RESULTS OF THE LIS INTERCOMPARISON STUDY

LIS Eelgrass Collaborative Virtual Meeting March 6, 2026

Long Island Sound Study
A Partnership to Restore and Protect the Sound

THE UNIVERSITY OF RHODE ISLAND

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

REVIEW AND GOALS

- Purpose of the Intercomparison Study (2024, 2025)
- Develop a monitoring plan for LIS eelgrass
- There are new tools available since Neckles et al., 2012

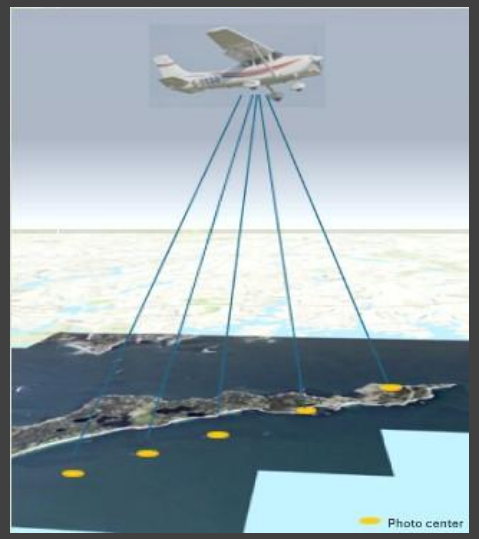
Estuaries and Coasts (2012) 35:23–46
DOI 10.1007/s12237-011-9410-x

Integrating Scales of Seagrass Monitoring to Meet Conservation Needs

Hilary A. Neckles · Blaine S. Kopp · Bradley J. Peterson · Penelope S. Pooler

Received: 29 November 2010 / Revised: 11 March 2011 / Accepted: 25 April 2011 / Published online: 10 May 2011

Aerial



Satellite

planet.

Drone

THE TEAM

University of Rhode Island:

Mike Bradley - Project Lead

Charles LaBash – Drone Ops (purchasing)

Chris Damon – Drone Ops (image processing)

EPA / LISS:

Cayla Sullivan – Project Lead/Admin/Dive Ops

Phil Colarusso – Dive Operations

USFWS:

Suzanne Paton – Project Lead /Admin

Tom Halavik (ret) – Boat Operations

MacKenzie Payne – Field Technical Support

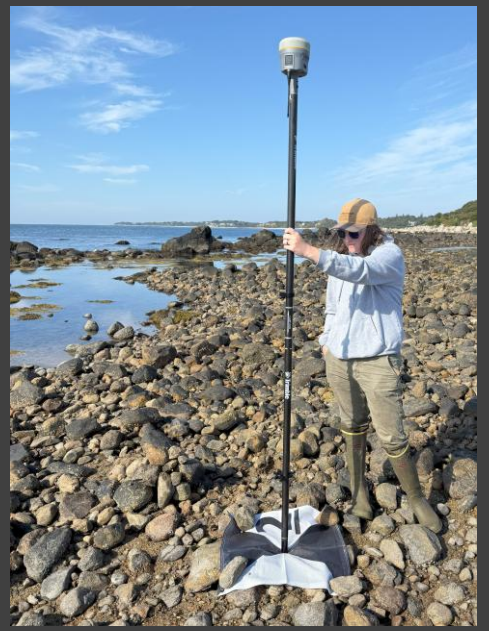
CT DEEP:

Kelly Streich - Admin

Chuck Morrison – Drone Ops (pilot in charge)

Dan Denyer – Drone Ops (pilot in charge)

Matt Green – Drone Ops (pilot in charge)



INTERCOMPARISON RESULTS

Table 1

Platform	Upfront ($)	Operational[1]	Field Logistics[2]
Drone	Medium (20-70K for a photogrammetric drone — one time purchase)	High	HIgh
Aerial	High (~50 — 75K per mapping year for image acquisition and processing)	Medium	Low
Satellite	Low (imagery is free for research)	High	None

1. Operational: relative cost of associated field work; data processing and management; analysis
2. Field logistics include permits and steps required to collect the imagery

