

# Think big, start small: invasive vegetation pilot studies to inform large-scale restoration management

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# Acknowledgements – Team Effort!

- **Research Team:** FRP & UCD
- **Field & Lab:** CCC, Solitude Lake Mgmt, Bryte Lab, Weck Lab
- **Stakeholders**
- **Funders:** DC Prop 1 Grant & FRP



SACRAMENTO-SAN JOAQUIN  
**DELTA CONSERVANCY**



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Sept 2018



# Pilot Study Objectives:

- Reduce rate of invasive aquatic veg species establishment within restoration areas to improve fish habitat.
- Decrease costs for maintenance of vegetation management once restoration is completed.





# The Invasive Plants



*Ludwigia hexapetala*  
**Water Primrose**  
Floating Aquatic Invasive in the Delta



*Phragmites australis*  
**Common reed**  
Emergent Aquatic Invasive  
in Suisun Marsh



*Alternanthera philoxeroides*  
**Alligatorweed**  
Emergent Aquatic Invasive in  
Suisun Marsh





# The Native Plants



*Schoenoplectus acutus*  
**Hardstem bullrush**  
Planted at Dutch and Bradmoor.  
Harvested on-site.



*Persecaria amphibia*  
**Smartweed**  
Planted at Dutch.  
Harvested from Prospect Island



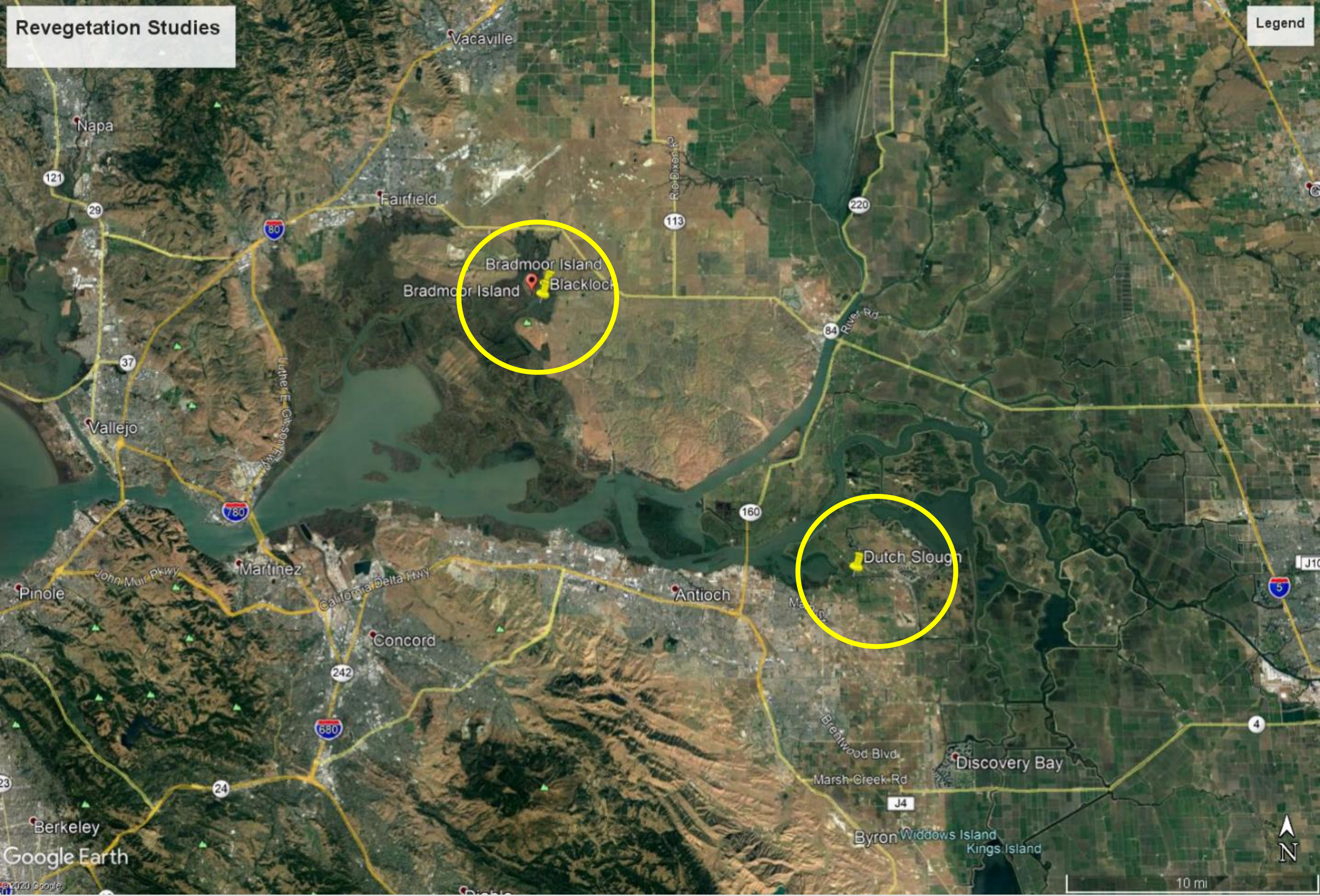
*Schoenoplectus americanus*  
**Chairmaker's bullrush**  
Planted at Bradmoor.  
Harvested on-site



