

Immersed in Veg: Using High Resolution Drone Imagery To Understand the Effect of Vegetation on Fish Monitoring in The Yolo Bypass



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Interagency
Ecological Program

COOPERATIVE ECOLOGICAL
INVESTIGATIONS SINCE 1970

GEOSPATIAL TECHNOLOGIES – DISE UAV PROGRAM



Big Notch Project:
Construction
Monitoring



Fish Passage Investigation



Ribbonweed Investigation and
Monitoring

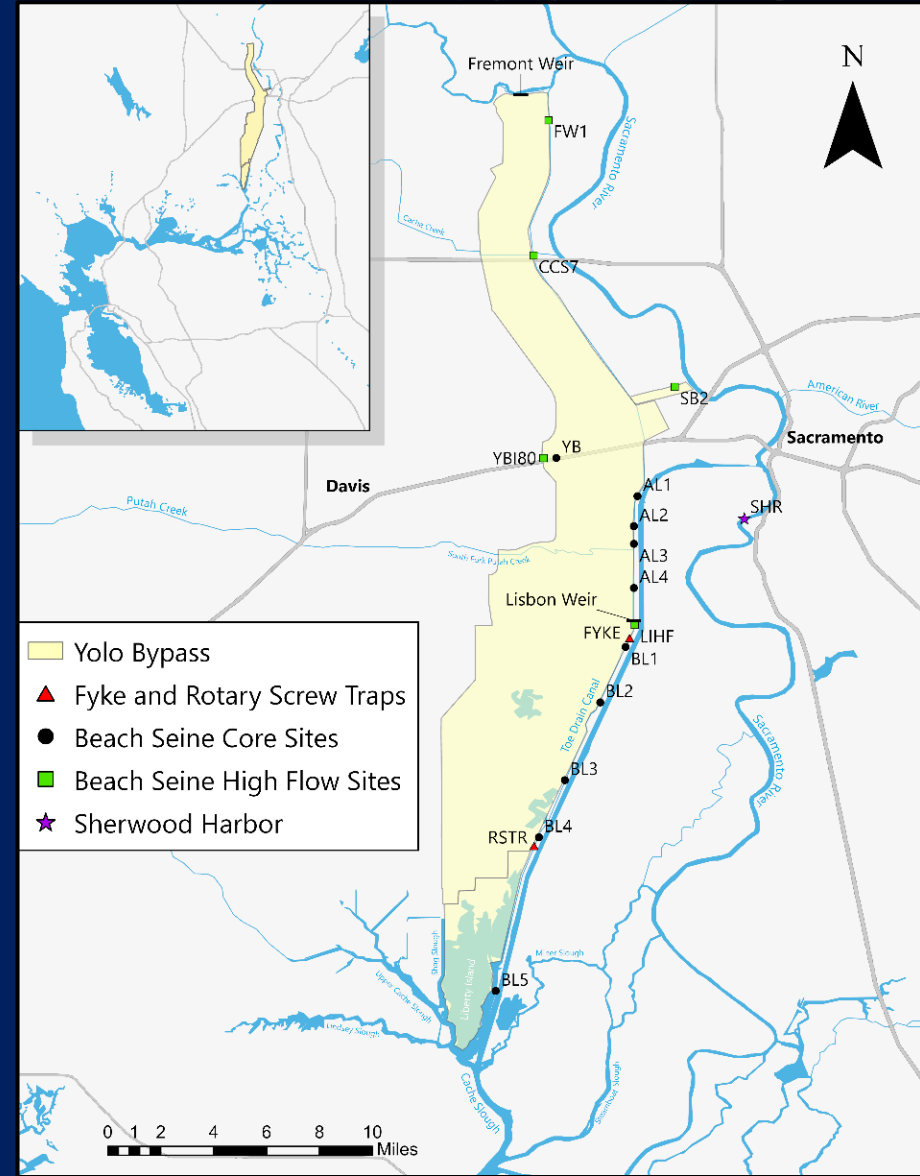