Table 2

Platform	Benefits	Limitations	Accuracy	Mapping Method; Metric
Drone	• Short flight times • Low cover eelgrass areas are visible (~5%)	• Acquisition area is limited to about 1 mi2 • Open water areas • Voluminous data to process	+/- 1cm with ground control +/- 1 m without ground control	Automated image classification; area and % cover
Aerial	Very good basemap for heads up digitizing and photo-interpretation of habitat	• Requires a photogrammetric contractor • Requires hours of good weather	+/- 1 m	Manual digitizing of eelgrass beds; presence /absence ; area
Satellite	• Imagery is available on demand year round • Imagery is atmospherically corrected	• Voluminous data to process • Low cover eelgrass beds are beyond detection limits	+/= 3m	Automated image classification; Areas of other habitats are mapped as well

DRONE SURVEY RESULTS

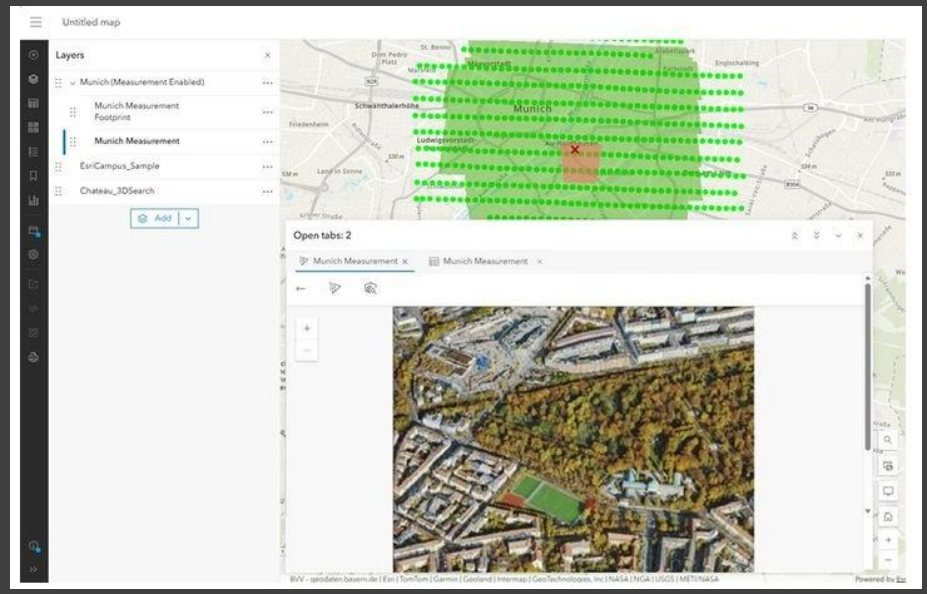
- We attempted to survey 3 sites twice a year
- Tested different processing and mosaicking software (Drone2map and Pix4d)
- Tested accuracy of mosaic without ground control

