Habitat mapping the GTMNERR using semi-automated classification and drone imagery

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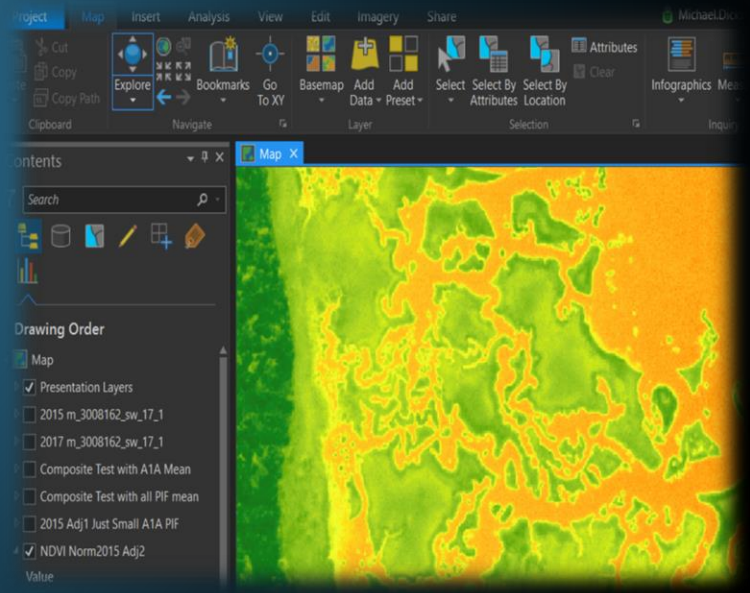
The importance of habitat mapping…