*Typha latifolia*  
**Broadleaf cattail**  
Planted at Bradmoor.  
Harvested on-site





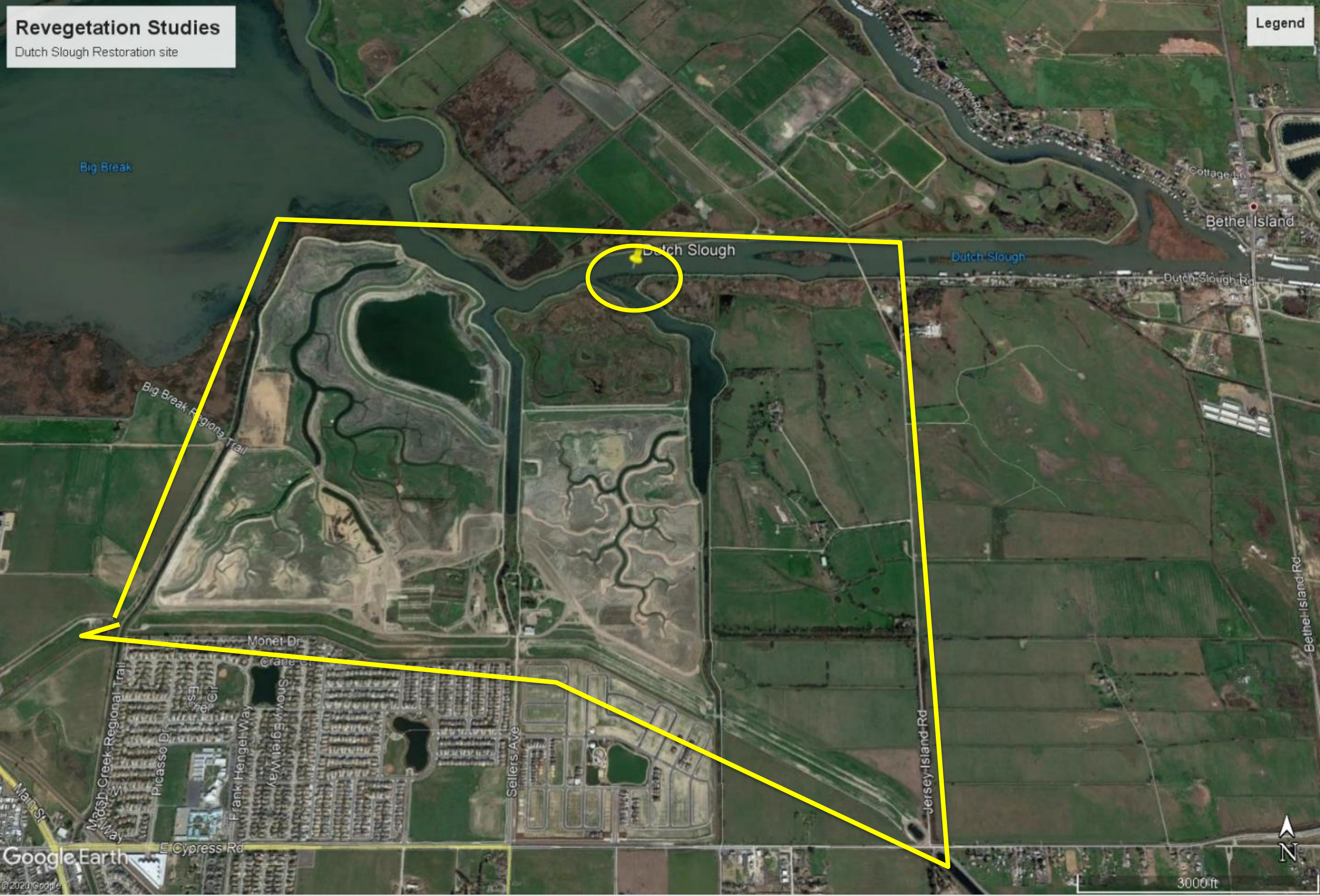




# Revegetation Studies

Dutch Slough Restoration site

Legend



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# Dutch Slough Implementation Site Map







Block 3

Block 2

