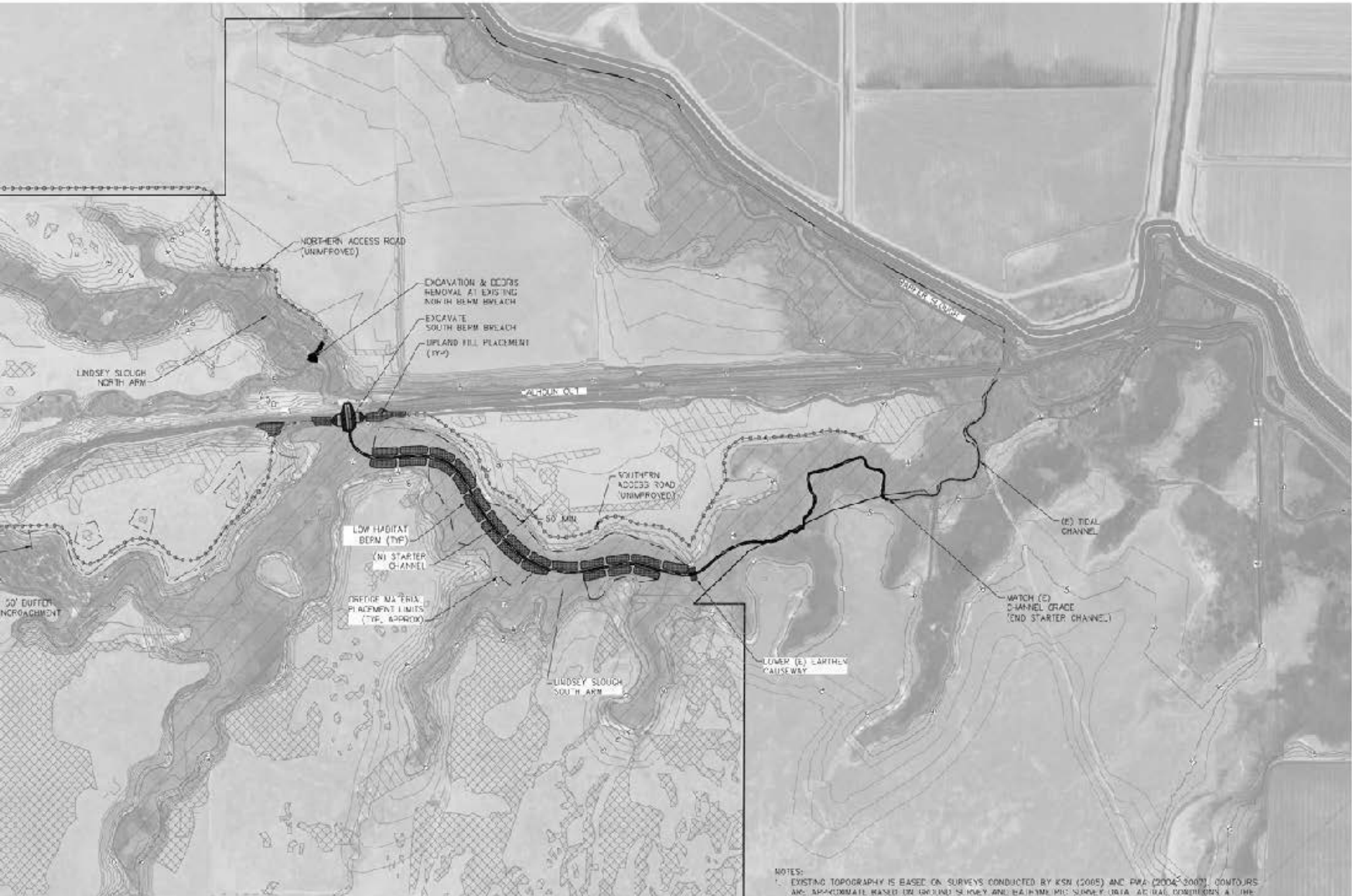
© Amber Manfree



Map: Amber Manfree



# Calhoun Cut Ecological Reserve (2014)



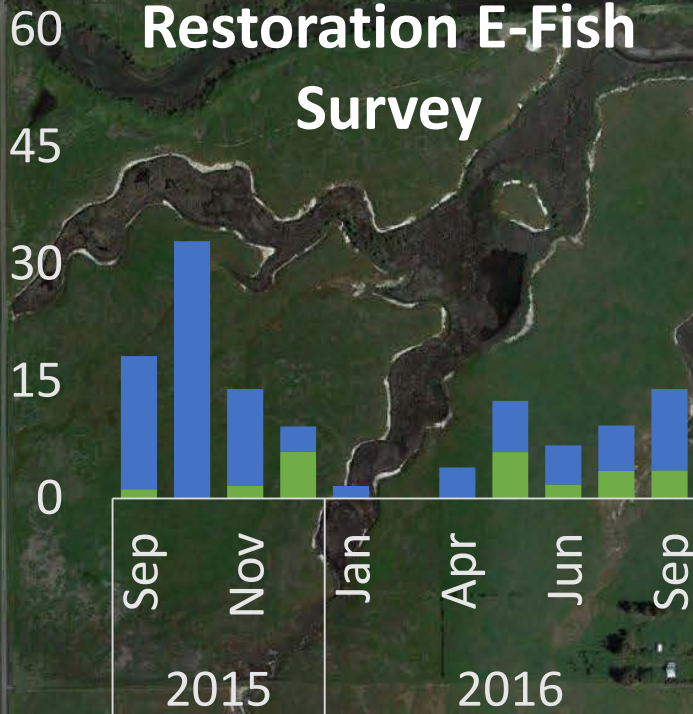
NOTES:  
 1. EXISTING TOPOGRAPHY IS BASED ON SURVEYS CONDUCTED BY KSN (2005) AND PWA (2004-2007). CONTOURS ARE APPROXIMATE BASED ON GROUND SURVEY AND BATHYMETRIC SURVEY DATA. ACTUAL CONDITIONS AT THE SITE MAY DIFFER AT THE TIME OF CONSTRUCTION.