Habitat Cover

Ecosystem function



Track Changes

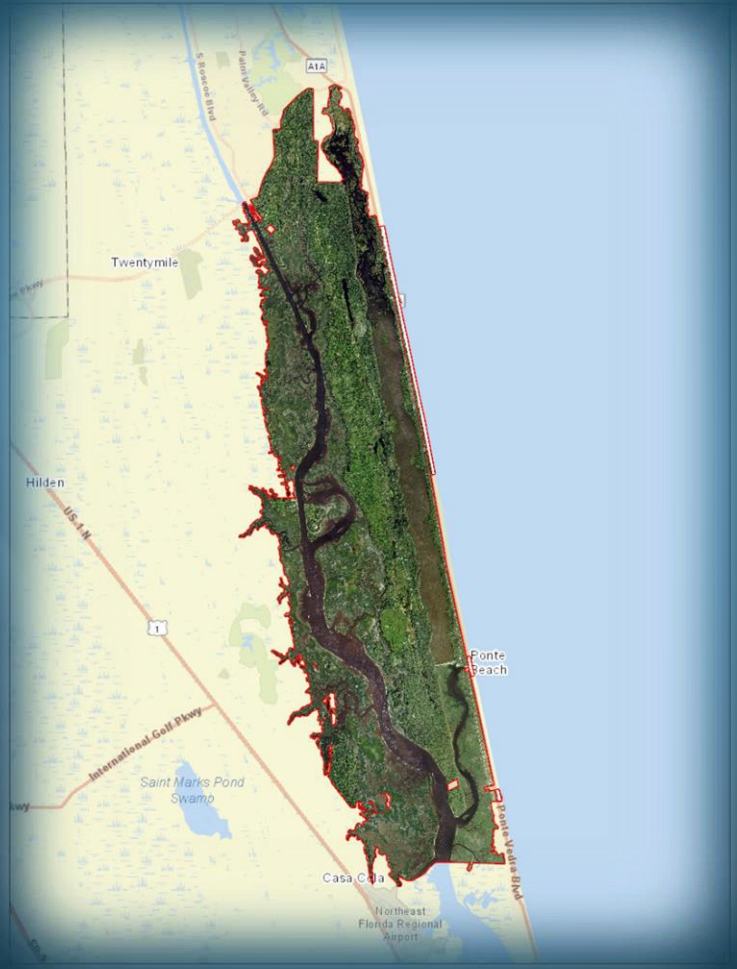
Presentation Overview

Objectives

Map in an efficient and non-destructive manner

Achieve an accuracy adequate to infer change

Explore the efficacy of remote sensing techniques



1 m resolution NAIP imagery collected via manned aircraft

Talking Points

North Section of GTM

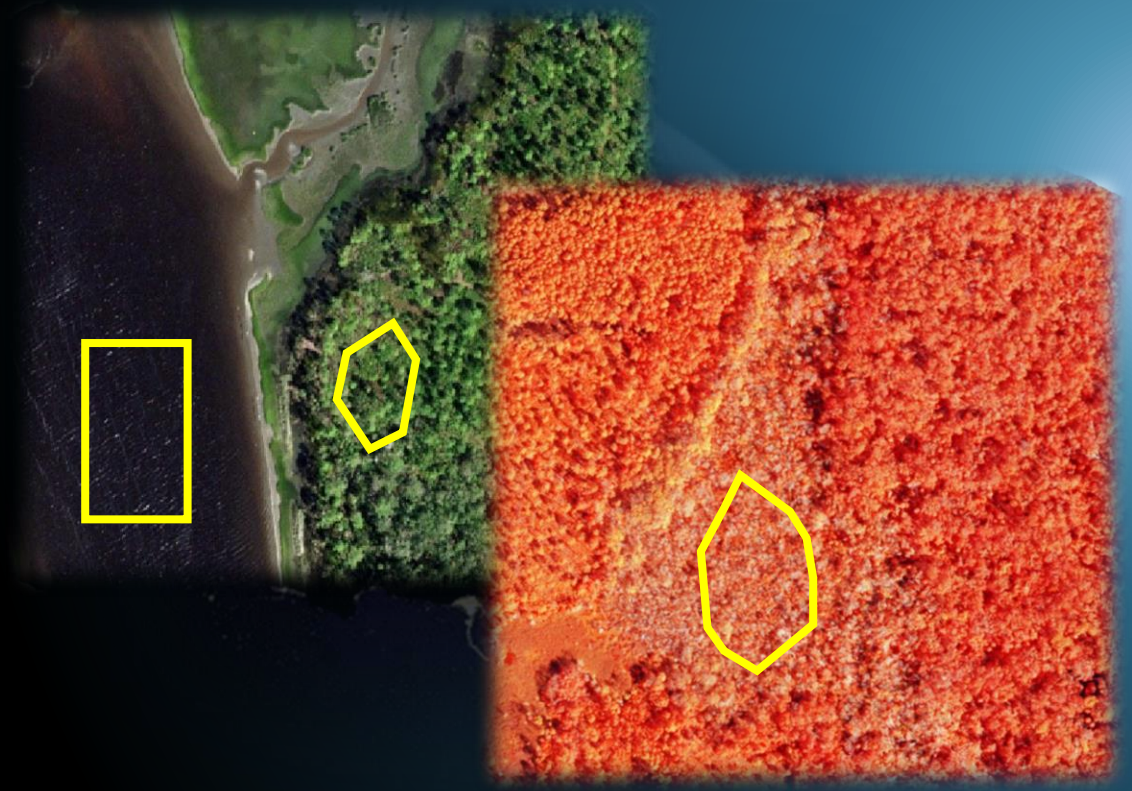
Part 1: Map Generation

Part 2: Accuracy Assessment (AA)