June

September

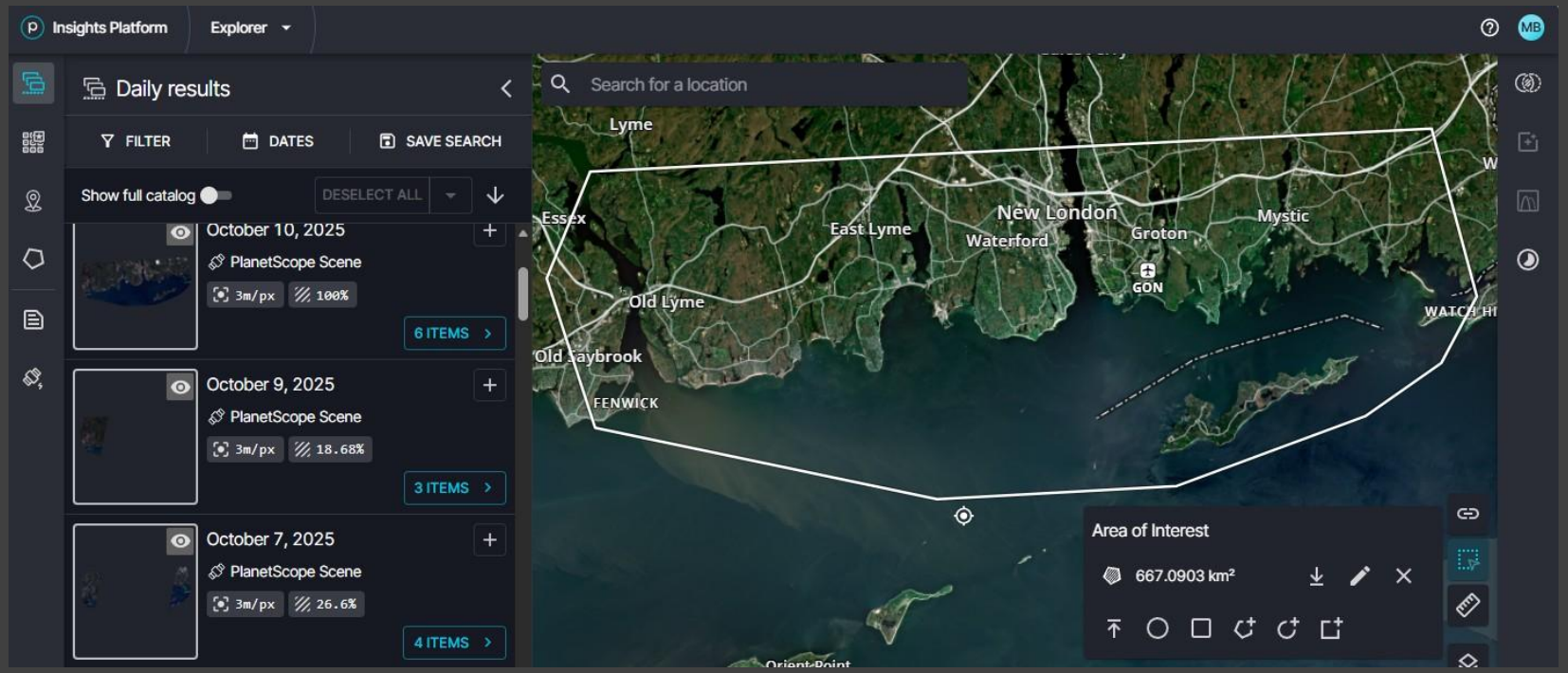
LESSONS LEARNED FROM DRONE SURVEYS

- Continue Drone imagery for Barleyfield Cove 2x / year
- Fly earlier and possibly higher (> 400ft AGL) for other sites
- Not worth collecting imagery 2x / year for other sites
- Not worth collecting survey control at sites besides Barleyfield Cove
- Explore the use of the Oriented Imagery Viewer