Block 1







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# Revegetation Studies

Bradmoor & Blacklock Restoration sites

Legend



Google Earth  
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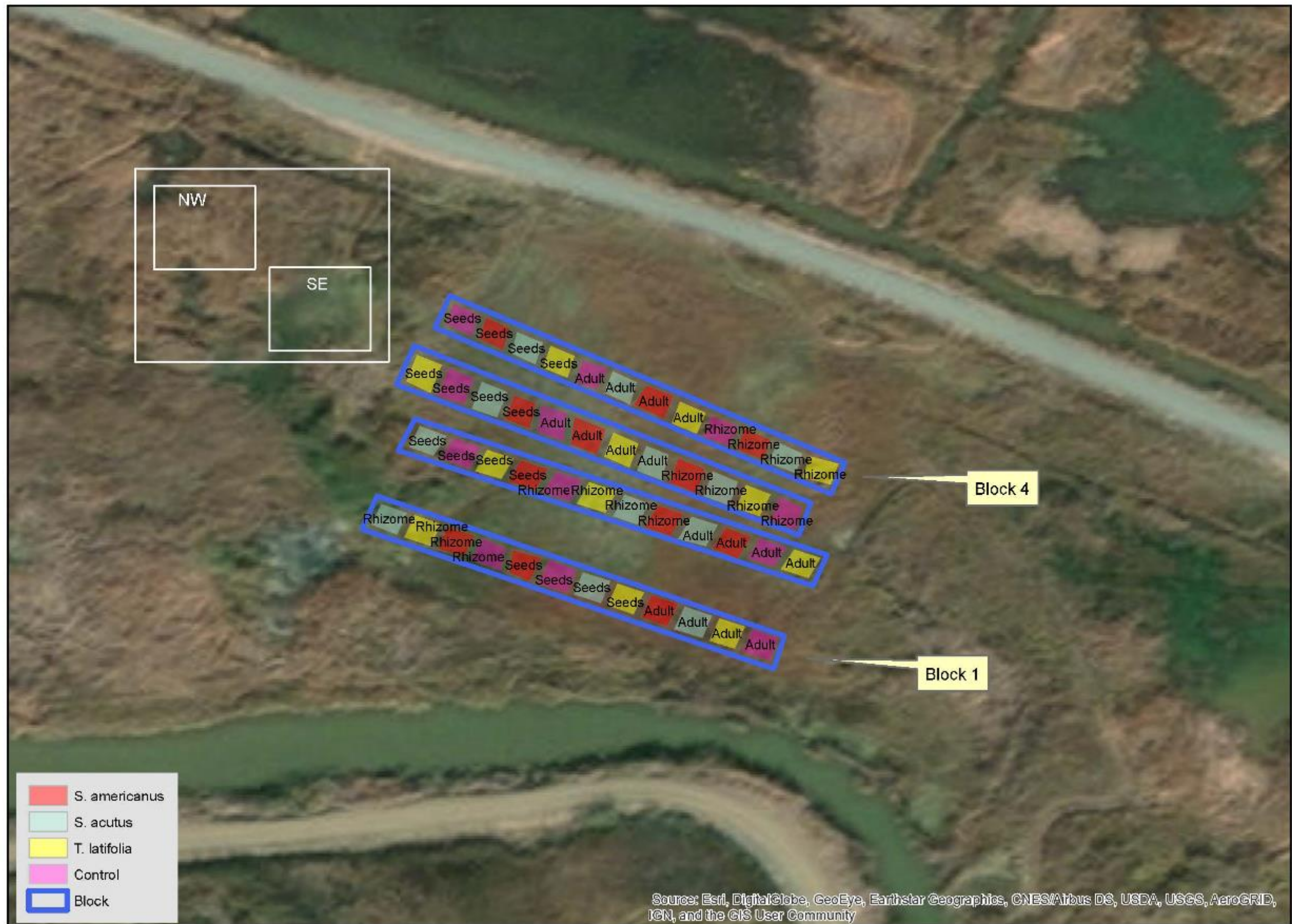
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Block 4