<p>PREPARED FOR</p> <p><b>SOLANO LAND TRUST AND CALIFORNIA DEPARTMENT OF FISH &amp; GAME</b></p>	<p>PREPARED BY</p> <p><b>ESA PWA</b>                  500 University Ave., Suite 200                  Berkeley, CA 94702                  Tel: 415.863.1100                  Fax: 415.863.1101</p>
<p>30% DRAFT NOT FOR CONSTRUCTION</p>	<p>SHEET TITLE</p> <p><b>SITE PLAN</b></p> <p>PROJECT</p> <p><b>LINDSEY SLOUGH FRESHWATER TIDAL MARSH ENHANCEMENT PROJECT</b></p>

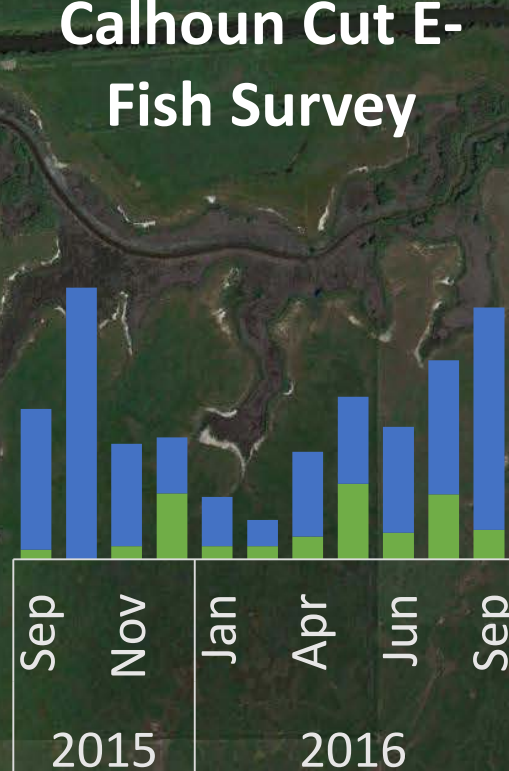
# Calhoun Cut



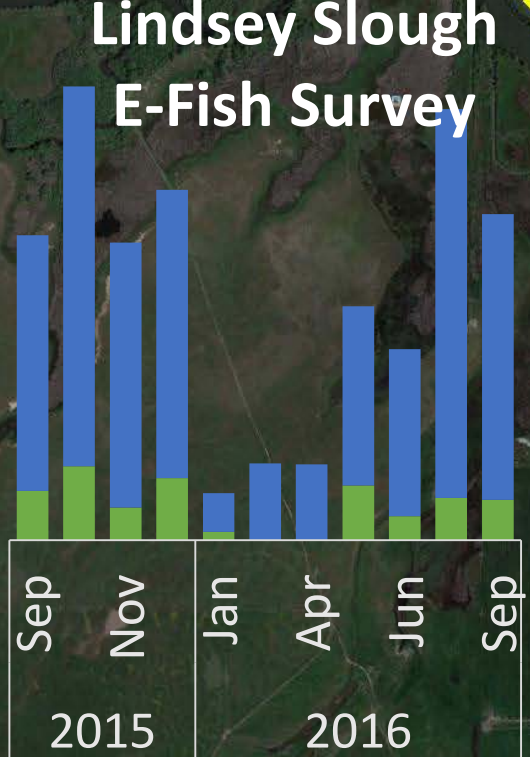
**Calhoun Cut Restoration E-Fish Survey**



