Patterns in Vegetation on Lake Kissimmee: Using Google Earth Engine to Develop a Long-term Dataset

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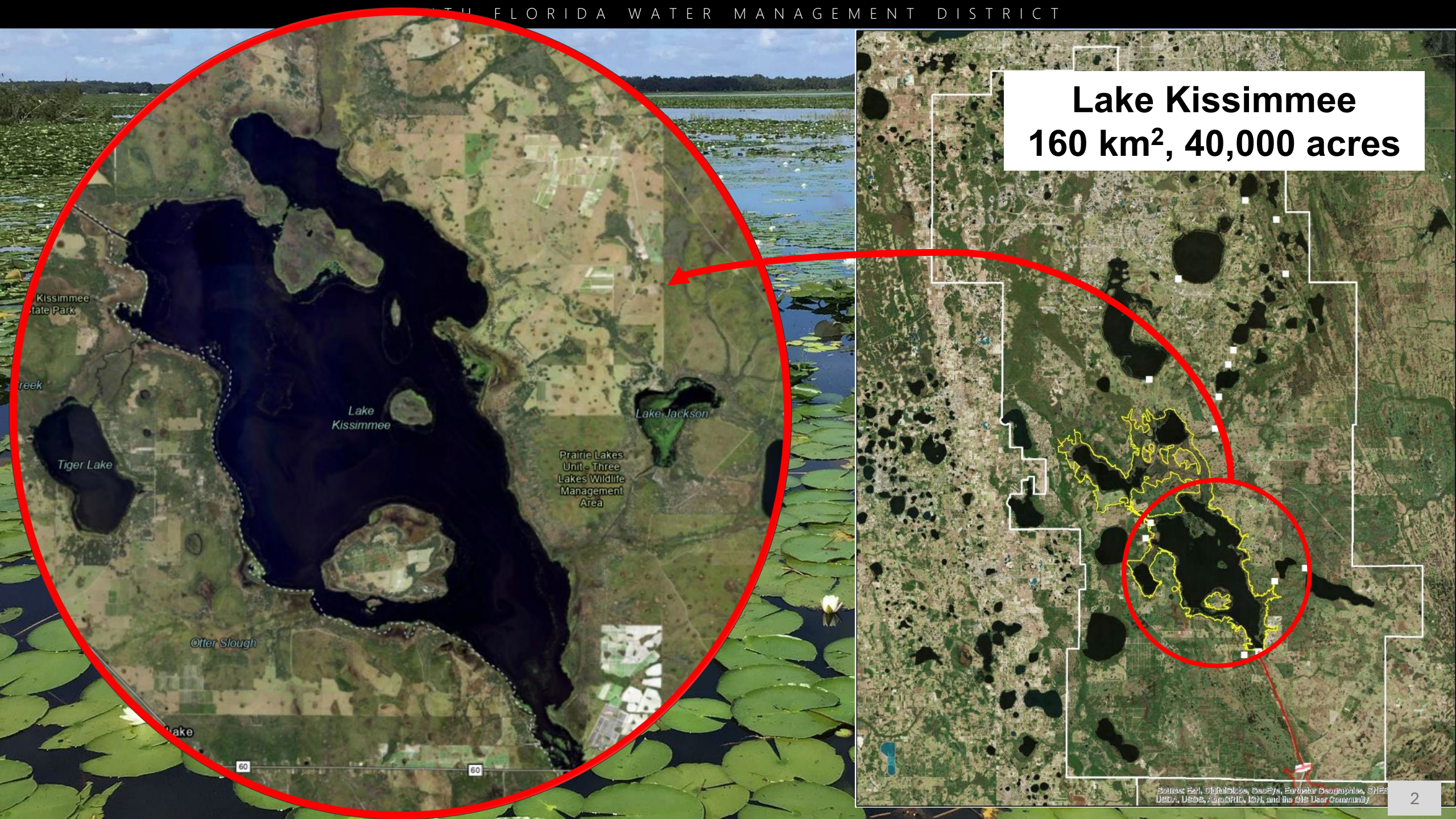
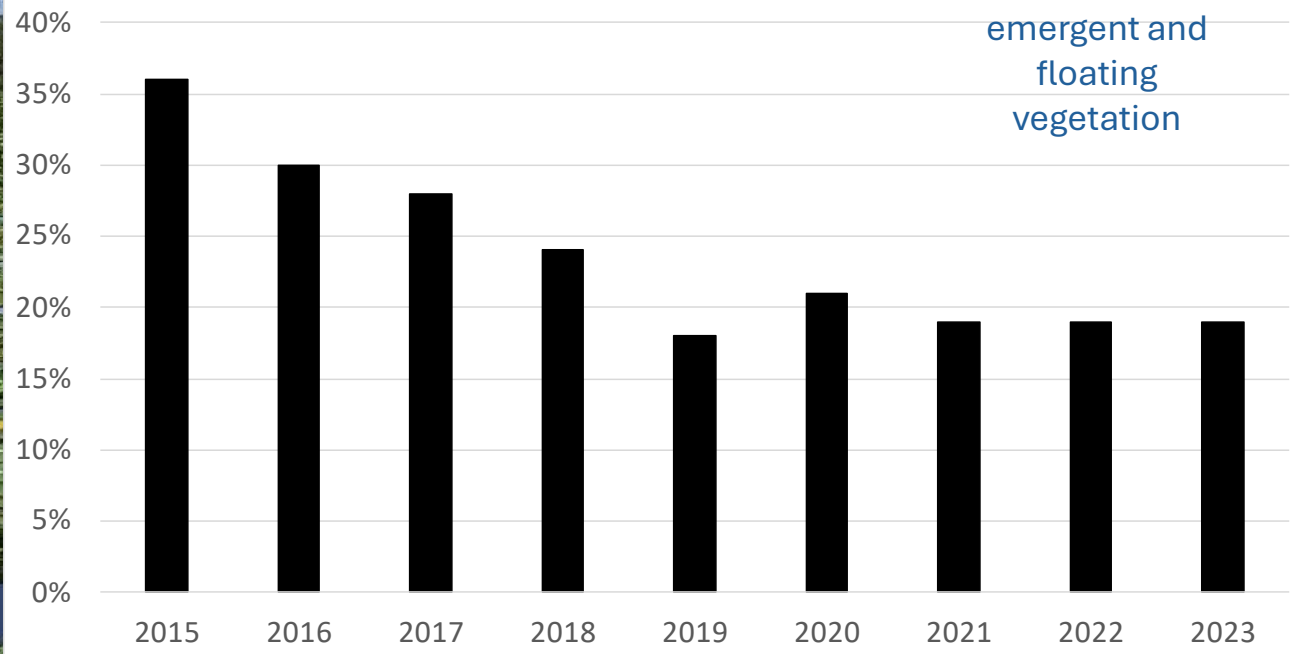
Leveraging Geospatial Technology to Support Restoration and Resilience Efforts