Blacklock Restoration: Phragmites Control
Study

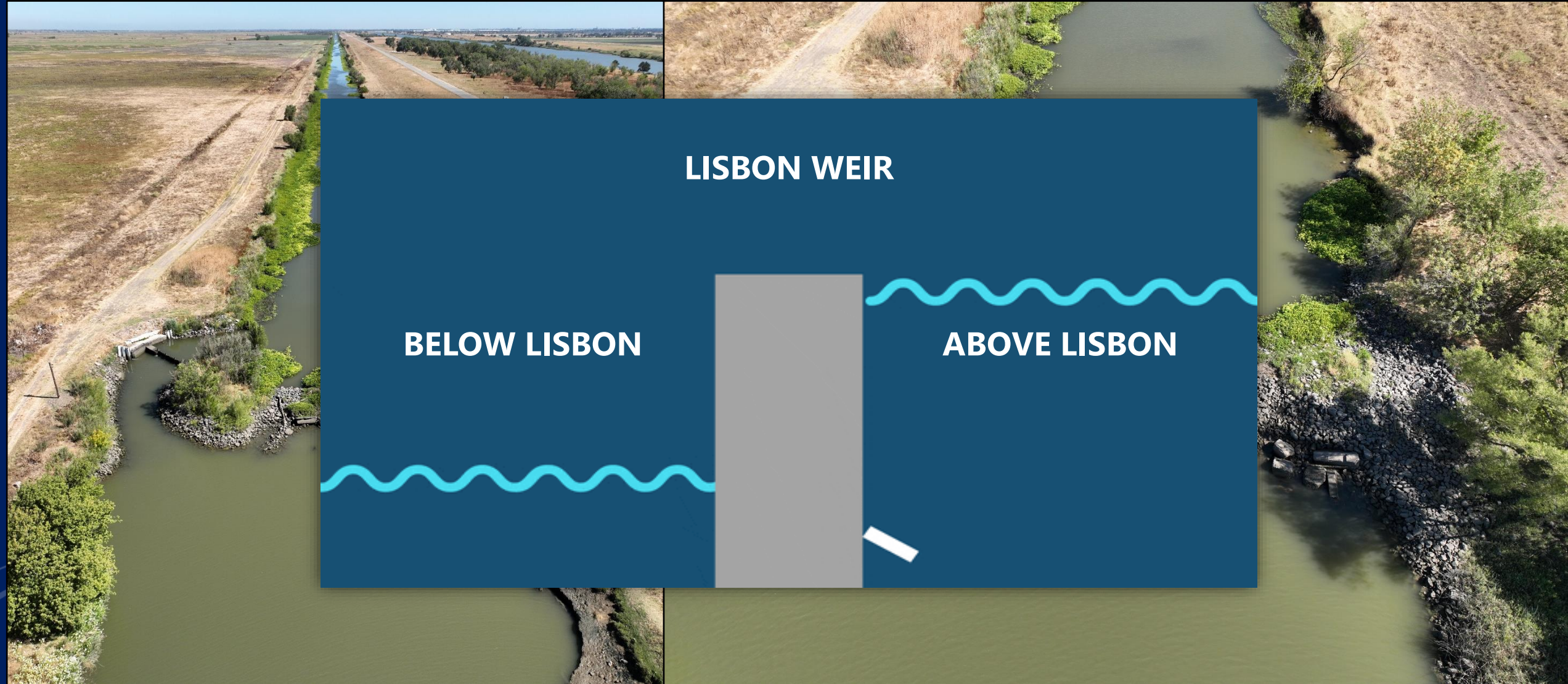


Salmon Redd Monitoring
and Mapping

YOLO BYPASS FISH MONITORING PROGRAM (YBFMP) – BACKGROUND



LET'S TALK ABOUT LISBON WEIR



LISBON WEIR

BELOW LISBON

ABOVE LISBON

YBFMP MONITORING AND VEGETATION



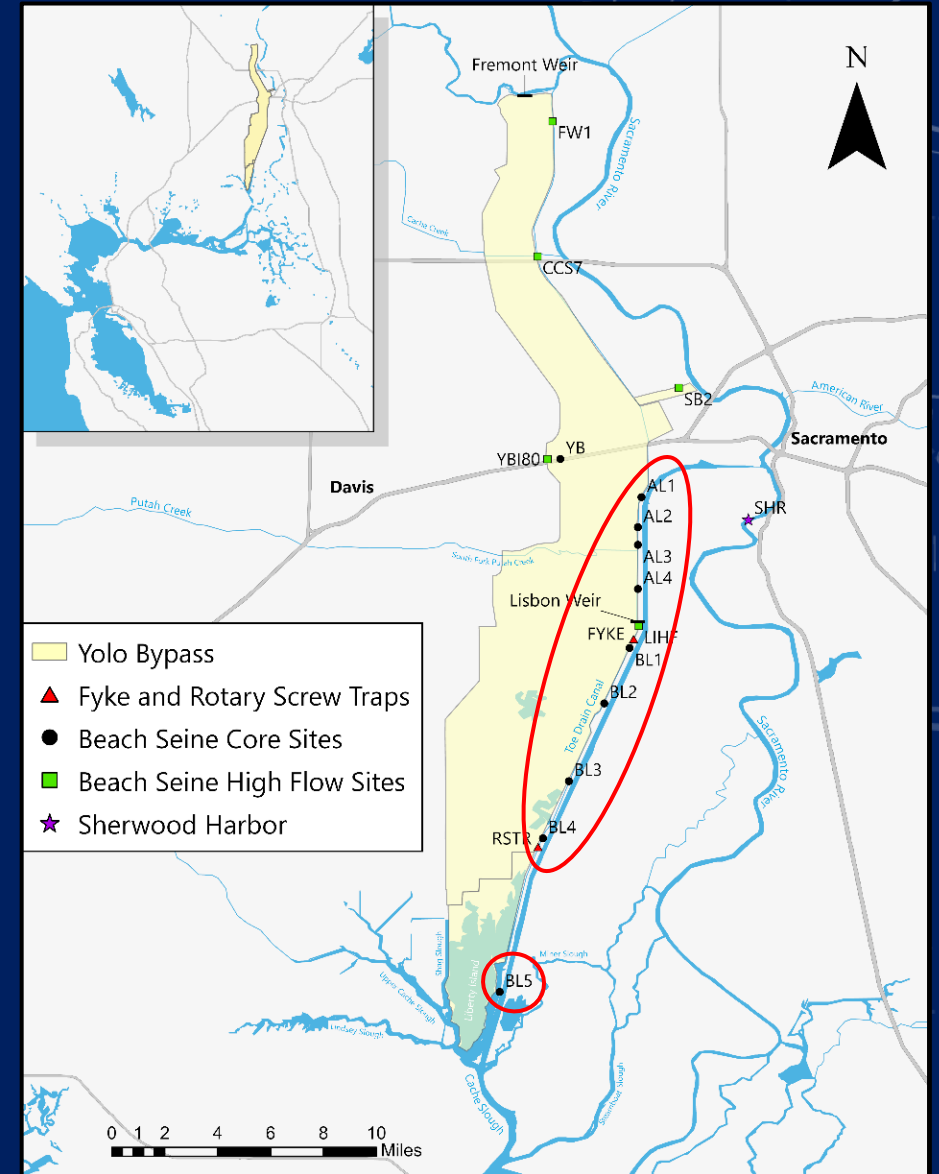
Ludwigia peploides or Water Primrose

Photo: John Madsen

YBFMP VEGETATION MONITORING – PILOT PROJECT

Project Goals:

- Collect monthly imagery