**Calhoun Cut E-Fish Survey**



**Lindsey Slough E-Fish Survey**



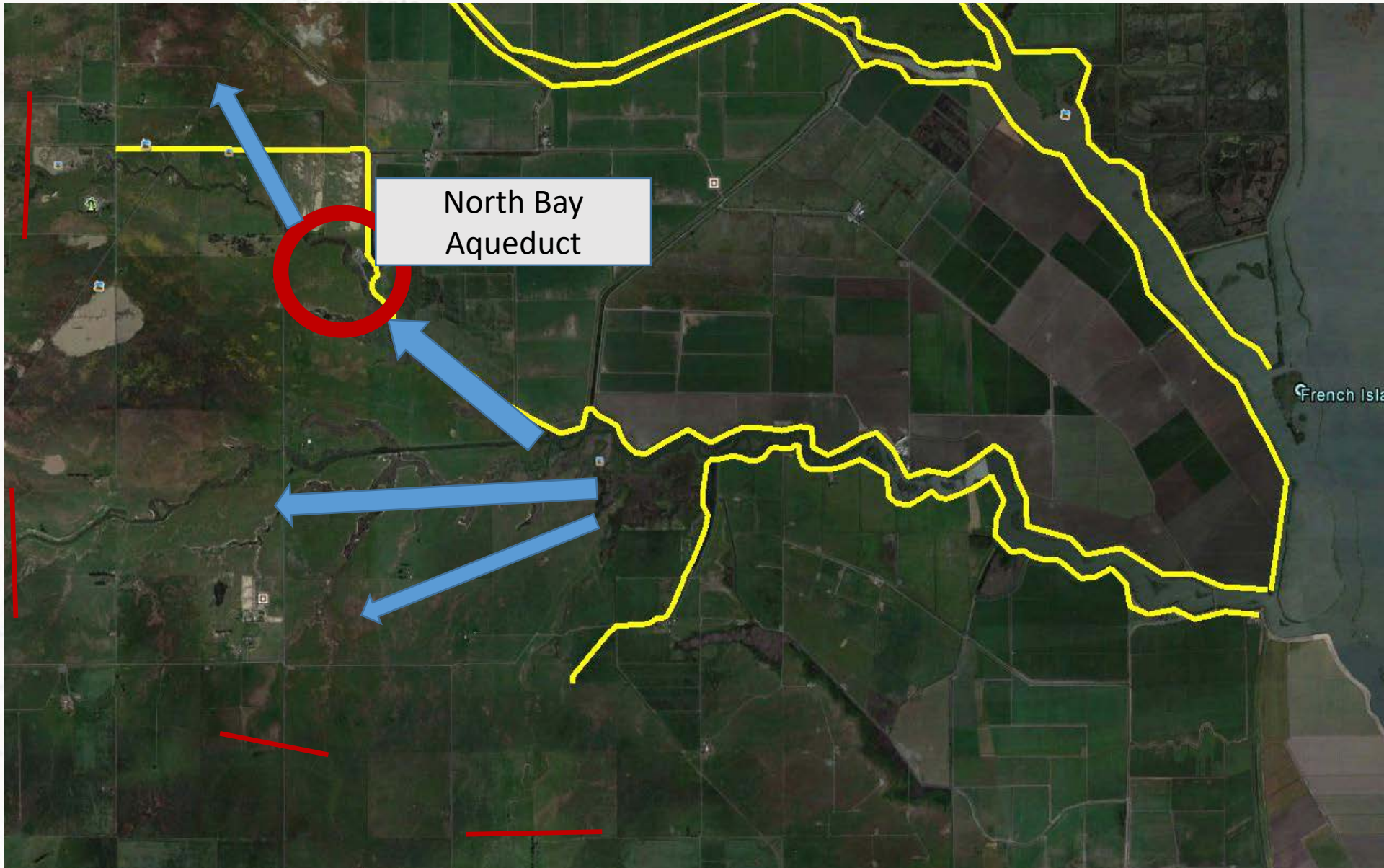
# Calhoun Cut

Cosumnes  
Reservas



# Calhoun Cut

Cosumnes Reserves

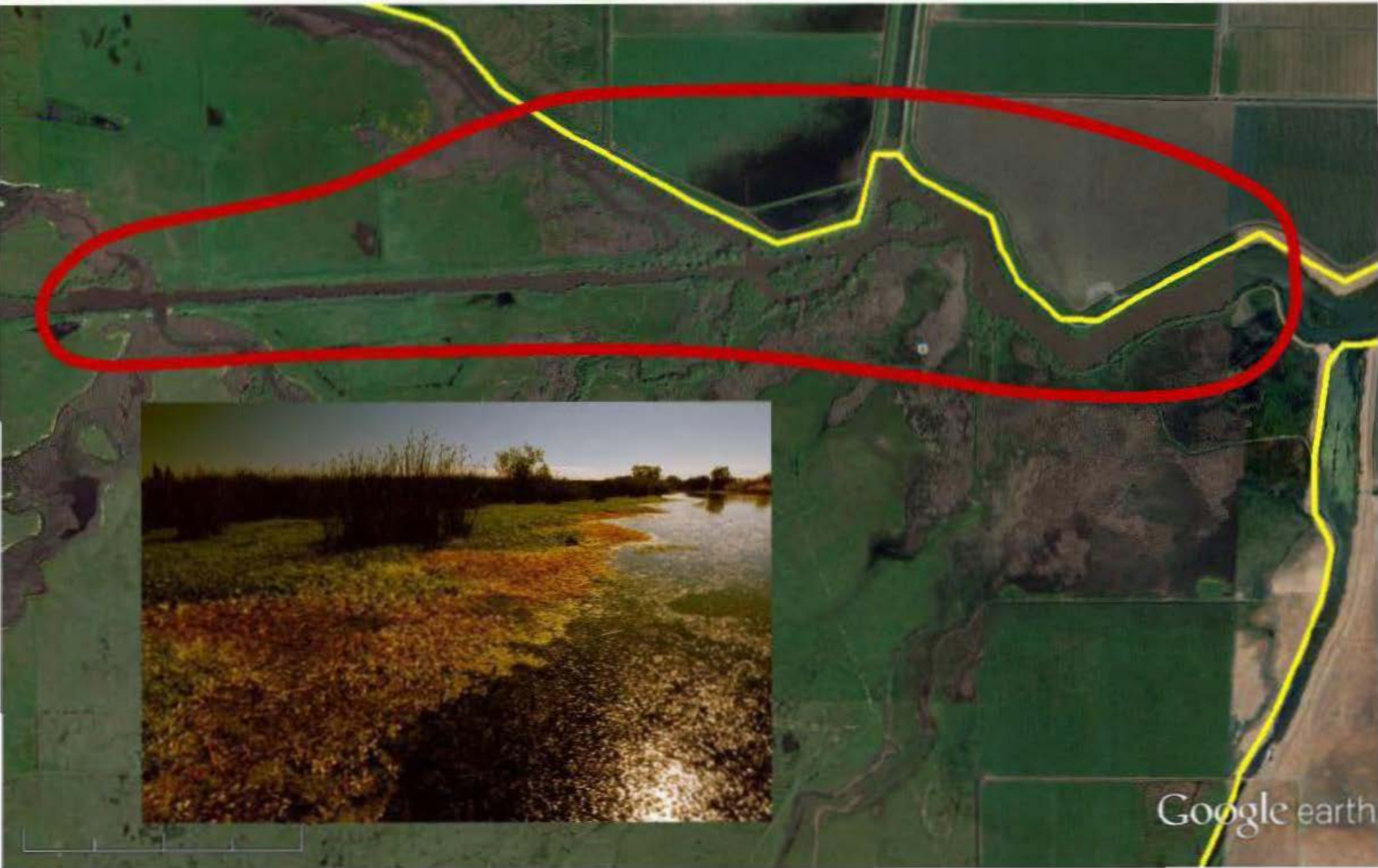