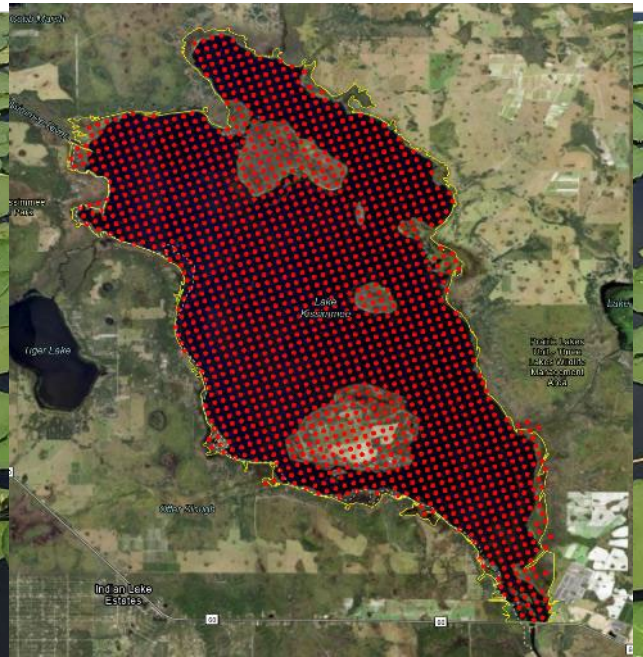


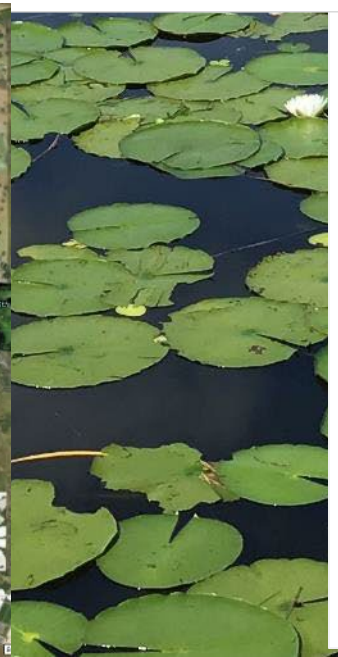
Lake Kissimmee
160 km², 40,000 acres

Percent of Aerial Cover of Submersed Vegetation on Lake Kissimmee, 2015 to 2023

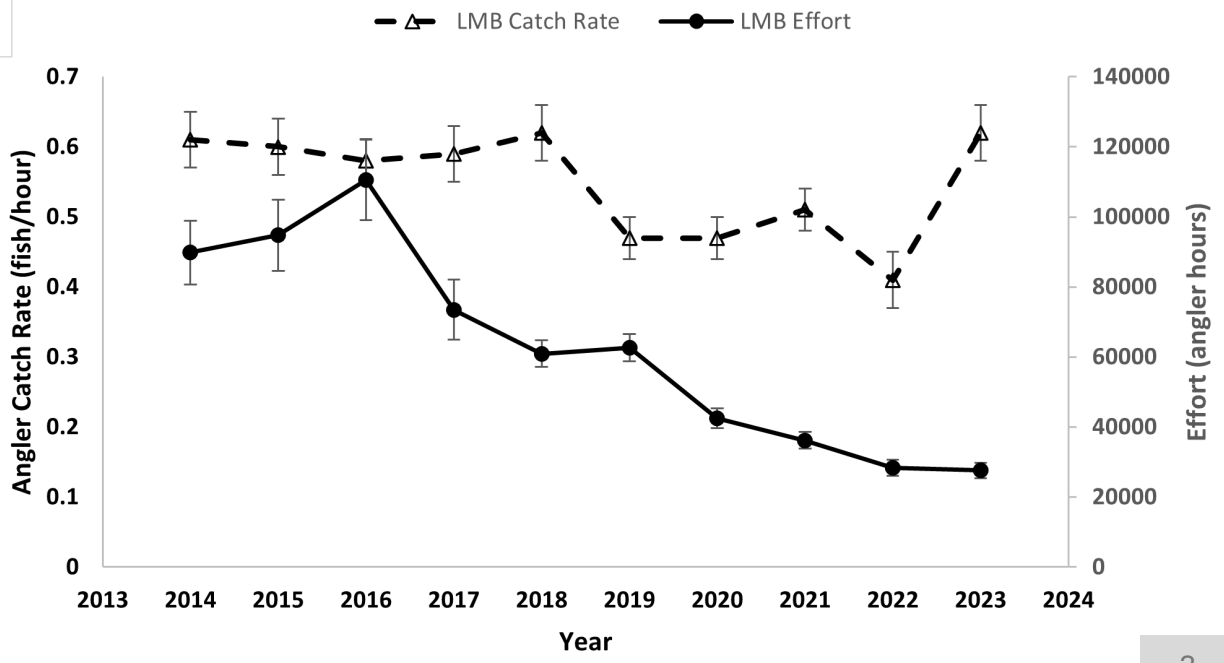
Includes SAV, emergent and floating vegetation