Drone Use for AA

Part 1: Map Generation

There are two methods for map generation…

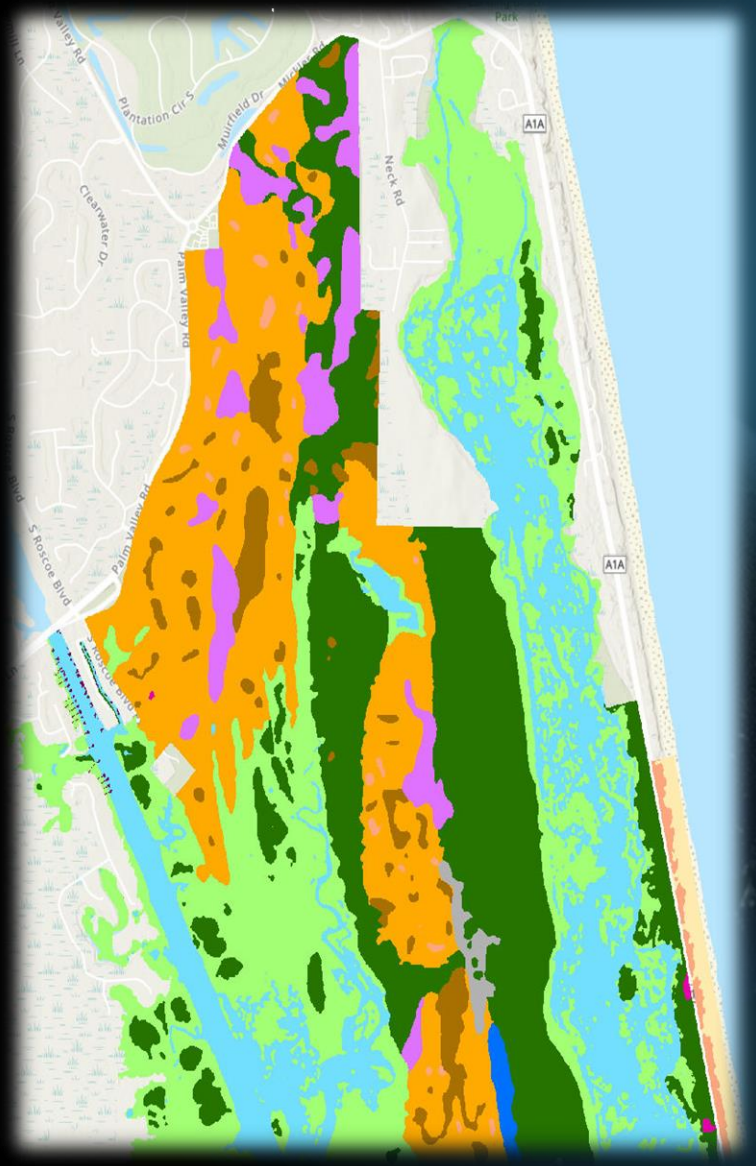


Semi-Automation

Digitization

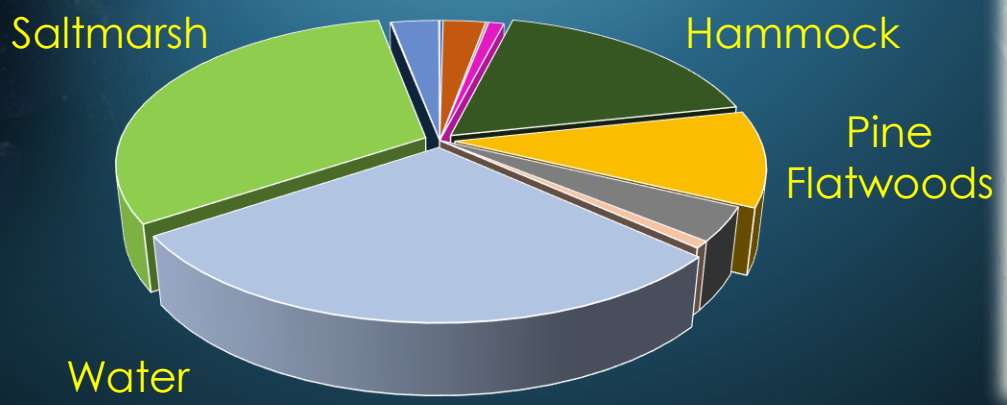
…and what was used was a combination of these two