North Bay  
Aqueduct

French Isla

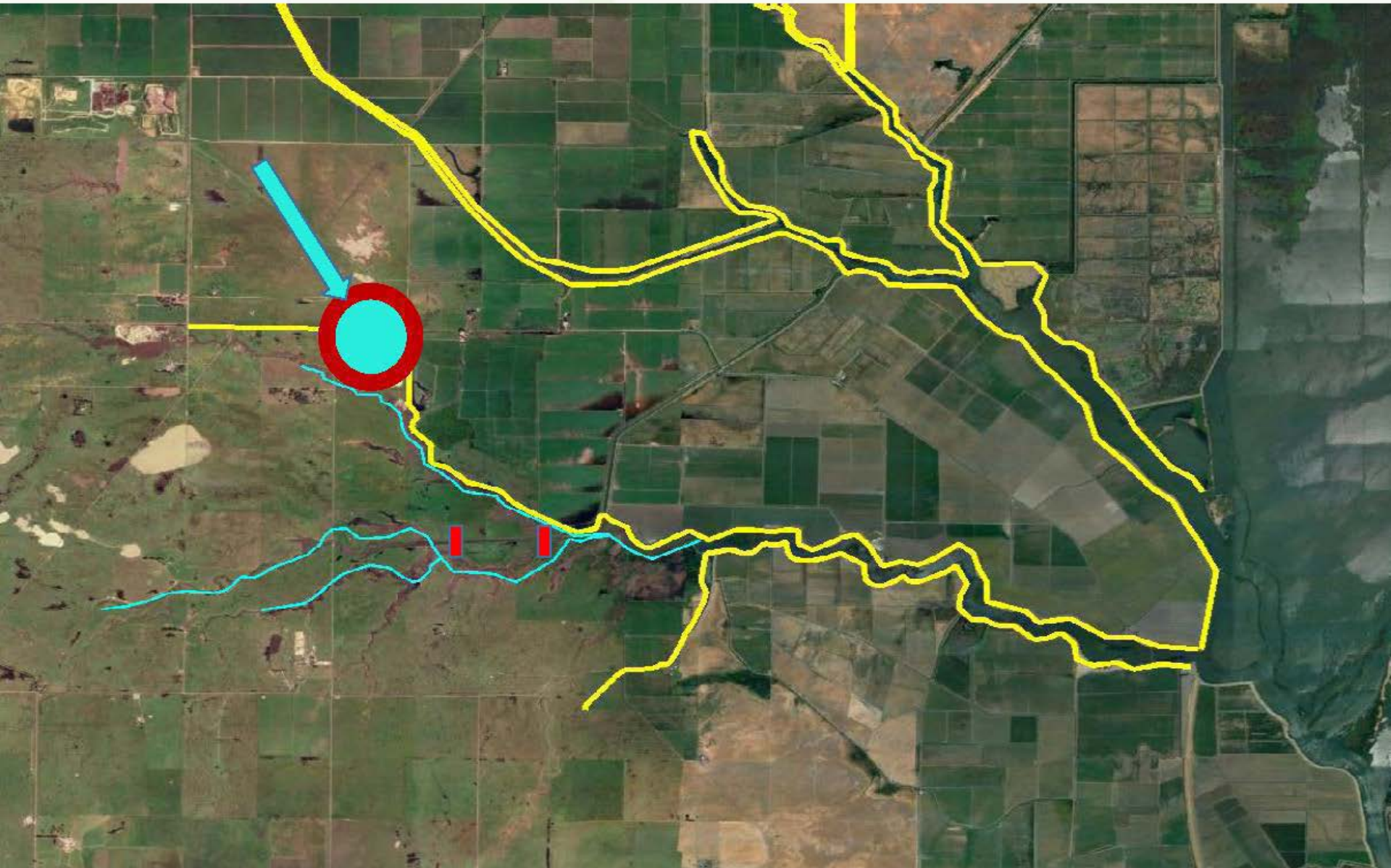
# Calhoun Cut

Cosumnes  
Reserves

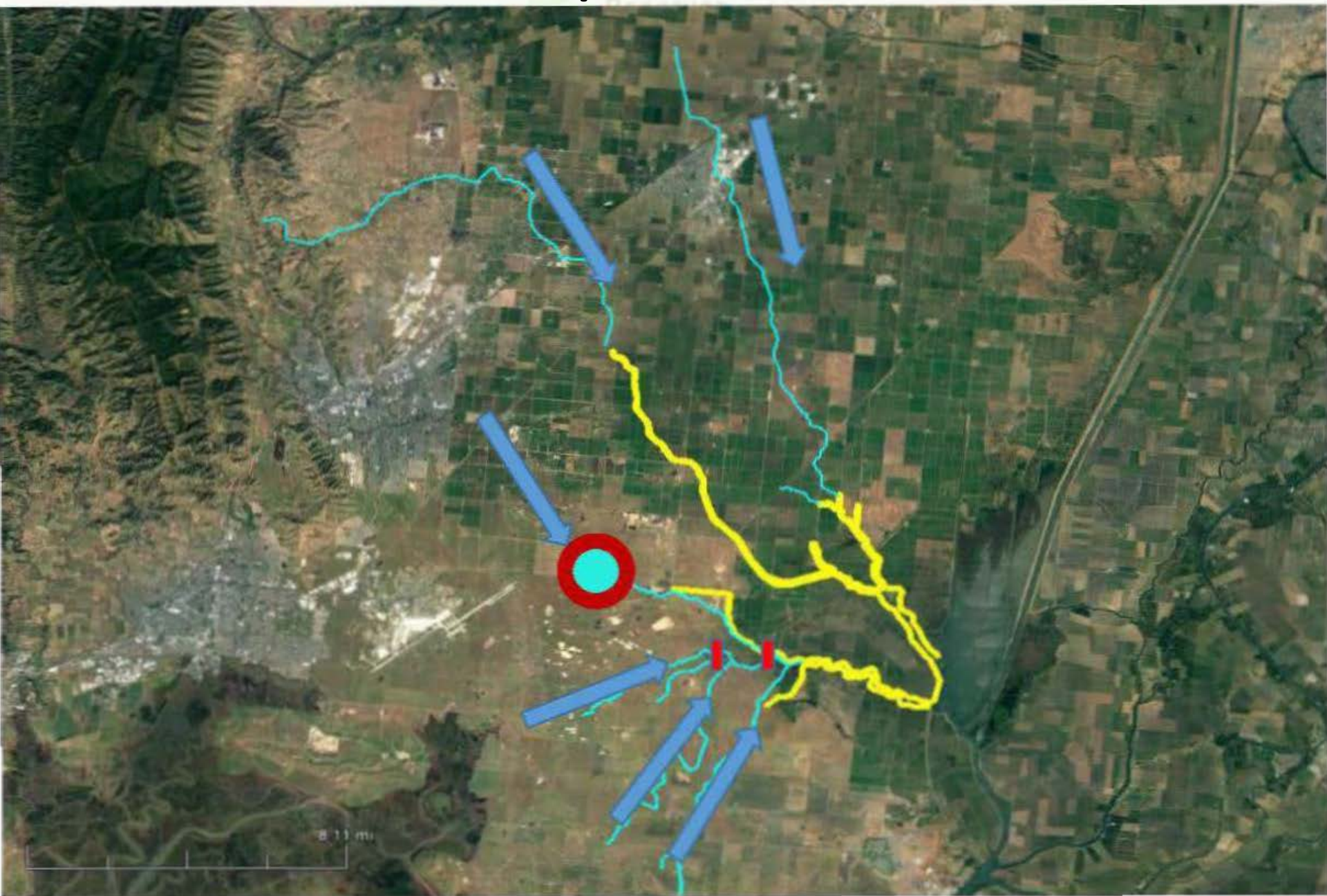


# Calhoun Cut

Cosumnes  
Reserves

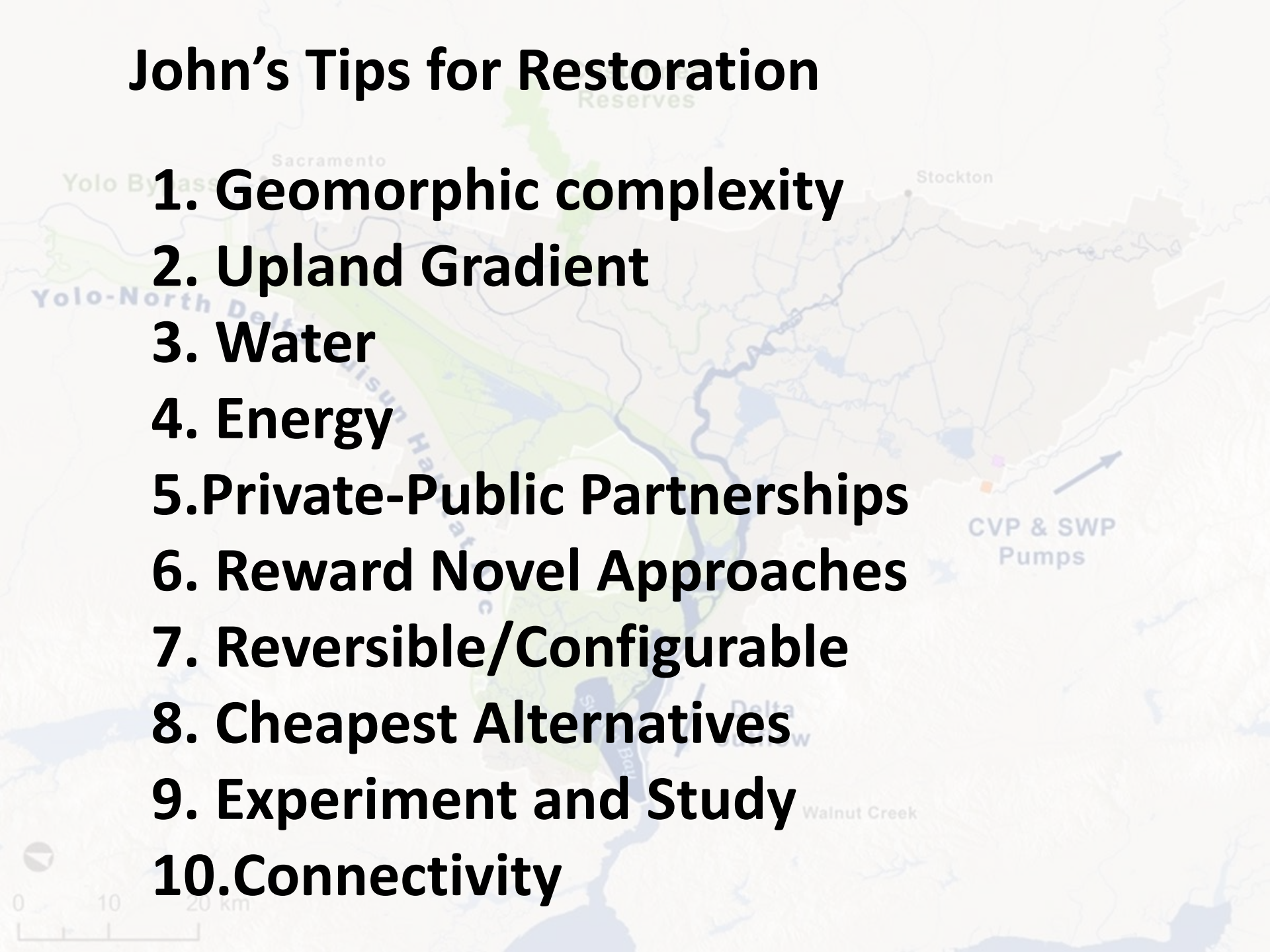