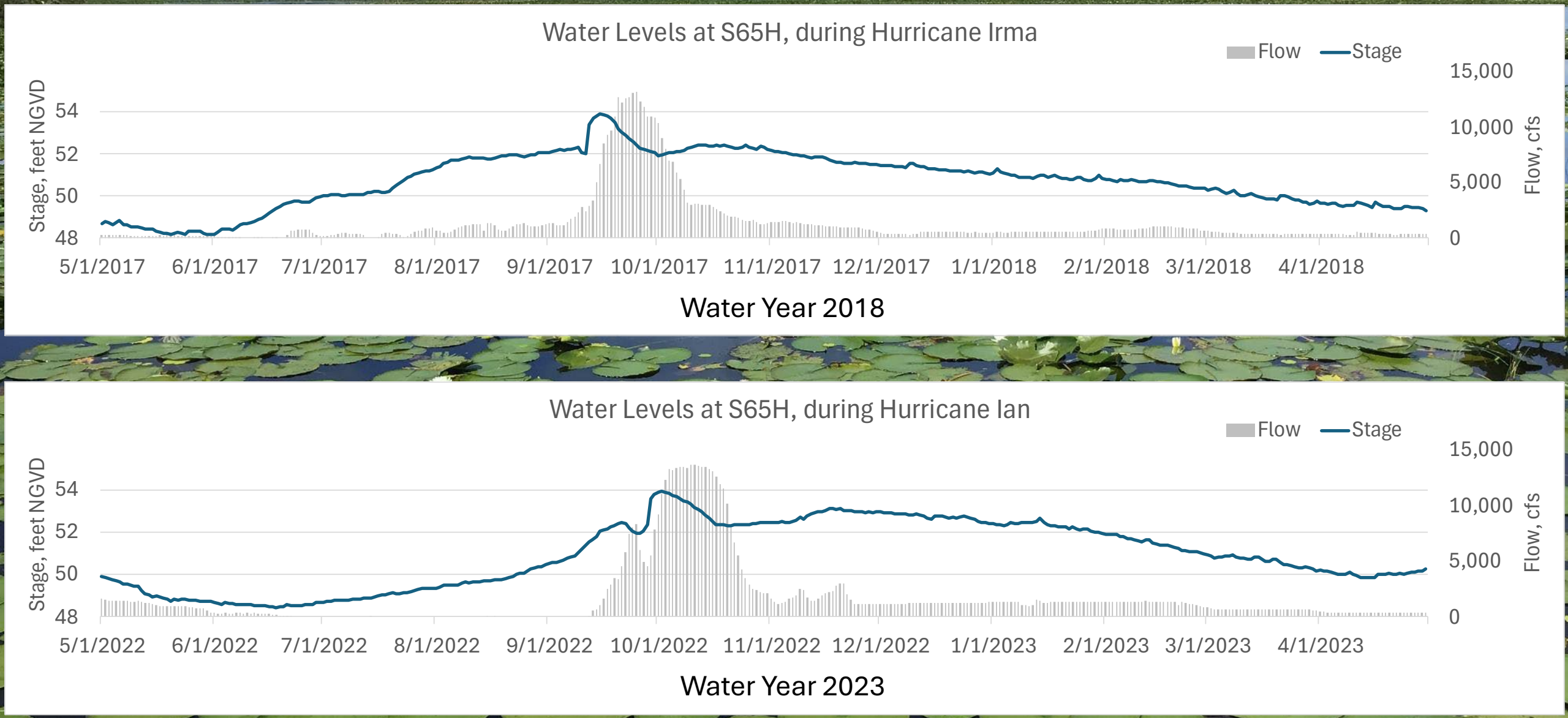




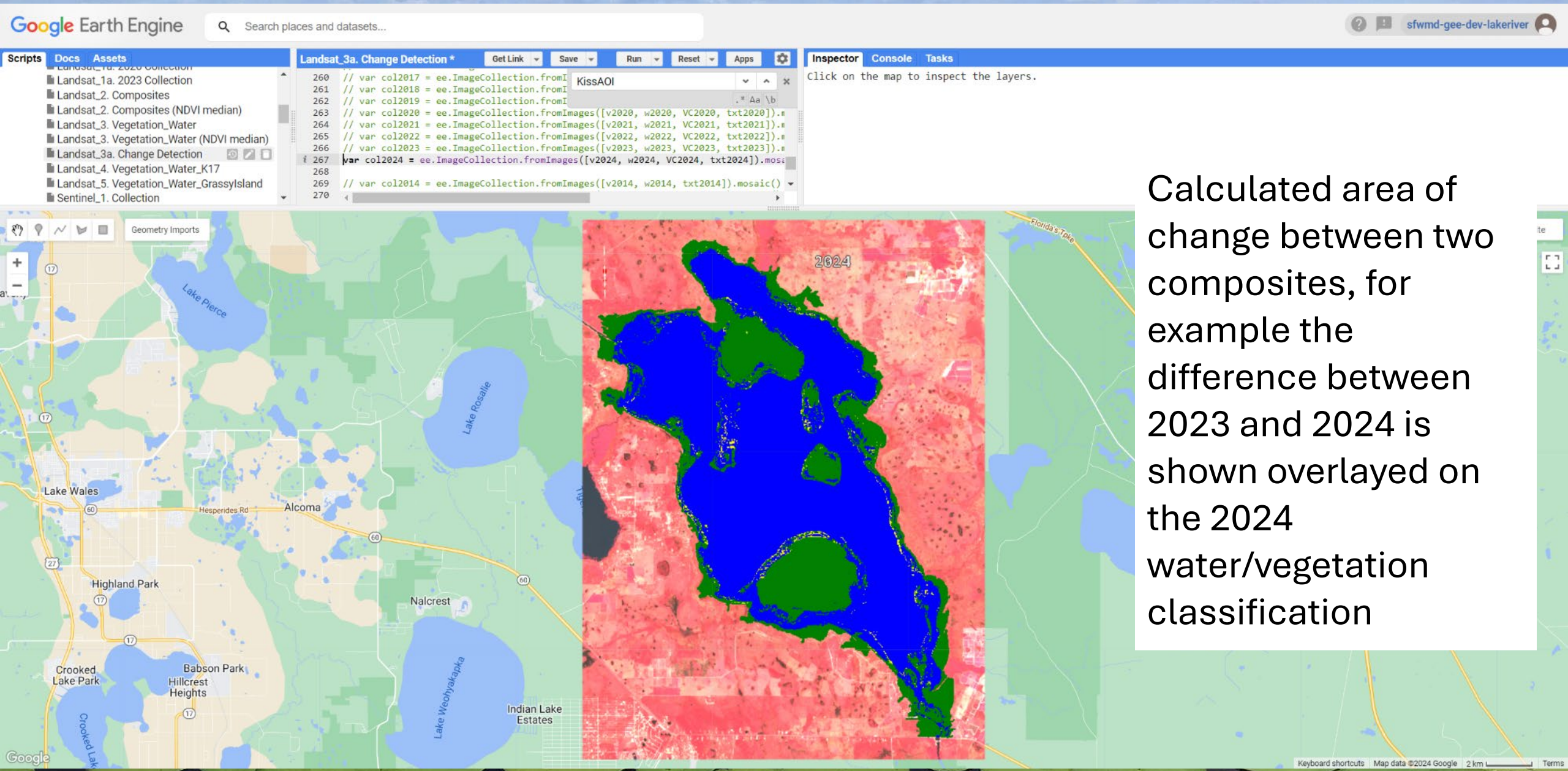


Largemouth Bass Angler Catch Rates & Effort

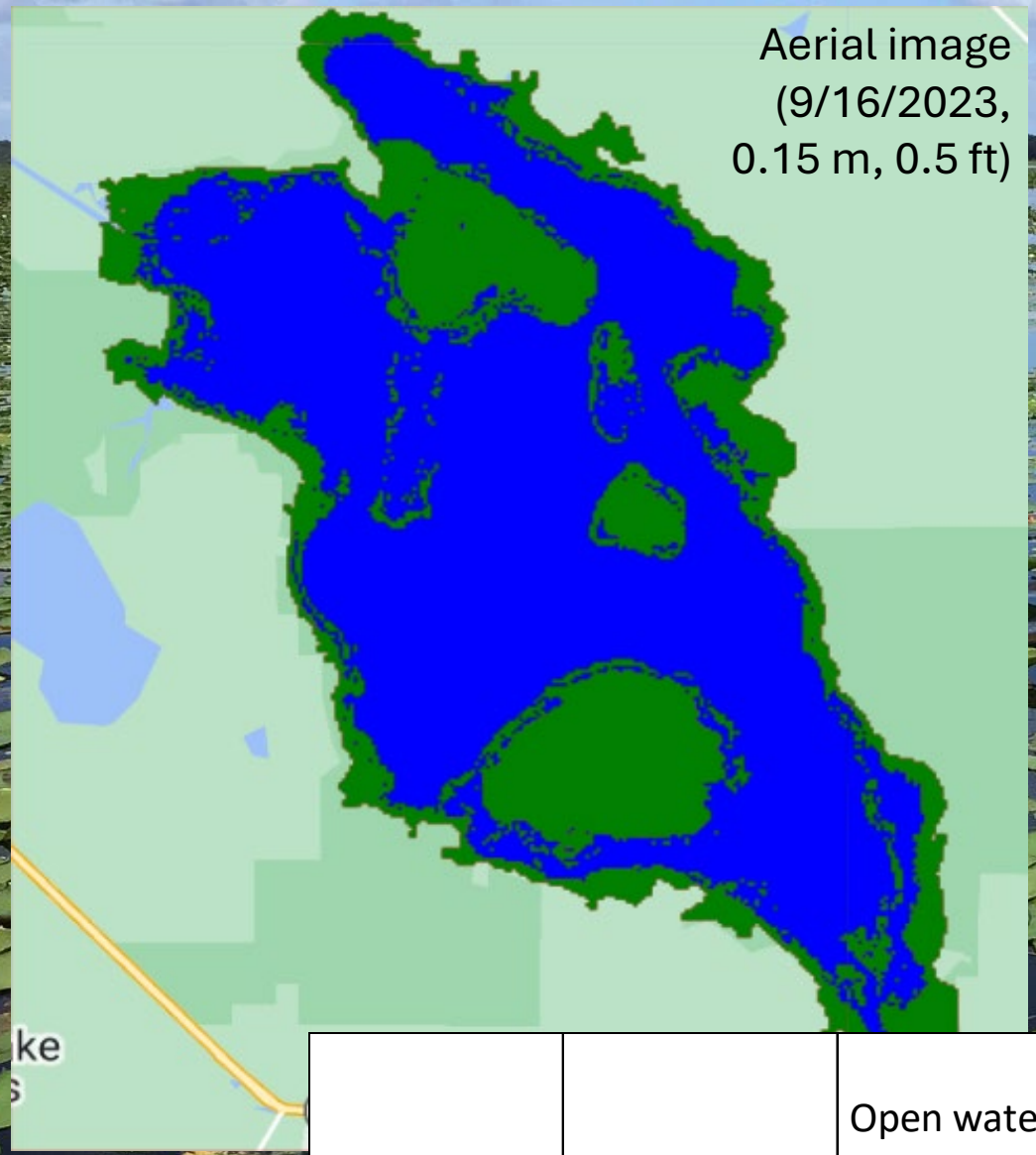


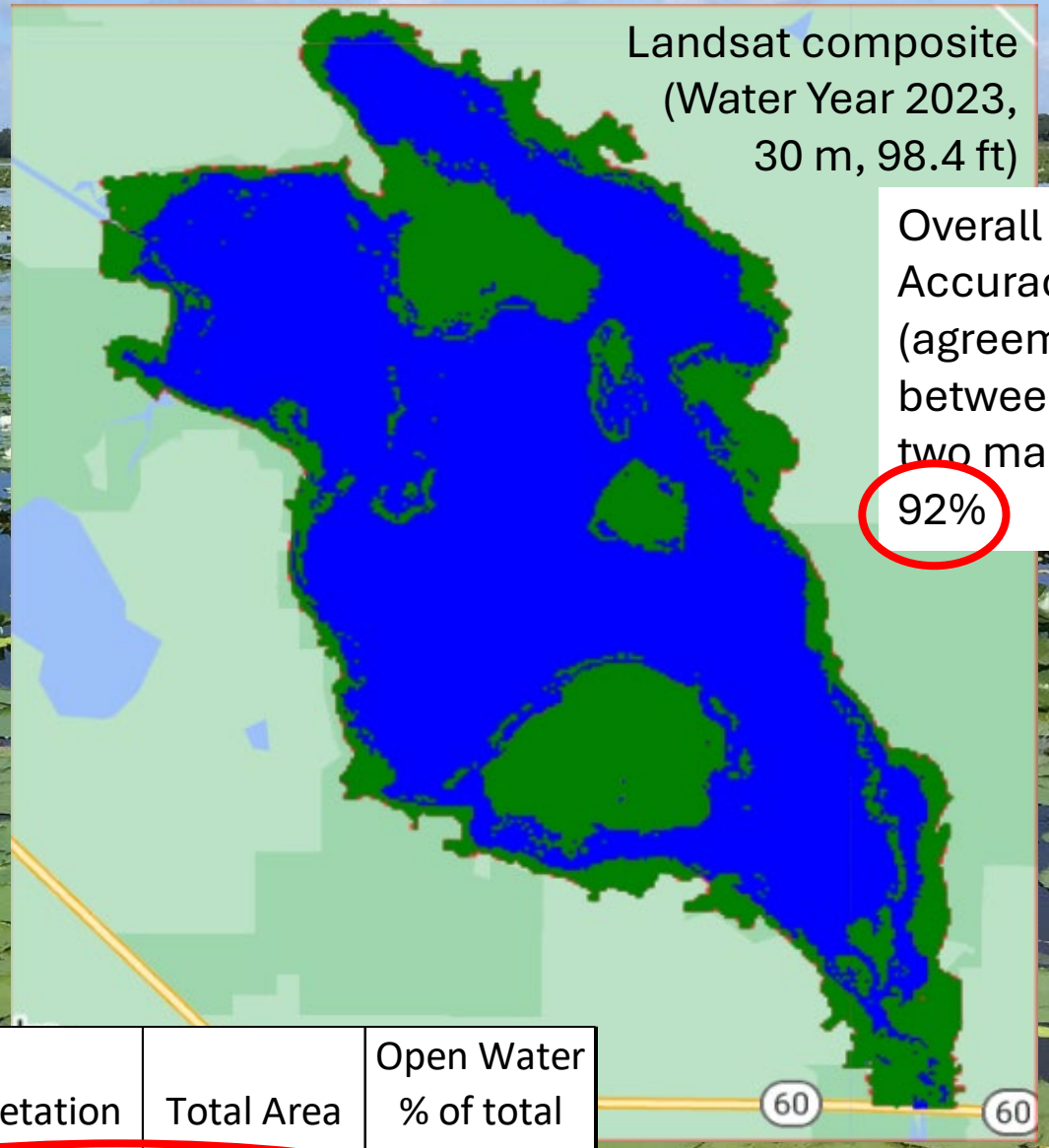

Water Levels at S65H, during Hurricane Irma
Flow
Stage
Stage, feet NGVD
54
52
50
48
15,000
10,000
5,000
0
Flow, cfs
5/1/2017
6/1/2017
7/1/2017
8/1/2017
9/1/2017
10/1/2017
11/1/2017
12/1/2017
1/1/2018
2/1/2018
3/1/2018
4/1/2018
Water Year 2018

Water Levels at S65H, during Hurricane Ian
Flow
Stage
Stage, feet NGVD
54
52
50
48
15,000
10,000
5,000
0
Flow, cfs
5/1/2022
6/1/2022
7/1/2022
8/1/2022
9/1/2022
10/1/2022
11/1/2022
12/1/2022
1/1/2023
2/1/2023
3/1/2023
4/1/2023
Water Year 2023



Calculated area of change between two composites, for example the difference between 2023 and 2024 is shown overlayed on the 2024 water/vegetation classification