Block 1

- S. americanus
- S. acutus
- T. latifolia
- Control
- Block



10 5 0 10 Meters

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# Bradmoor Fun







Block 1

Block 2

Block 3

Block 4





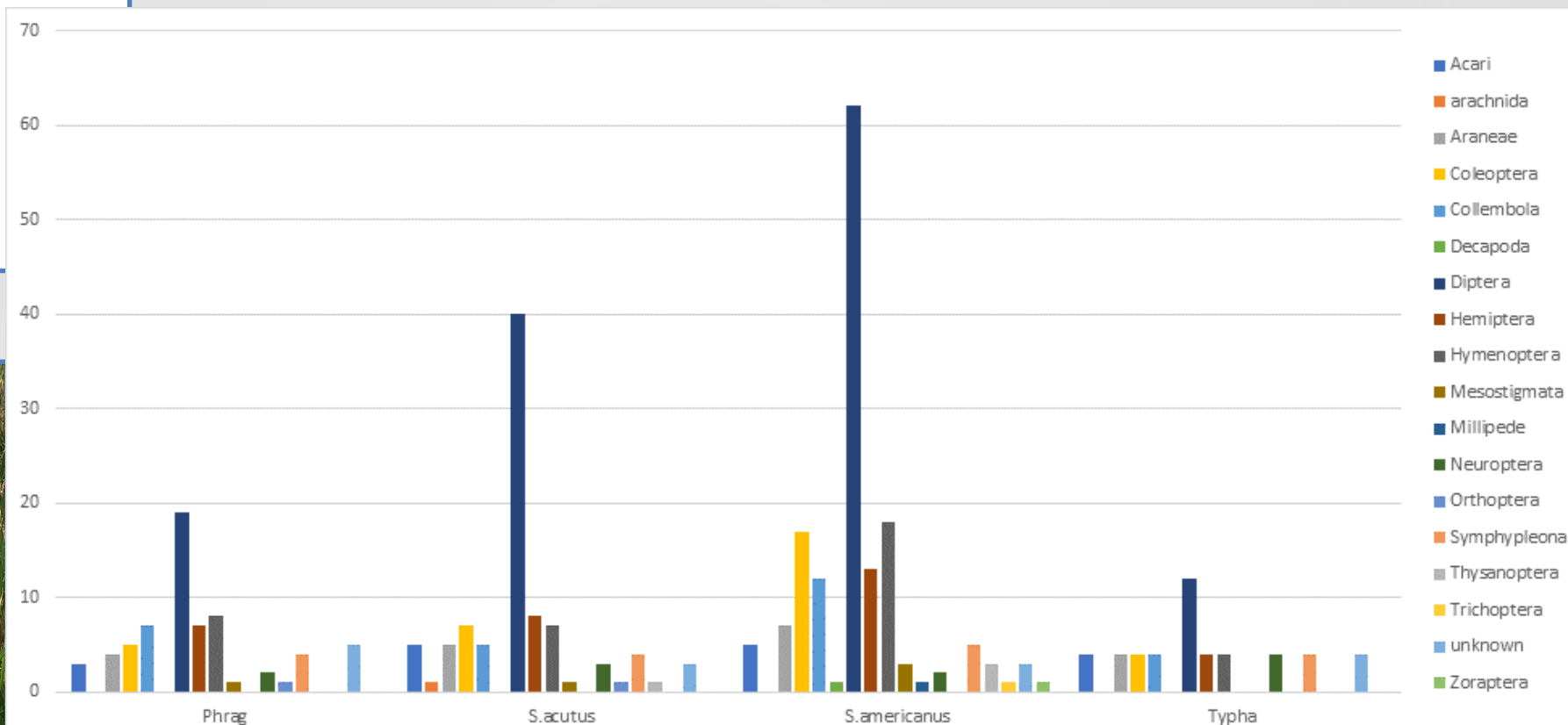




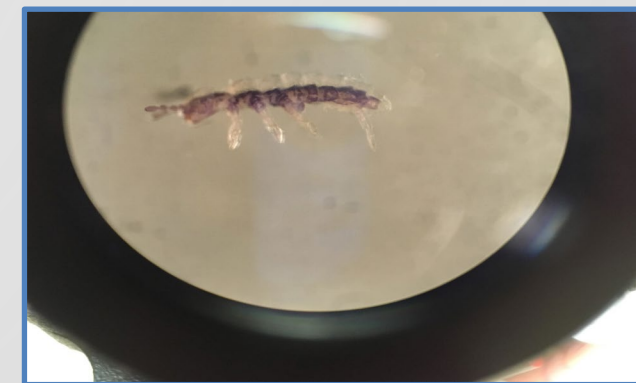
# Comparison of arthropod diversity and relative abundance in *Phragmites australis*, *Schoenoplectus acutus* and *Schoenoplectus americanus* in a managed tidal wetland (Bradmoor Island, CA).

## Sample Collection Dates

- 1/30/2019 (winter + methods testing. Typha only collected during the Winter)
- 5/9/2019 (spring)
- 8/29/2019 (Summer)
- 2020 collection dates cancelled due to COVID



Row Labels	Sum of total
Phrag	561
spring	315
summer	234
winter	12
S.acutus	898
spring	759
summer	35
winter	104
S.americanus	3330
spring	3239
summer	77
winter	14
Typha	31
winter	31
<b>Grand Total</b>	<b>4820</b>







Bradmoor

Reference North

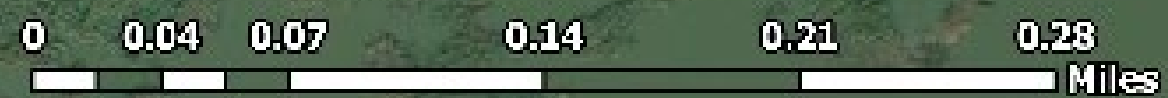
Arnold

Breach North

Breach South

Reference South

- Control
- Imazapyr
- Glyphosate/Imazapyr
- Glyphosate/Mow
- Imazapyr/Mow
- Glyphosate/Imazapyr/Mow
- Reference Sites