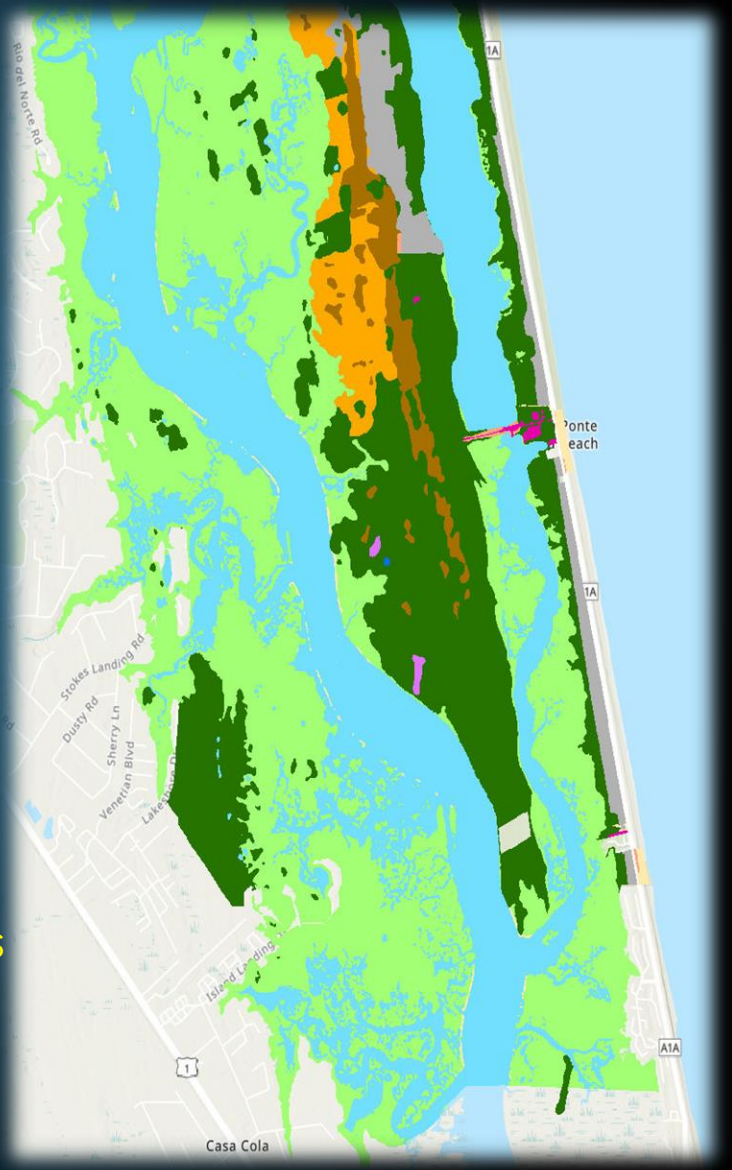
Part 1: Map Generation



Class	GTM Description	NOAA Description	Code	Acres
1	Herbaceous Cover	Herbaceous Upland	6130	40.26
2	Freshwater Marsh	Emergent Wetland	5230	489.79
3	Freshwater Pond	Aquatic Bed	4130	35.91
4	Wetland Hardwood	Forested Wetland	5250	175.15
5	Oak Hammock	Forested Upland	6150	3290.39
6	Pine Flatwoods	Forested Upland	6150	1978.02
7	Scrub	Scrub-Shrub Upland	6240	702.87
8	Sand	Unconsolidated Substrate	6220	143.01
9	Open Water	N/A	N/A	5404.69
10	Intertidal Marsh	Emergent Wetland	2260	5854.95
11	Impervious Cover	Impervious Cover	8110	8.96
12	Built-Up Cover	Built-Up Cover	8320	3.58
13	Supratidal Marsh	Emergent Wetland	2340	545.22
14	Cleared Land	Cleared Land	8156	8.11
15	In-water Residential	Residential Cover	8330	2.35