- Build orthomosaics and analyze vegetation growth
- Impact of vegetation
- Understand the resource cost



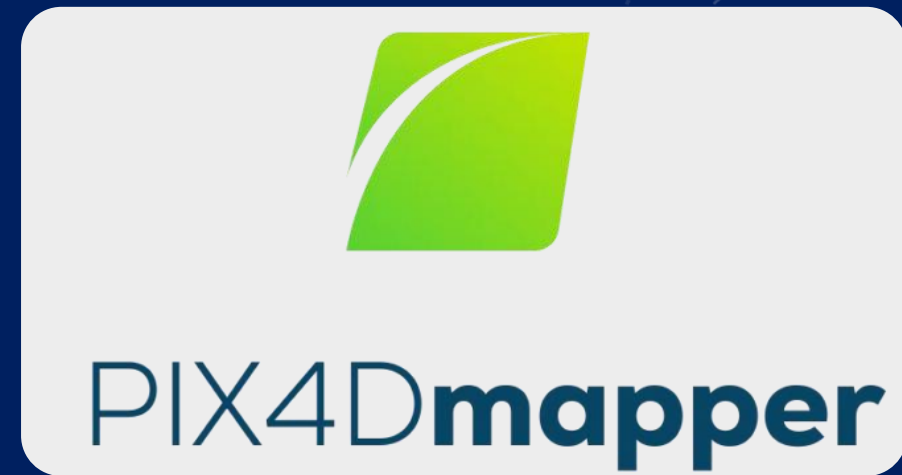
YBFMP PILOT VEG MONITORING RESEARCH QUESTIONS

1. Can UAV imagery provide a way to estimate surface area of vegetation in the Toe Drain over time?
2. How does vegetation affect YBFMP core monitoring stations?
3. Does vegetation surface area impact fish community structure at monitoring stations in the Toe Drain?