# North Delta Complex



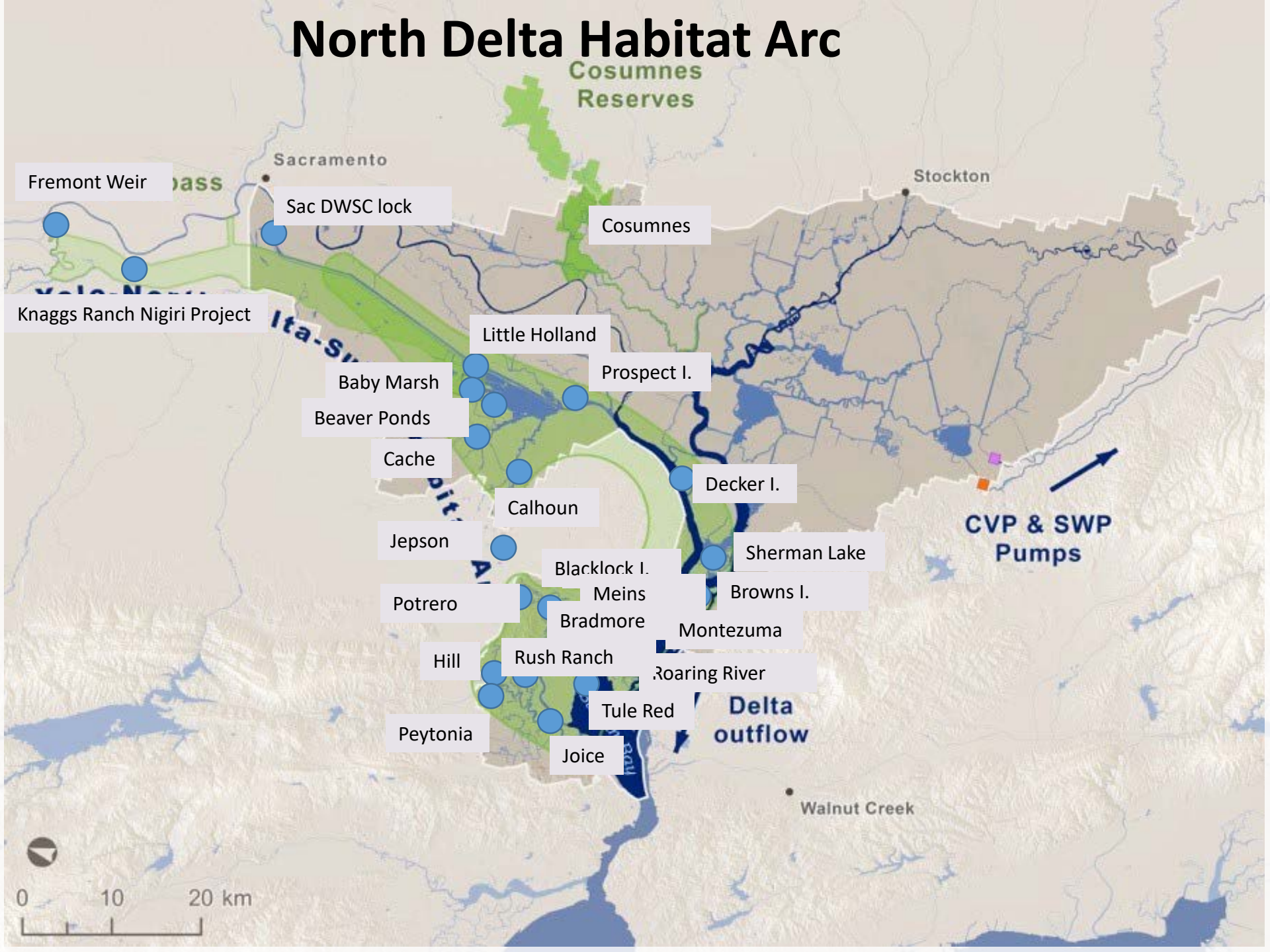
# John's Tips for Restoration

1. Geomorphic complexity
2. Upland Gradient
3. Water
4. Energy
5. Private-Public Partnerships