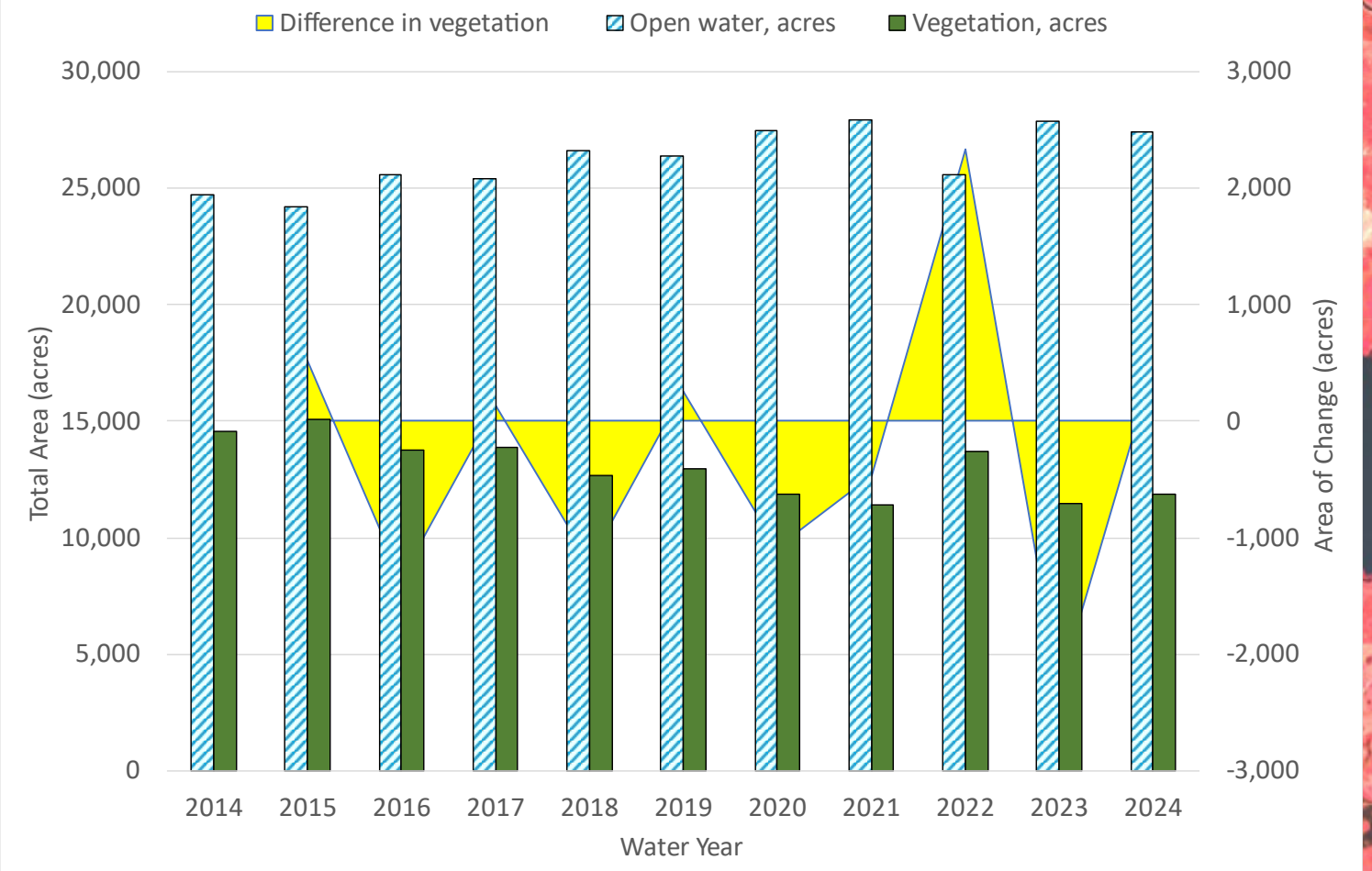




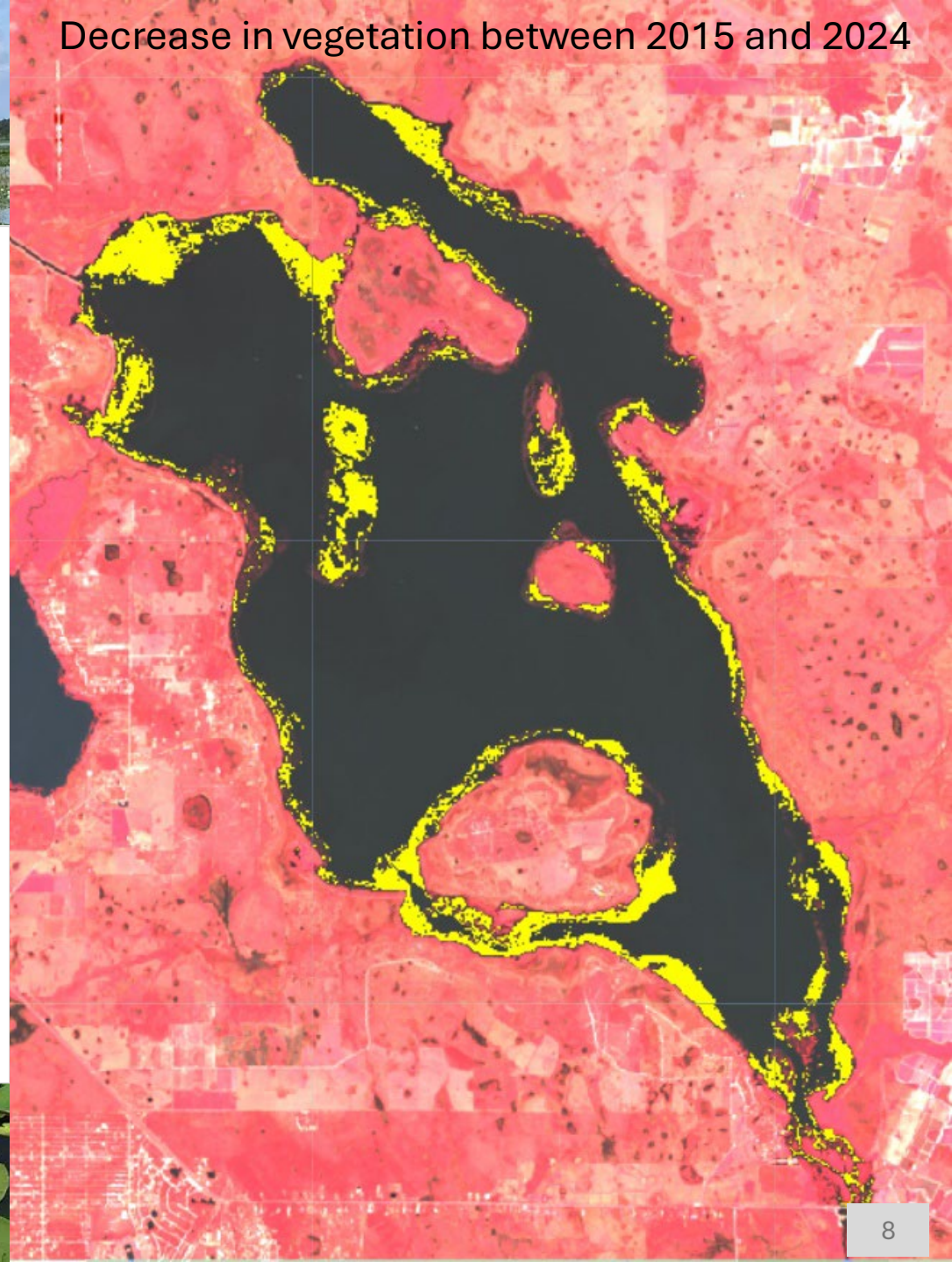
Overall Accuracy (agreement between the two maps): 92%

Image	Date	Open water acres	Vegetation acres	Total Area acres	Open Water % of total area
KCH2023	Aug-Sept 2023	27,968.03	11,485.44	39,453.47	71%
Landsat 2023 Composite	WY 2023	27,883.68	11,448.22	39,331.90	71%
	Difference	84.35	37.22	121.57	0.2%

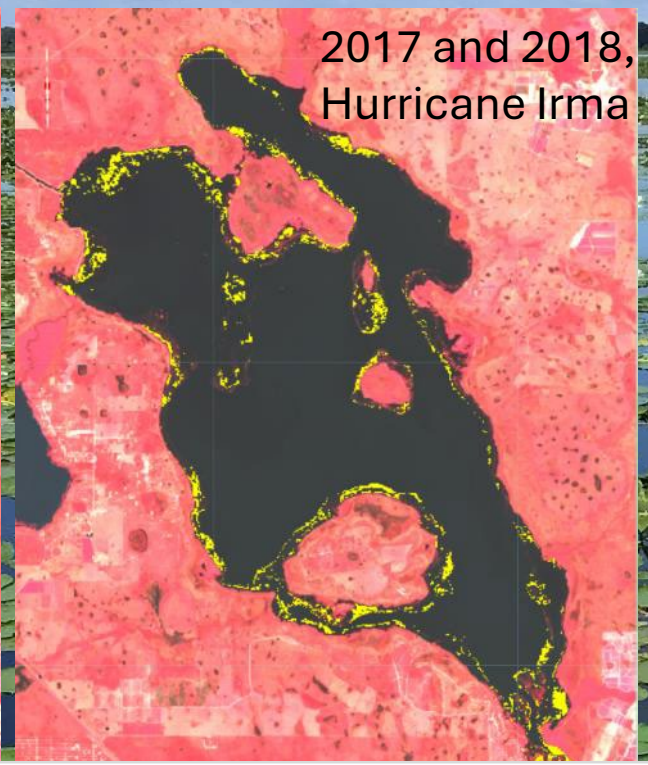
Difference in vegetation between 2015 and 2024