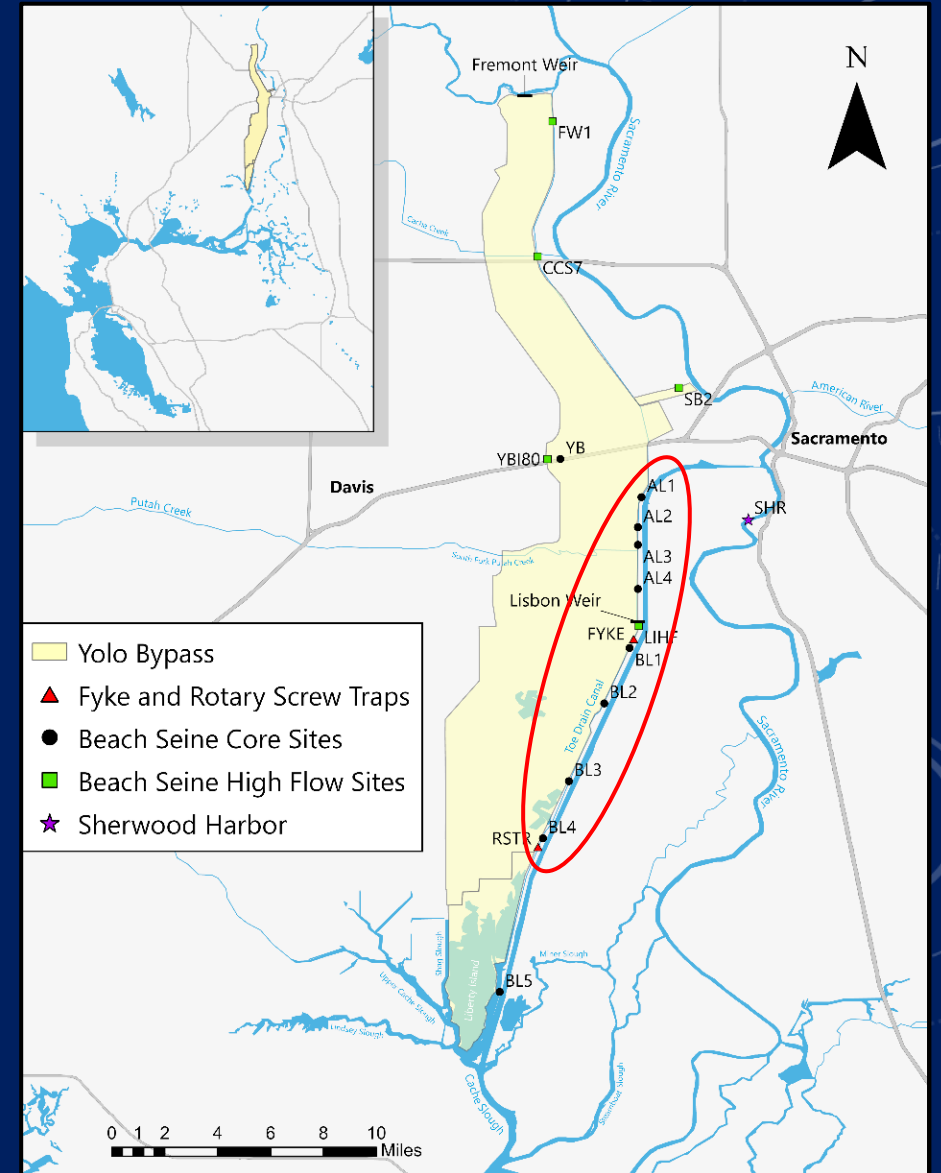
MISSION PLAN MONITORING METHODS

- Hi-resolution imagery
 - Ground Sampling Distance (GSD) – 3cm/pixel and 2cm/pixel
- 12 submissions – 23km of continuous imagery
- Post processing using Pix4Dmapper software