6. Reward Novel Approaches
7. Reversible/Configurable
8. Cheapest Alternatives
9. Experiment and Study
10. Connectivity





# North Delta Habitat Arc



# Thanks to research sponsors ...

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US Fish & Wildlife Service



# ...and supporters





**Thanks to our crew and collaborators:**

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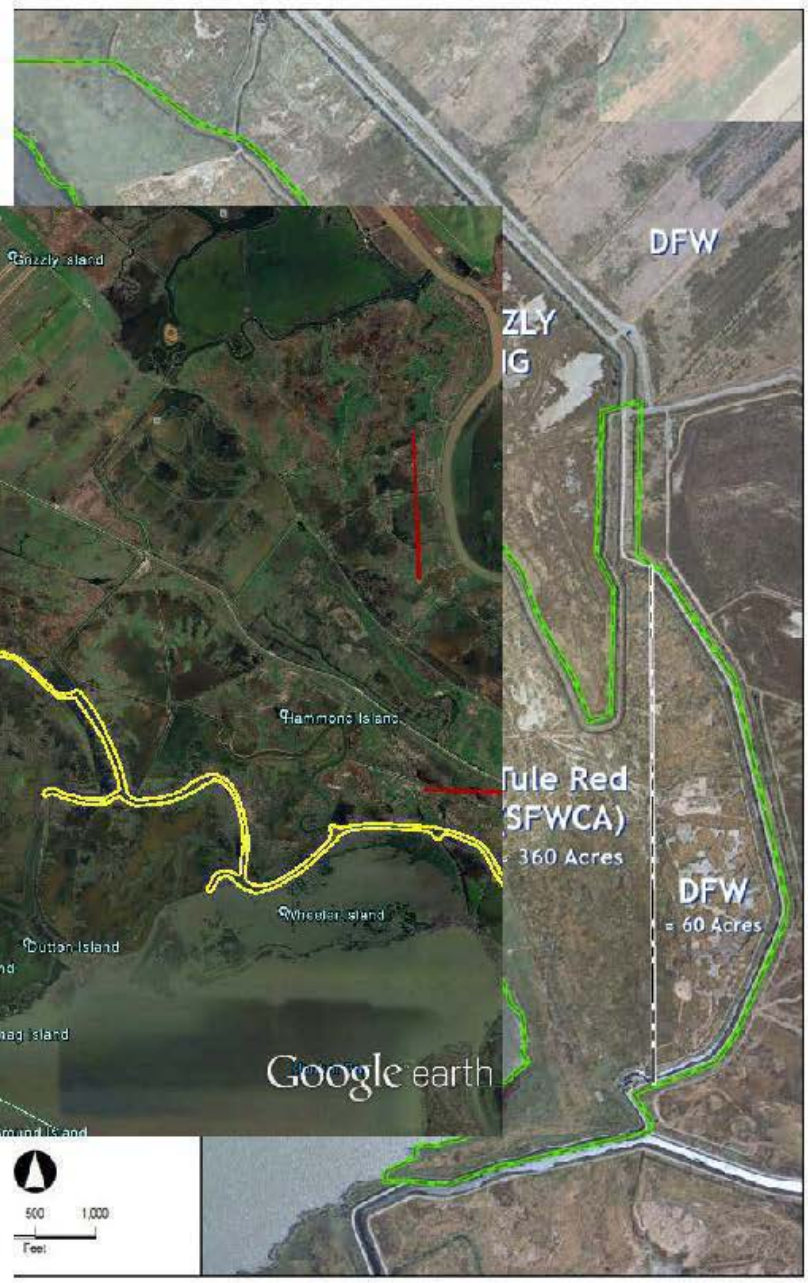
**Alumni:**