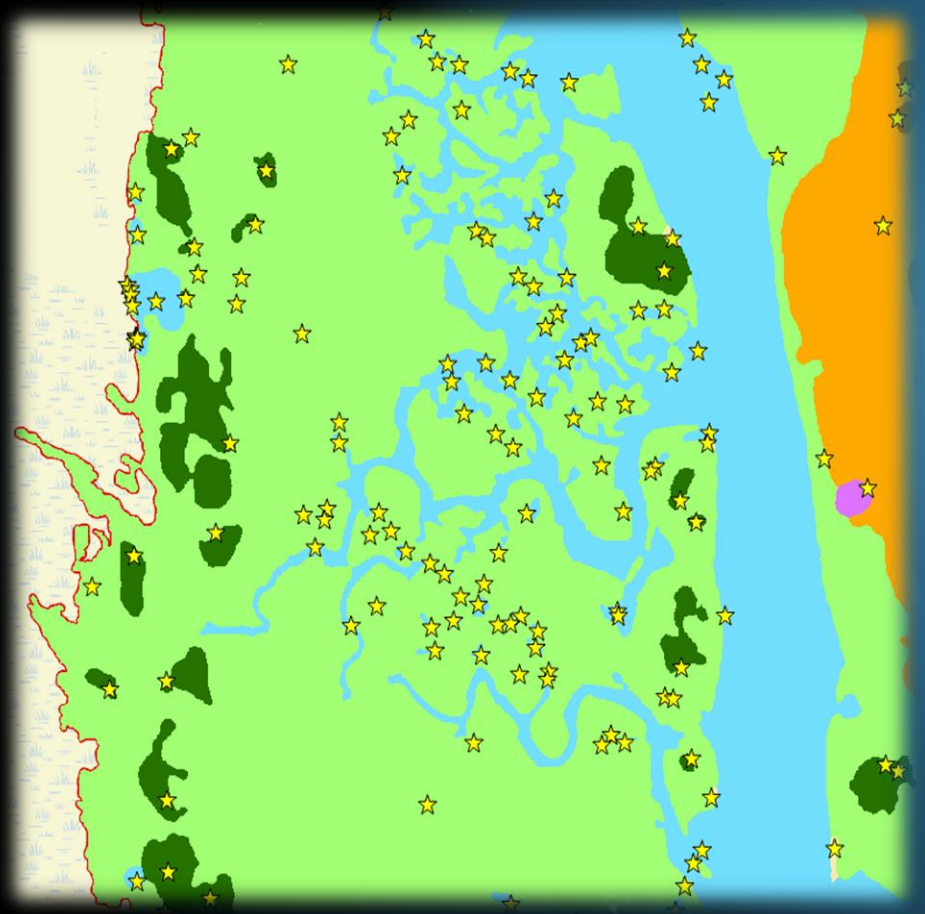
Proportion of Coverage





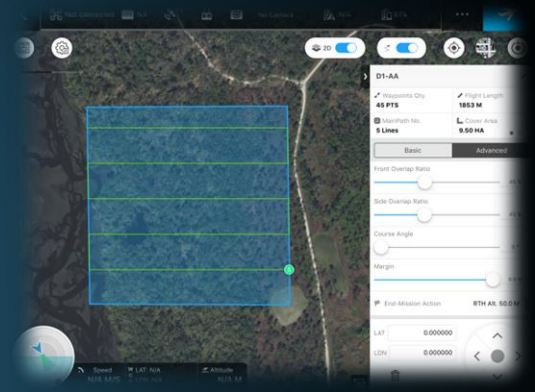
Part 2: Accuracy Assessment

Stratified Random Design



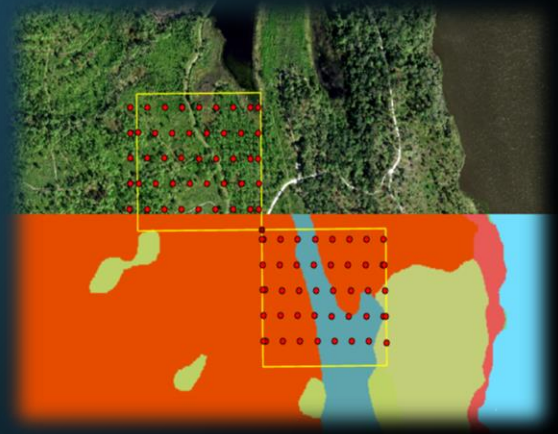
Drones

DJI Mavic Pro



Mission Planning

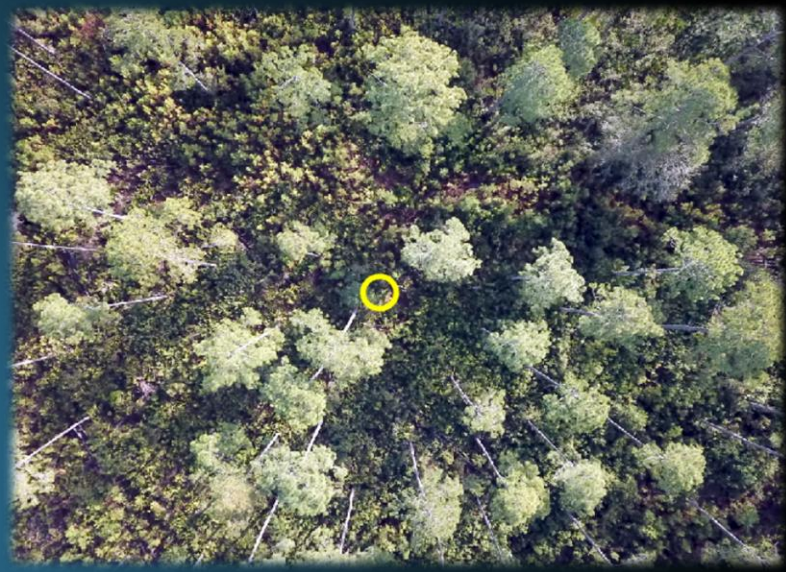
Automated Flights



GIS

Part 2: Accuracy Assessment






Part 2: Accuracy Assessment

HABITAT	CATEGORY	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	TOTALS
Intertidal Saltmarsh	Class 1	**63**	3	0	0	0	0	2	0	0	0	0	0	1	69
Supratidal Marsh	Class 2	0	**22**	0	0	0	0	5	0	0	0	0	0	0	27
Freshwater Pond	Class 3	0	0	**10**	4	0	0	0	0	0	0	0	0	0	14
Freshwater Marsh	Class 4	1	0	0	**106**	4	0	11	0	2	0	0	0	0	124
Wetland Hardwood	Class 5	0	0	0	0	**33**	0	13	0	0	0	0	0	0	46
Herbaceous Cover	Class 6	0	0	0	0	0	**15**	2	0	1	0	0	0	0	18
Inland Upland	Class 7	9	5	1	8	11	1	**613**	0	21	0	0	0	0	669
Sand	Class 8	0	0	0	0	0	1	0	**12**	0	0	0	0	0	13
Scrub-Shrub	Class 9	0	0	0	5	0	0	7	0	**137**	0	0	0	0	149
Impervious Cover	Class 10	0	0	0	0	0	0	0	0	0	**9**	0	2	0	11
Built-Up Cover	Class 11	0	0	0	0	0	0	1	0	0	0	**4**	0	0	5
Cleared Land	Class 12	1	0	0	0	0	0	0	0	0	0	0	**7**	1	9
Water	Class 13	2	28	0	0	0	0	0	0	0	0	0	0	**102**	132
TOTALS		76	58	11	123	48	17	654	12	161	9	4	9	104	**1286**