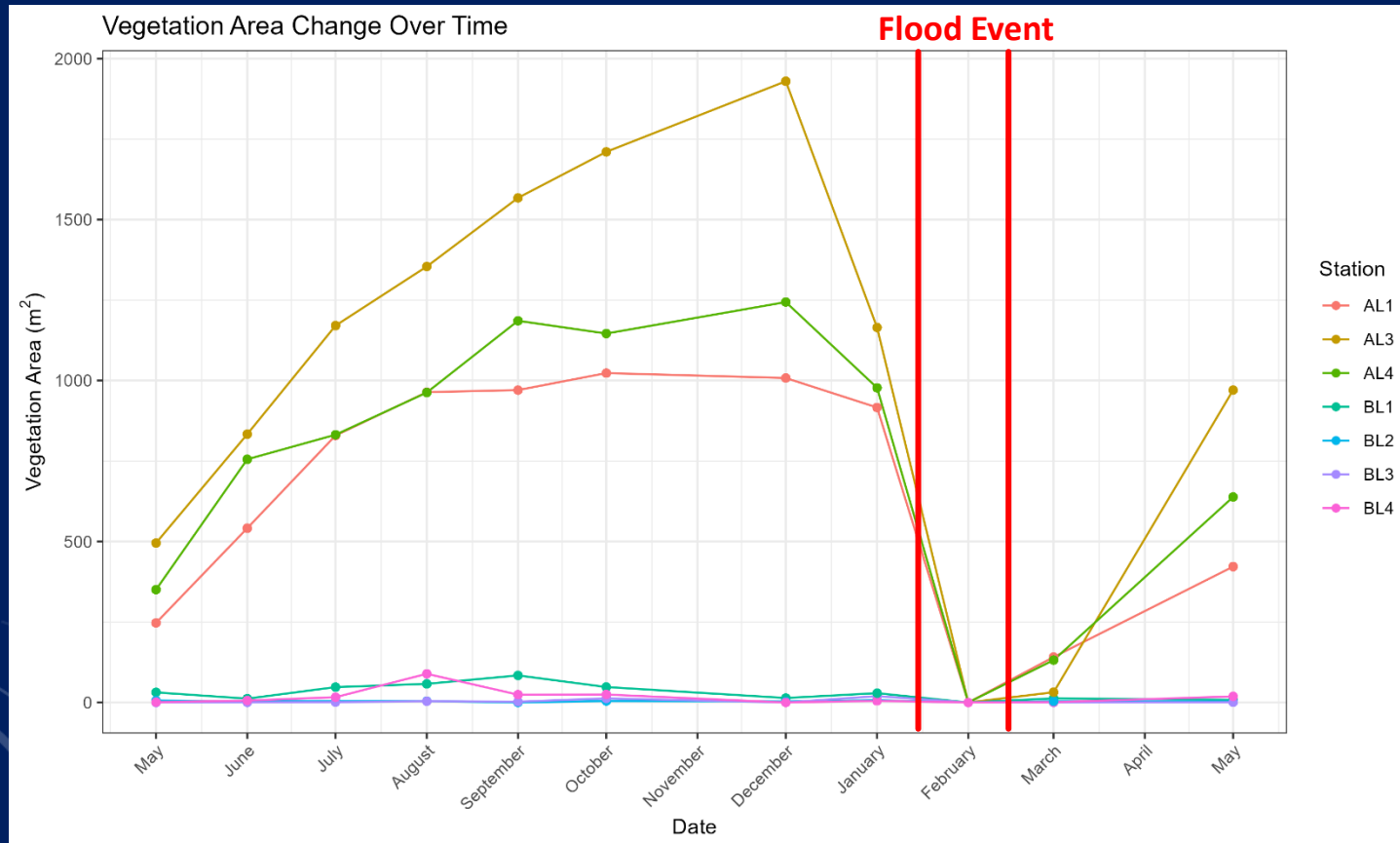
DATA PROCESSING

- Create orthomosaic and add mid-point
- Create a 50m buffer around mid-point
- Draw polygons around vegetation
- Calculate vegetation surface area for each monitoring station