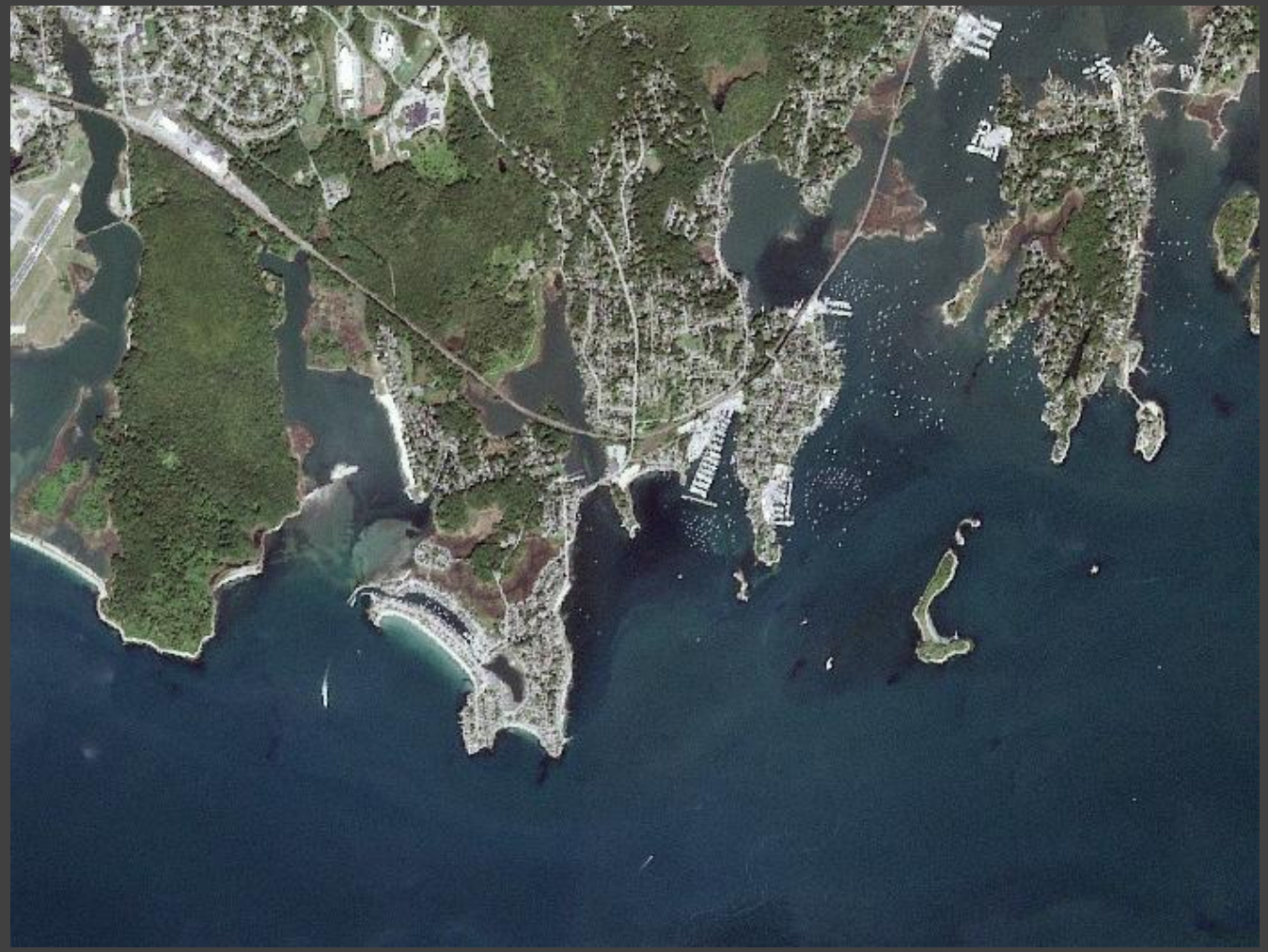
SATELLITE MAPPING METHODS

- SuperDove satellites (8 band) fly over LIS from 10:30 am to 12:30 pm everyday
- Low tide PlanetScope imagery from Aug 15 to Oct 15 was downloaded (10s of gbytes)
- Chose 8 band surface reflectance (atmospherically corrected) and harmonized to Sentinel 2