- 1,286 acquired photos
- 5 days
- Less than 10 hrs flight time

- Overall Accuracy: 88%
- Kappa Stat: 83% (± 3%)
- Occurrence of Error

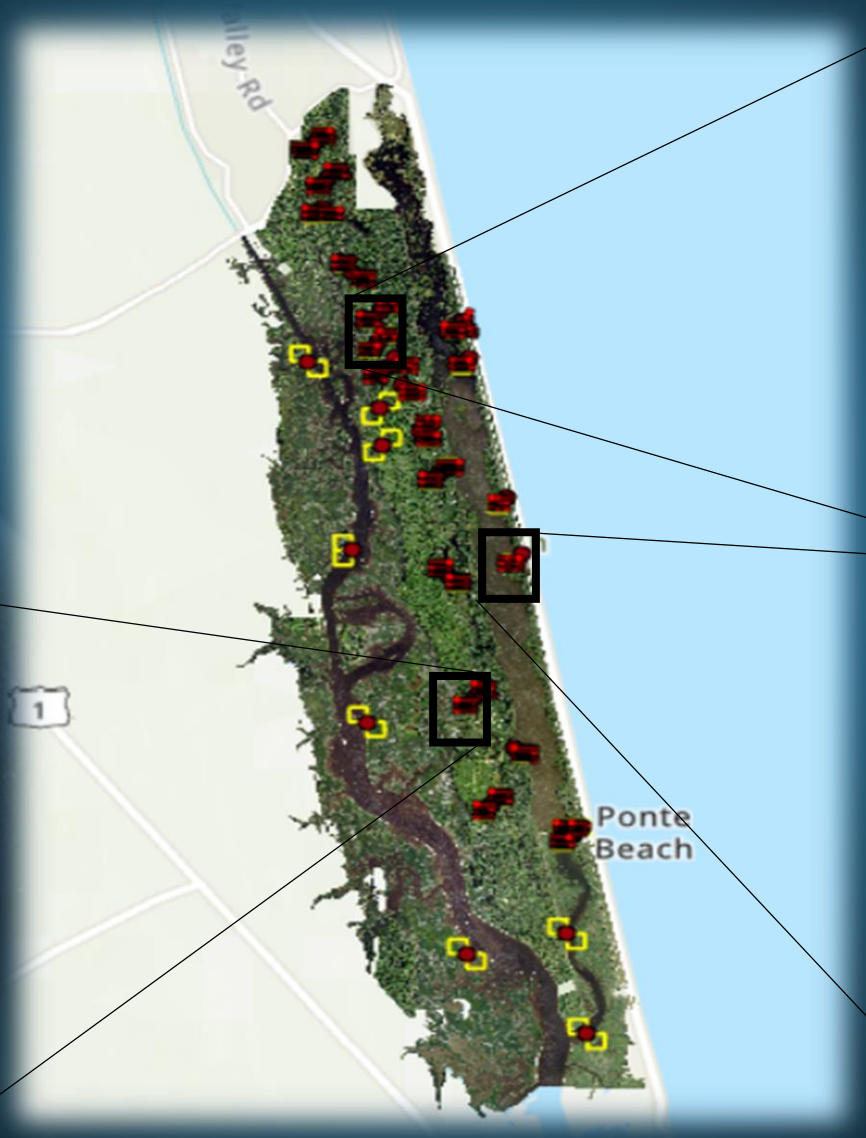
Assessing Error

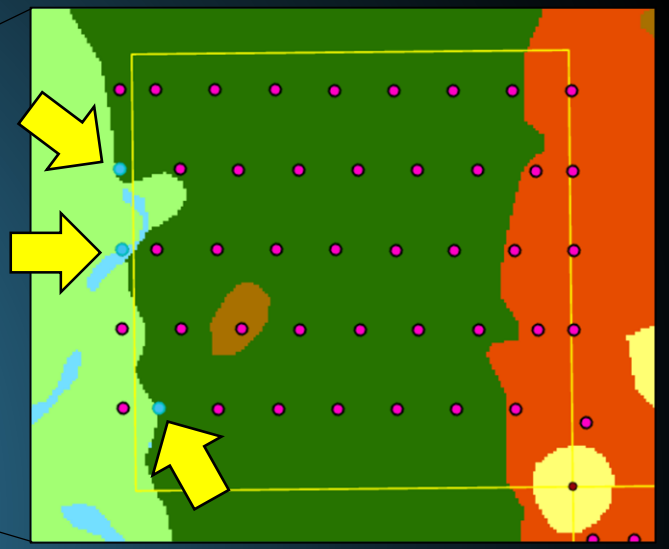
Error Occurrence

Edge Effect

Changing Habitats

Photo Ambiguity





Summary

Were the objectives met?

- Maps were generated and assessed efficiently with no impact
- Drones can be an effective tool

Pros

- Efficient
- Non-invasive
- Scalable
- Cost effective
- Ideal for general land cover classifications

Cons

- High initial cost
- Logistical constraints of drone flying
- Difficult to interpret species composition
- Accuracy photos lack in situ context

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Is 83% good enough?

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