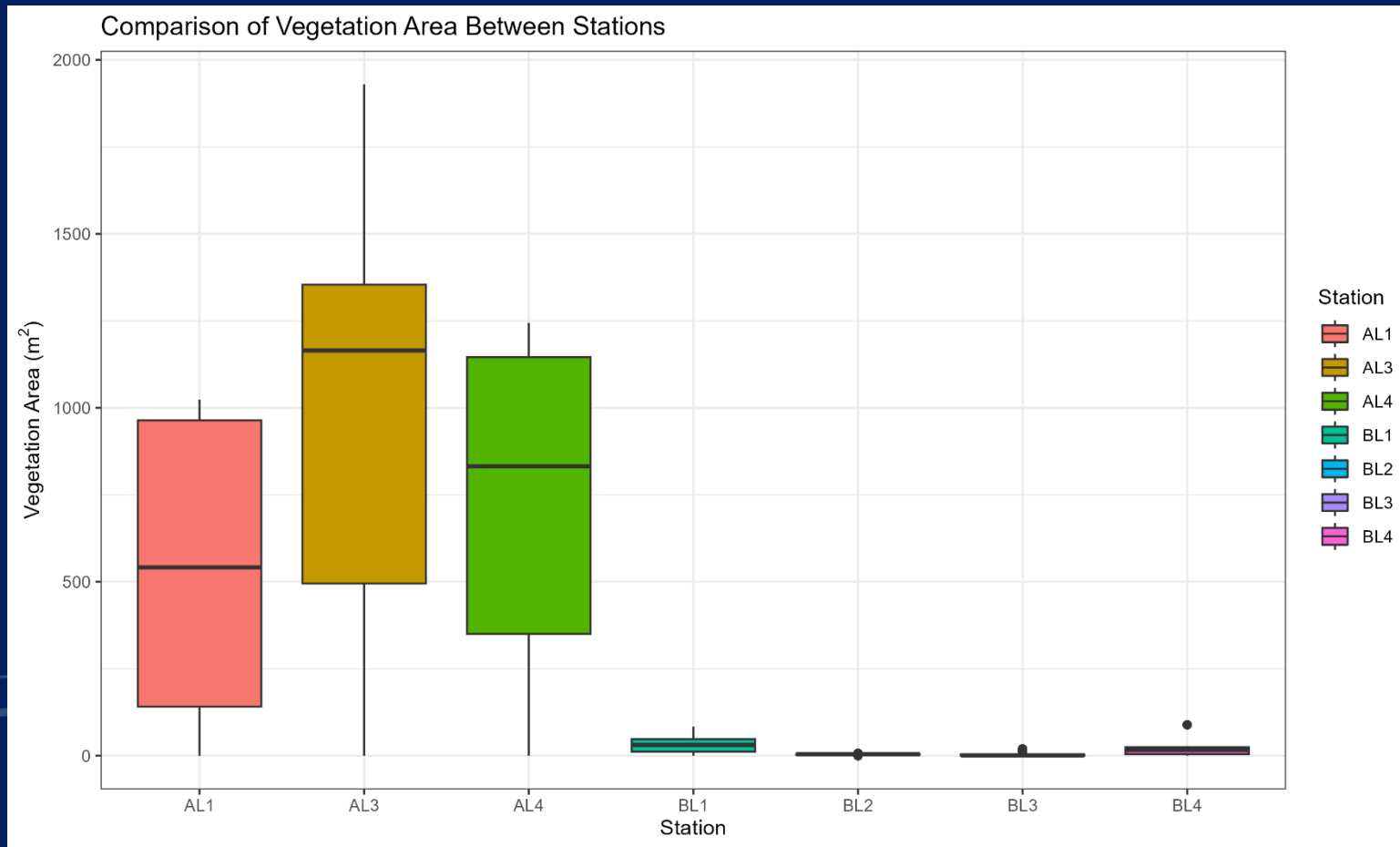
RESEARCH QUESTION #1

- Can UAV imagery provide a way to estimate surface area of vegetation in the Toe Drain over time?