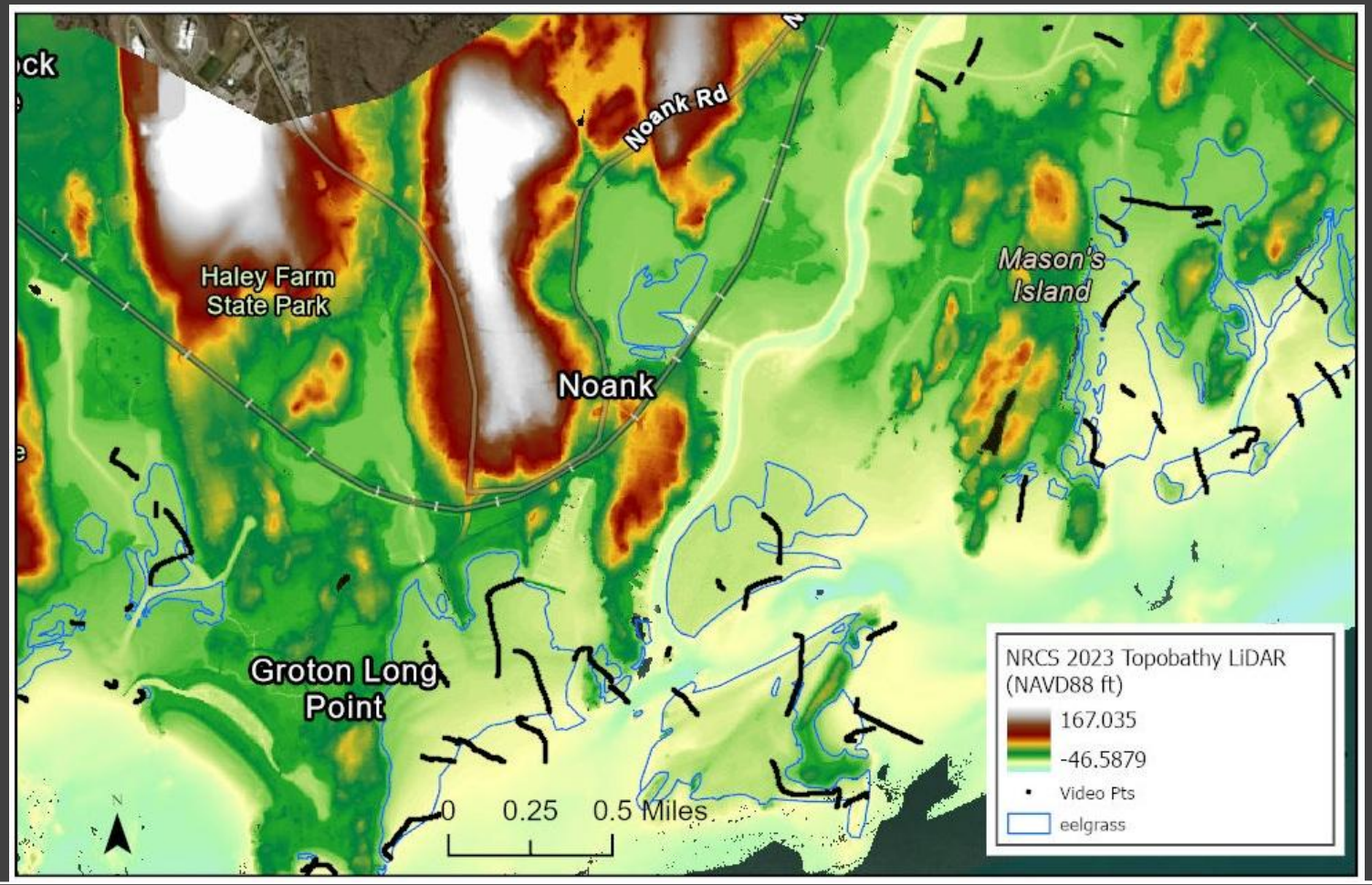
SATELLITE MAPPING METHODS

- Mosaic of Sept 13 and October 3 8 band PlanetScope image

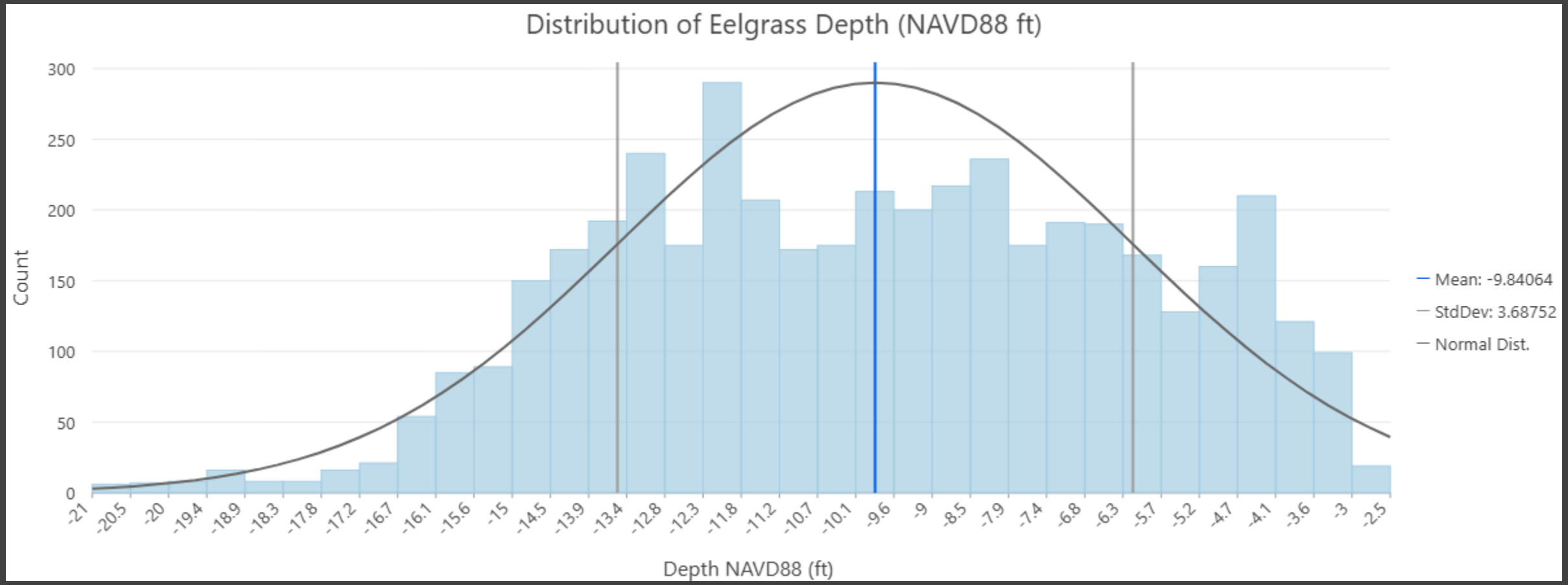


SATELLITE MAPPING METHODS

- Downloaded and processed NOAA and USDA 2023 Tobobathy LiDAR from www.coast.noaa.gov (Digital Coast)
- Conducted eelgrass depth analysis by intersecting underwater video locations