Kathleen Berridge  
Amy Chandos  
Kyle Phillips  
Melissa Riley  
Martin Perales  
Matt Young  
Brian Williamson

# Tule Redd

**KEY**

- Tidal Channel
- Transitional Habitat
- Marsh Plain Pond (High)
- Marsh Plain Pond (Low)



# Brannon Island

Cosumnes  
Reserves



# Brannon Island



# Brannon Island



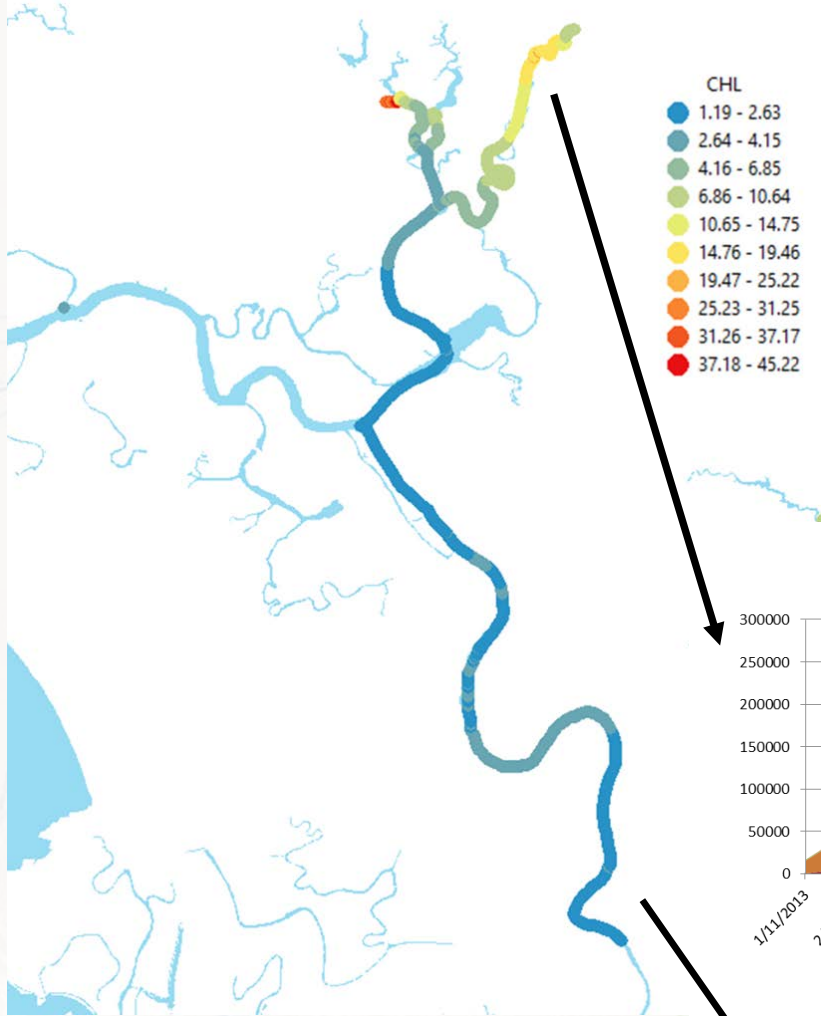
# Brannon Island





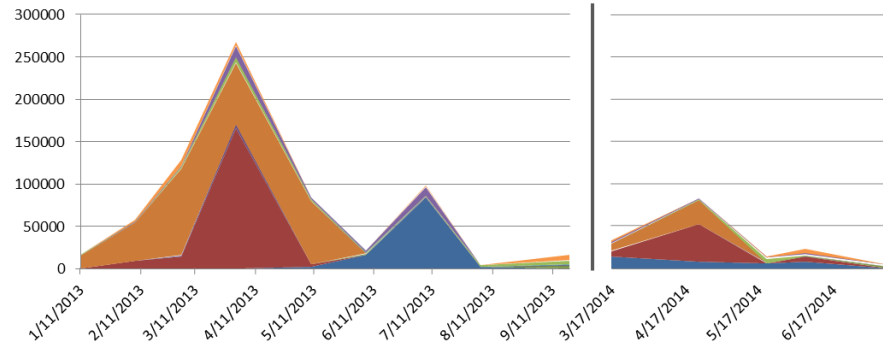
# First Mallard Slough





**Jacob Montgomery**  
 “Zooplankton biomass and chlorophyll-a trends in the North Delta Arc”

### Upper Denverton



### Upper Montezuma