RESEARCH QUESTION #2

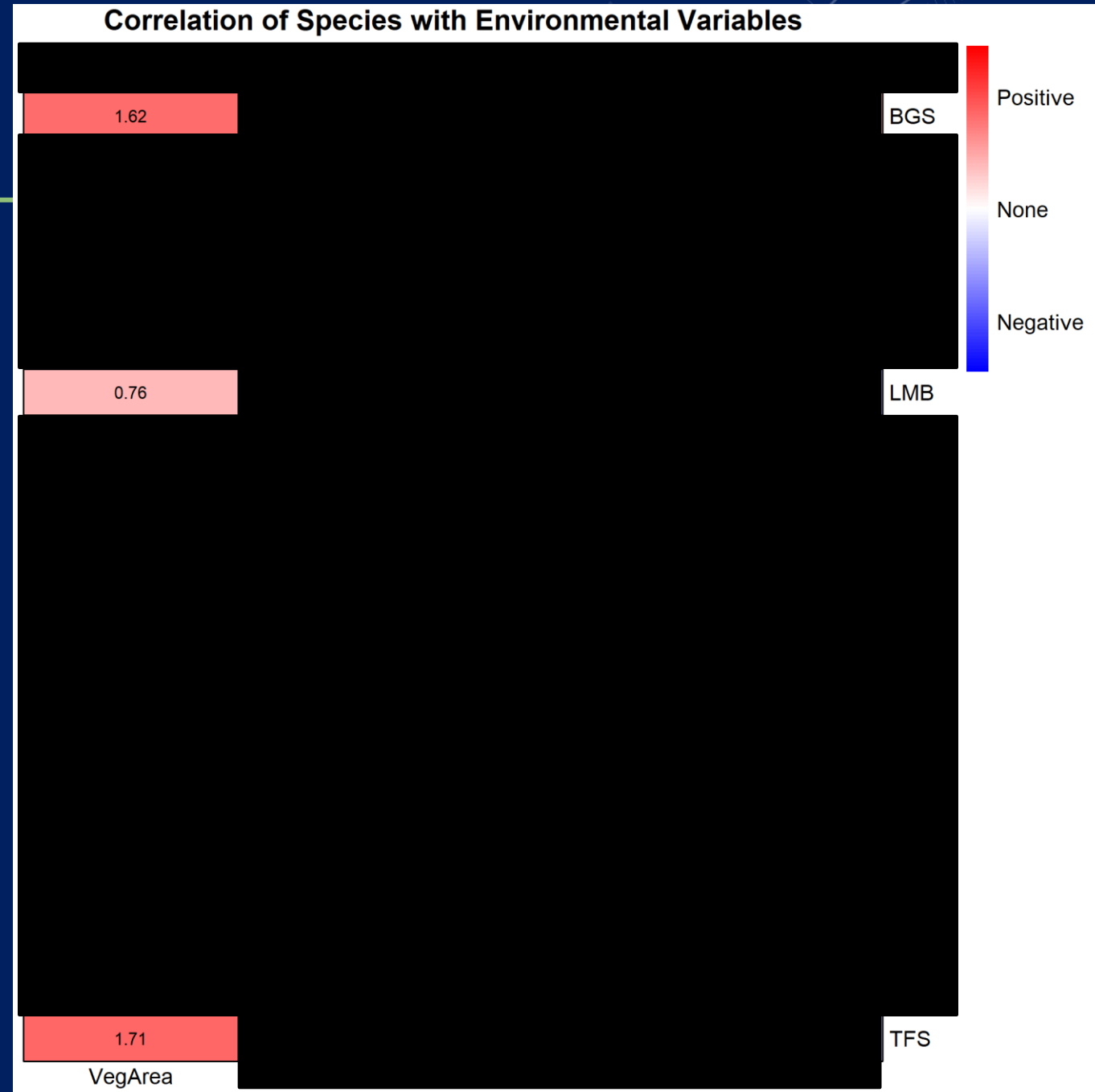
- How does vegetation affect YBFMP core monitoring stations?



Station	Seine Length Median
AL1	24m
AL3	28m
AL4	30m
BL1	30m
BL2	30m
BL3	30m
BL4	30m