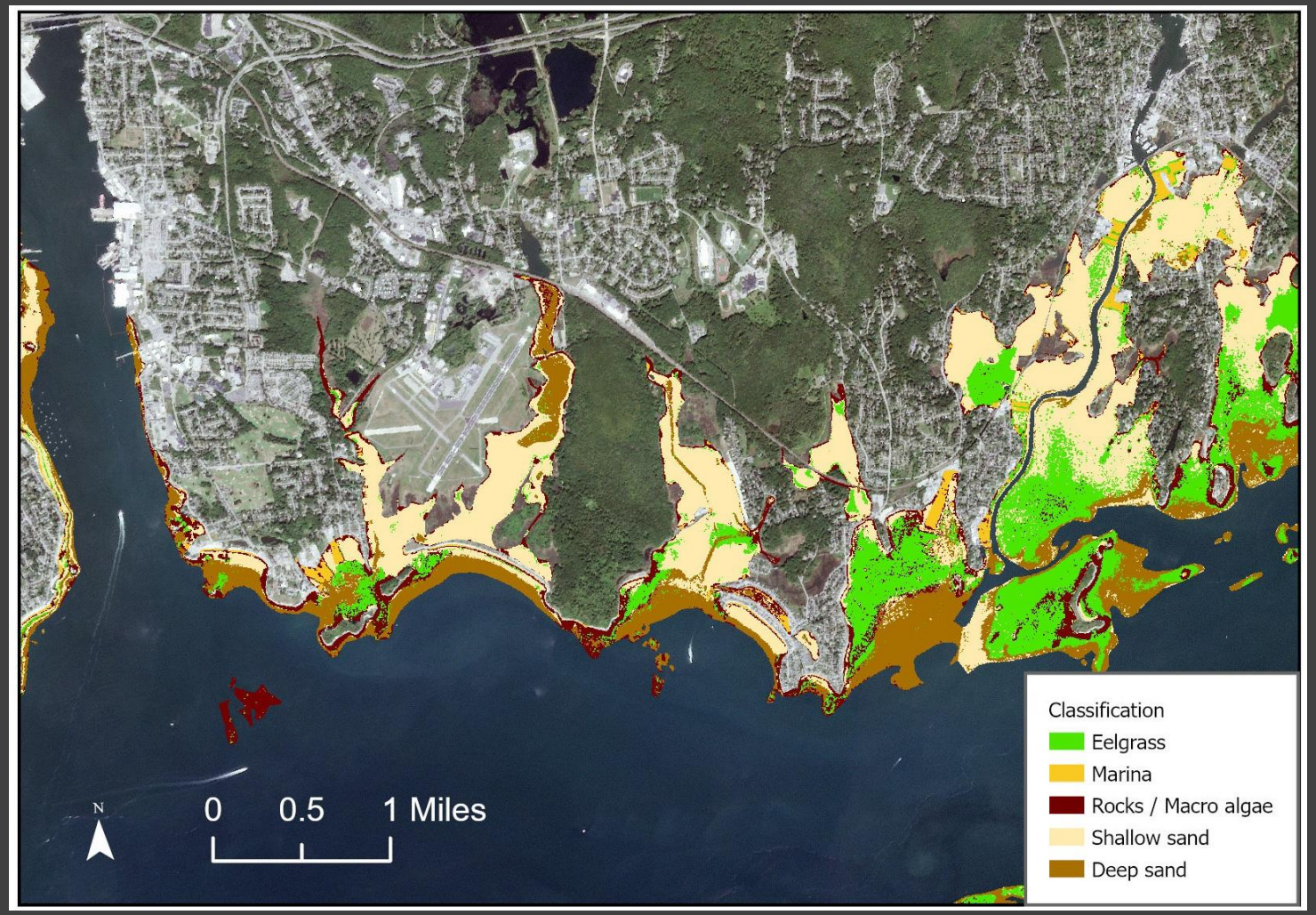


LIS EELGRASS DEPTH



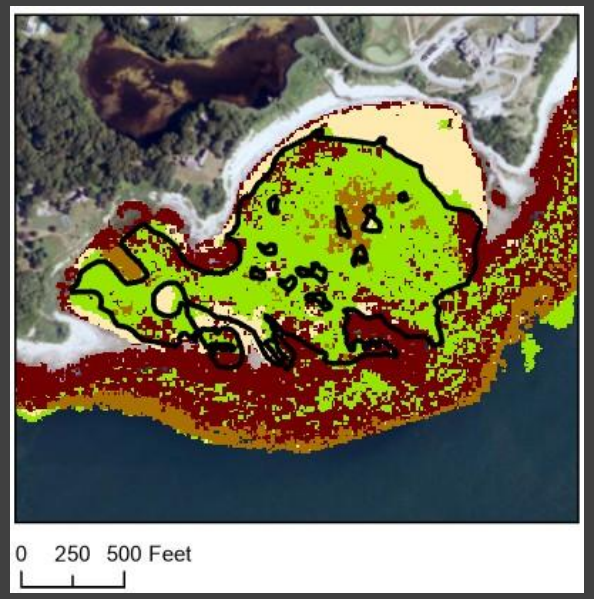
SATELLITE MAPPING METHODS

- Selected all pixels that were between 0 and -17ft (1 std)
- Created a polygon to clip PlanetScope imagery
- The final image used for classification was a composite of the topobathy (-17ft-0) layer and PlanetScope (9 band)
- The Support Vector Machine model within ArcGIS was used for image classification