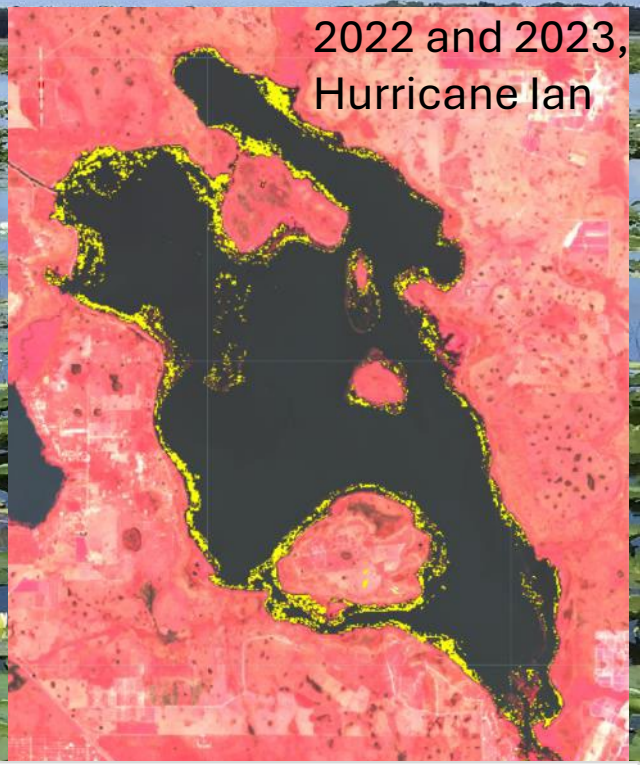


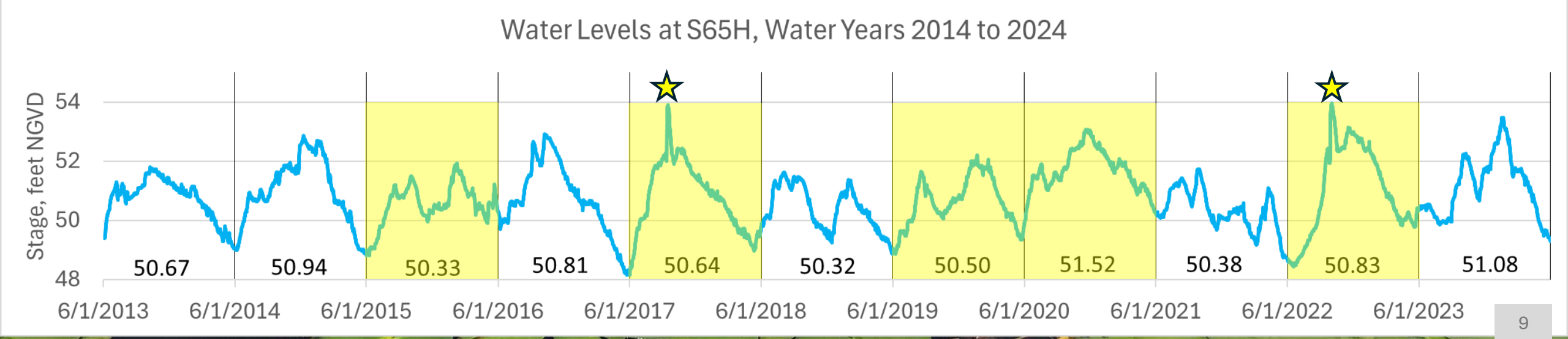
Decrease in vegetation between 2015 and 2024