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JT Robinson - December 2020



# Phragmites management



Spray



Mow





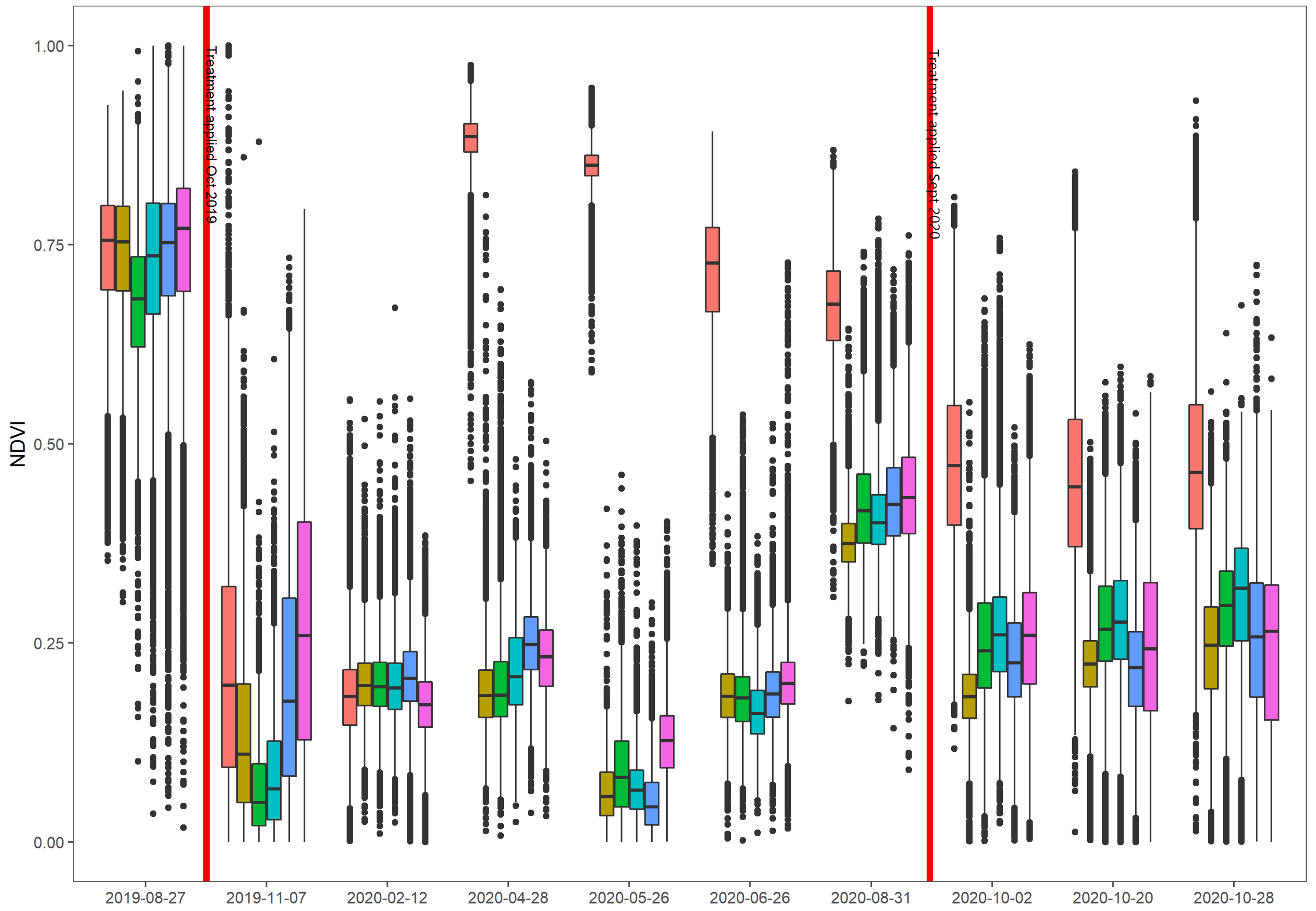
# Monitoring





Treatment

- Control
- Glyphosate/Imazapyr
- Glyphosate/Imazapyr/Mow
- Glyphosate/Mow
- Imazapyr
- Imazapyr/Mow





# Post-Herbicide Application

## Herbicide Chemical Analysis

- **Glyphosate** (Bryte Lab) = all samples contained <25 µg/L, reported as non-detects
- **Imazapyr** (WECK lab) =

Result (µg/L)	sample	Sample date
0.11	1D (control)	10/9/2019
0.45	3A (glyphosate/imazapyr)	10/9/2019
0.19	3B (glyphosate/imazapyr)	10/9/2019
0.26	6C (glyphosate/imazapyr/mow)	10/9/2019

- **Nonylphenol** (WECK lab) = Non-detect





# Conclusion

- Add pilot studies into the planning phase of restoration projects
- Next steps
  - Complete data analysis
  - Lessons learned
  - Management recommendations
  - Facilitate permitting
  - Full-scale implementation





# Thank you! Questions?

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*Upon a visit from Europe, I knew I had to stay  
There were abundant wetlands to take over and many lakes to invade  
I happened upon a nice reserve in eastern Suisun Marsh  
Where harvest mice chomped on pickle weed and conditions weren't so harsh  
It had two levee breaches that allowed me to spread my rhizomes  
And lots of open mudflat for me to build my homes  
But then these mean humans that call themselves "scientists"  
Intruded in my waters and questioned my existence  
They brought their marsh master and hit me with their pesticides  
But in some places I grew even greener to their dismay and their surprise  
I know they think they're smart, with their YSIs and drones  
But I'll show them how well I can grow back with all my supportive clones  
Time will tell, anyhow, we'll see what comes of this  
But for now I'm off to sleep, it's time for my senesce*

*-Anonymous*