RESEARCH QUESTION #3

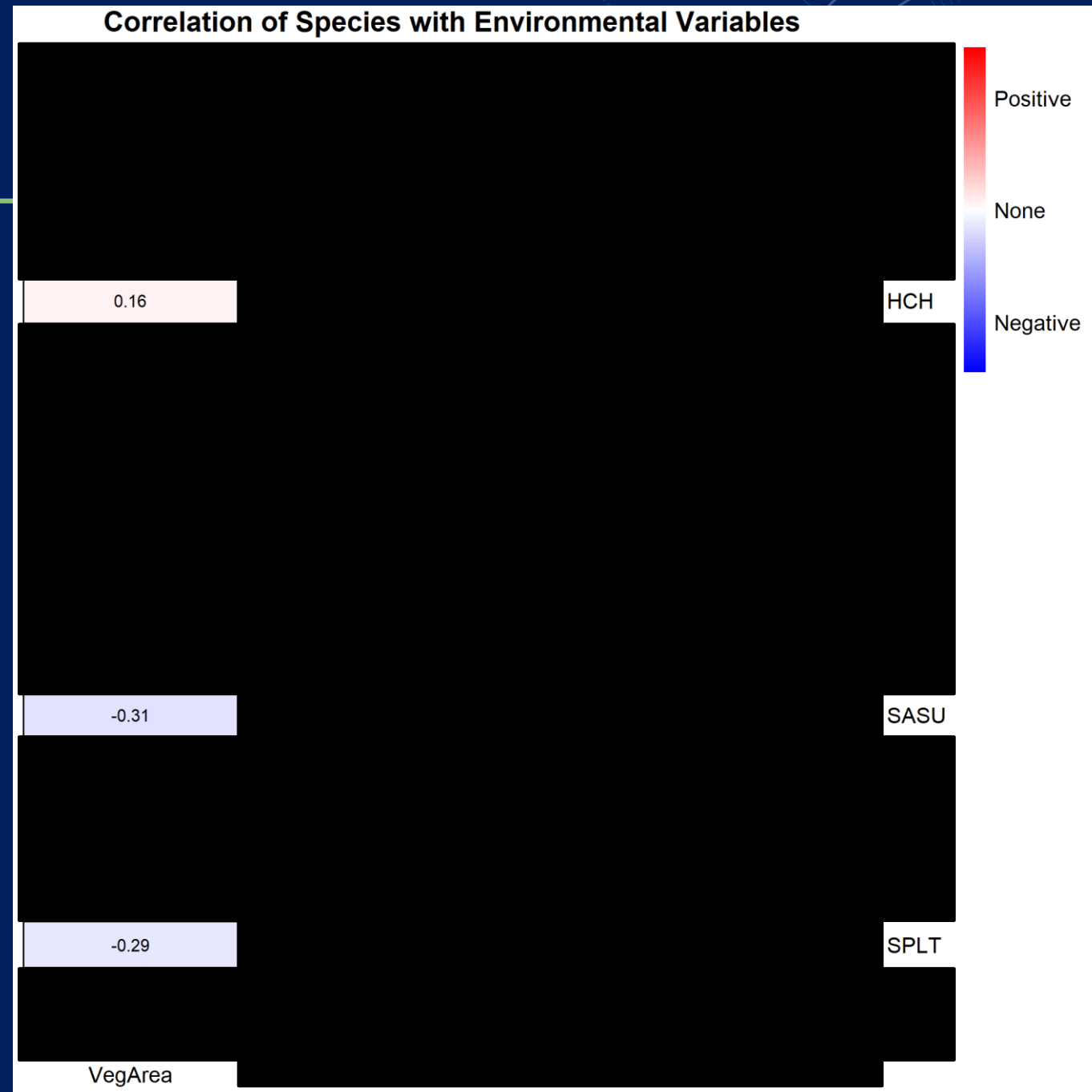
- Does vegetation surface area impact fish community structure at monitoring stations in the Toe Drain?



RESEARCH QUESTION #3

- Does vegetation surface area impact fish community structure at monitoring stations in the Toe Drain?
- Pairwise PERMANOVA was run on four variables using vegan package and adonis2 function with a Bray-Curtis dissimilarity matrix

Variable	R2	P value
WaterTemperature	0.105	0.001
Month	0.075	0.001
Turbidity	0.035	0.001
VegArea	0.719	0.001



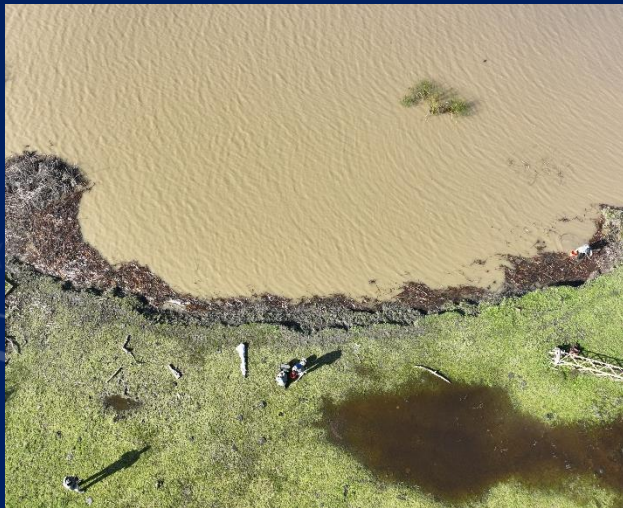
YBFMP VEGETATION MONITORING – SO WHAT?!?!?

- Drone imagery can be a useful tool to quantify vegetation in the Yolo Bypass
- Vegetation is impacting sampling sites in the Yolo Bypass especially at the Above Lisbon sites.
- More data is needed to make better informed decisions. It would be interesting to see the differences between water year types.



FUTURE DIRECTION – SO WHAT CONTINUED

- Post-processing for full toe drain mapping and analysis is extensive and time consuming
- YBFMP Vegetation Monitoring will be a sister study for the YBFMP over the next few years
- Imagery could be used as a baseline for Big Notch Project



SHOUT OUT!!!!



Thank you! Any Questions?



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