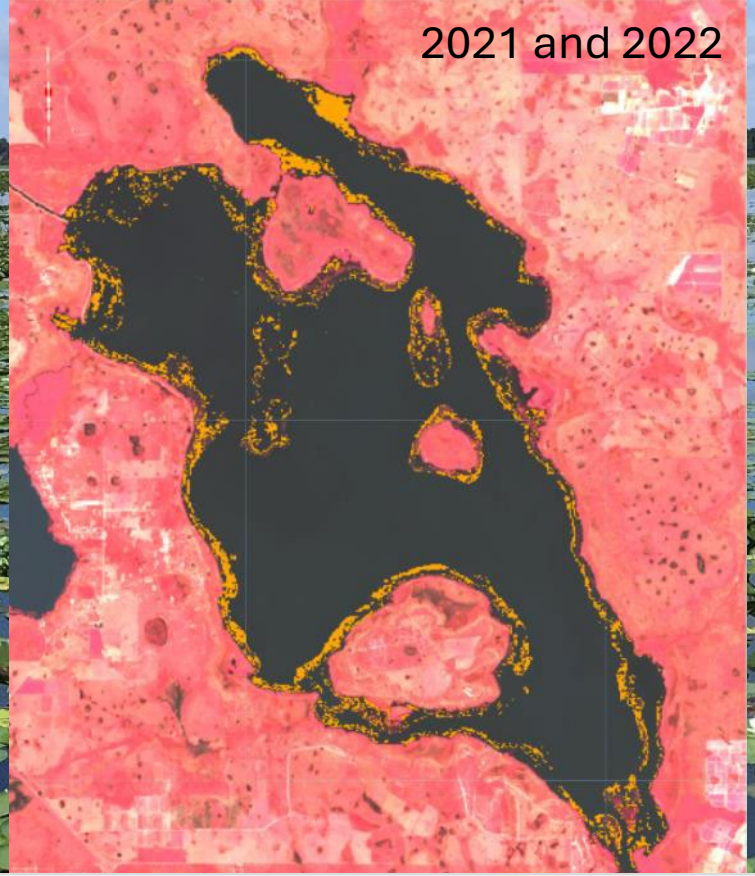
Loss in vegetation

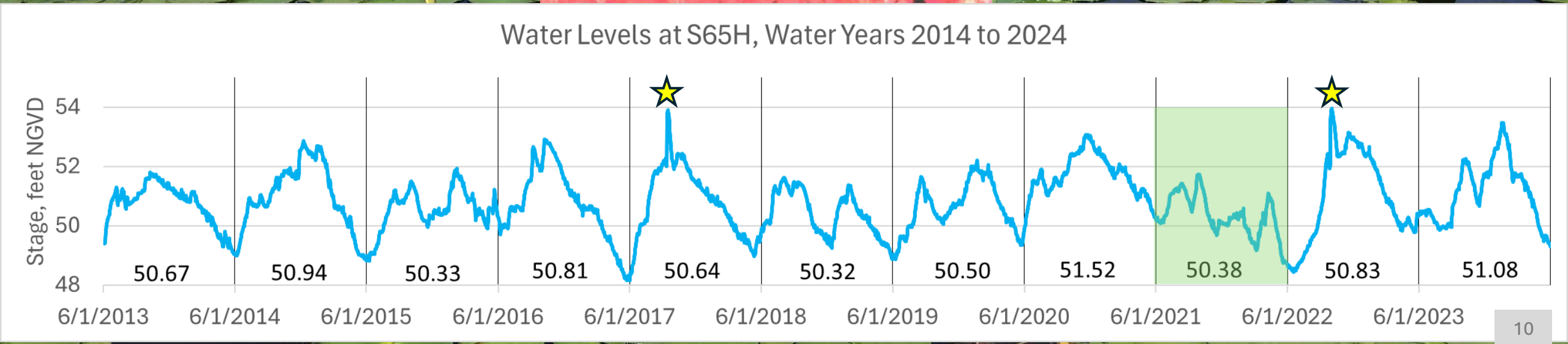




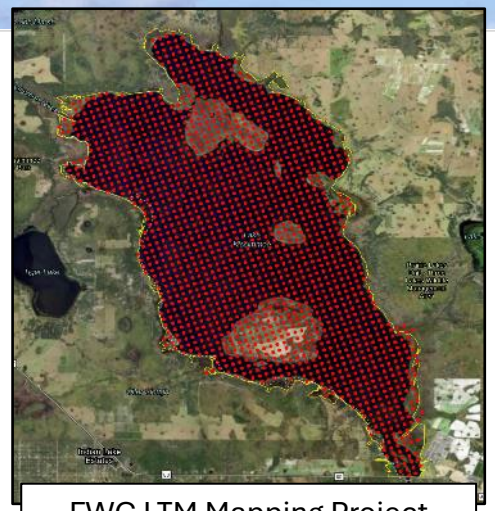


Increase in vegetation





Frequency (%) of aquatic plant species sampled by point-intercept
Data from the FWC LTM Lake Vegetation Mapping programs



FWC LTM Mapping Project

Frequency of Occurrence

35%
30%
25%
20%
15%
10%
5%
0%

Hurricane Irma

Hurricane Ian

2016* 2017* 2018* 2019* 2020* 2021* 2022* 2023* 2024*

Water Year (Calendar Year)

Paspalidium geminatum

Panicum hemitomon

Nuphar advena

Nymphaea odorata

Ceratophyllum demersum

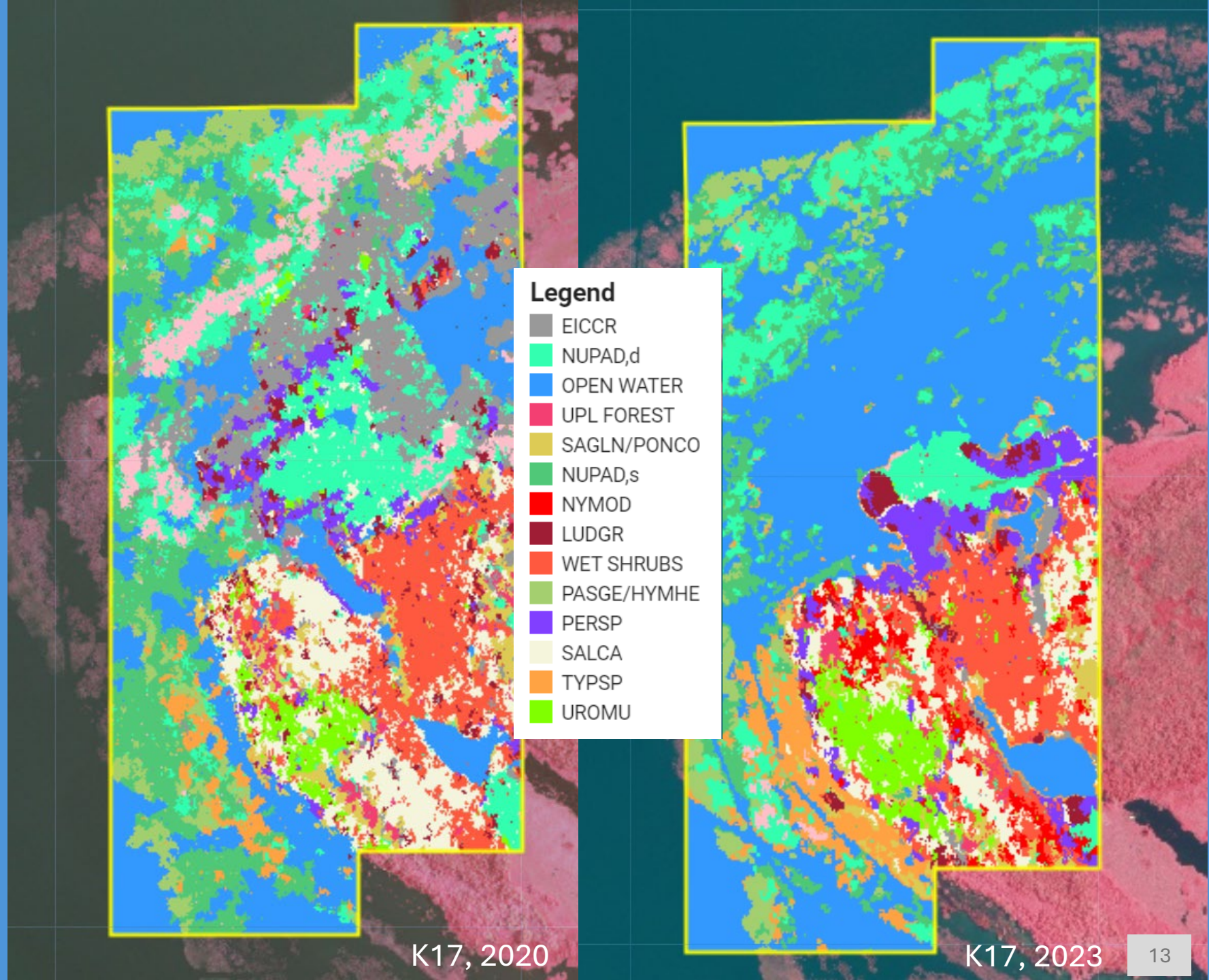
Hydrilla verticillata

In conclusion:

- Littoral vegetation on Lake Kissimmee has decreased since 2014
- Hurricanes have impacted littoral vegetation on Lake Kissimmee, with the amount of loss dependent on the duration of higher water
- Lake Kissimmee experienced a substantial increase in littoral vegetation in WY 2022, possibly due to the very dry spring when water levels hovered around 50’ NGVD.
- Various data sets are available to study littoral vegetation, but high-resolution classification maps collected regularly are needed to provide a more complete understanding of how hydrology affects littoral vegetation

Next steps:

- Classification mapping in sentinel grids
- A more robust accuracy assessment focused on the areas of change
- Expanding this binary classification method to other lakes in the KCOL



Thank you!

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