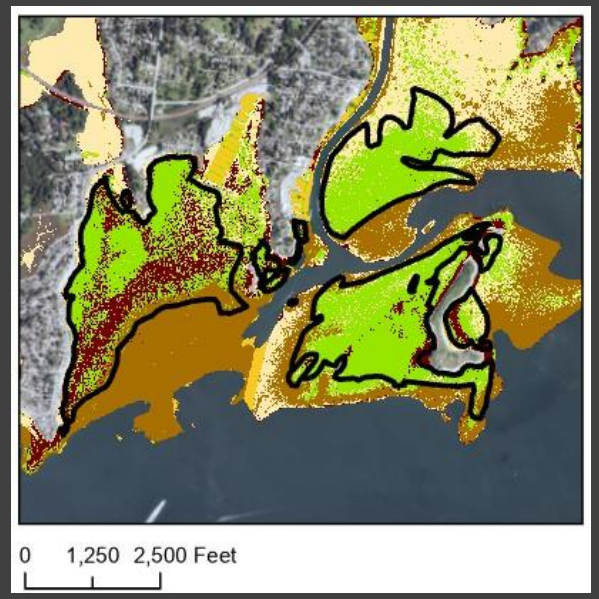


2024 AERIAL SURVEY AND PLANET IMAGERY COMPARISON

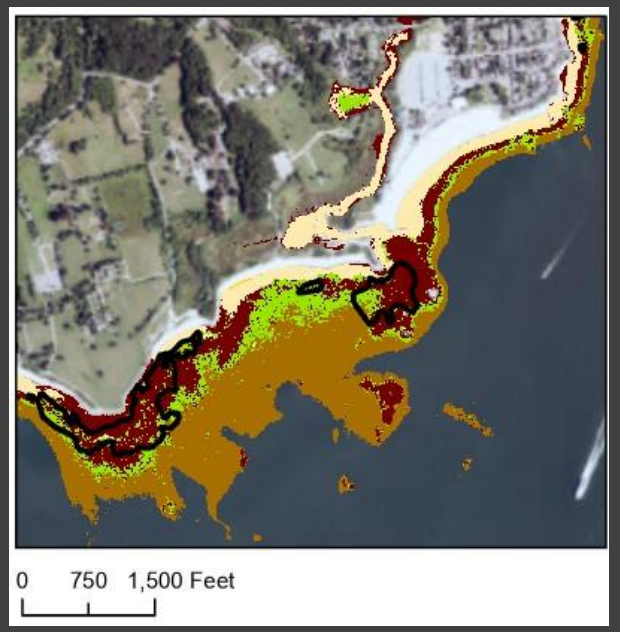
Barleyfield Cove, Fishers Island, NY



Groton Long Point, CT



Ocean Beach New London, CT



Total **acres** of eelgrass in **aerial survey** = 2,014

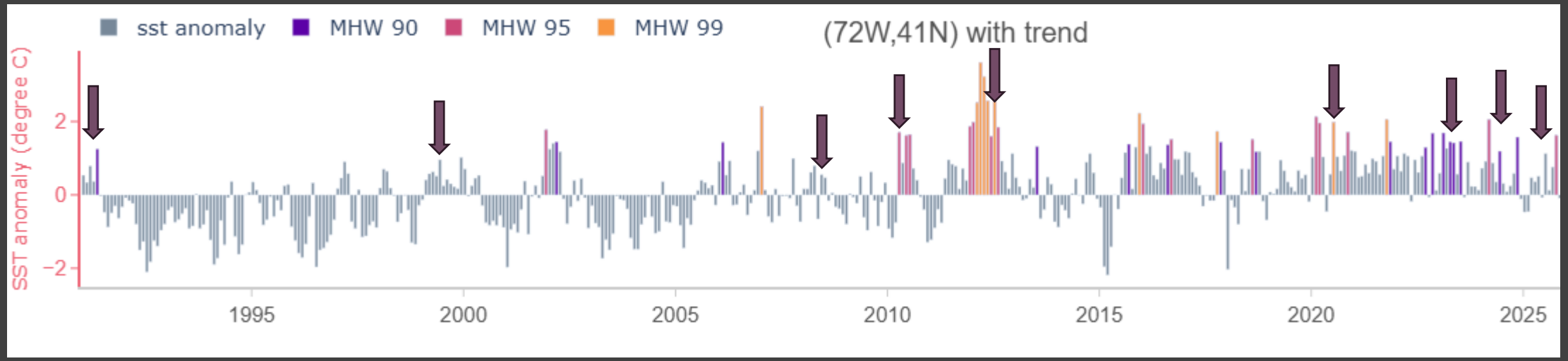
Total **acres** of eelgrass from **satellite** = 2,286

Planet Classification
- Eelgrass
- Marina
- Rocks / Macro Algae
- Shallow Sand
- Deep Sand
- Aerial Survey Eelgrass

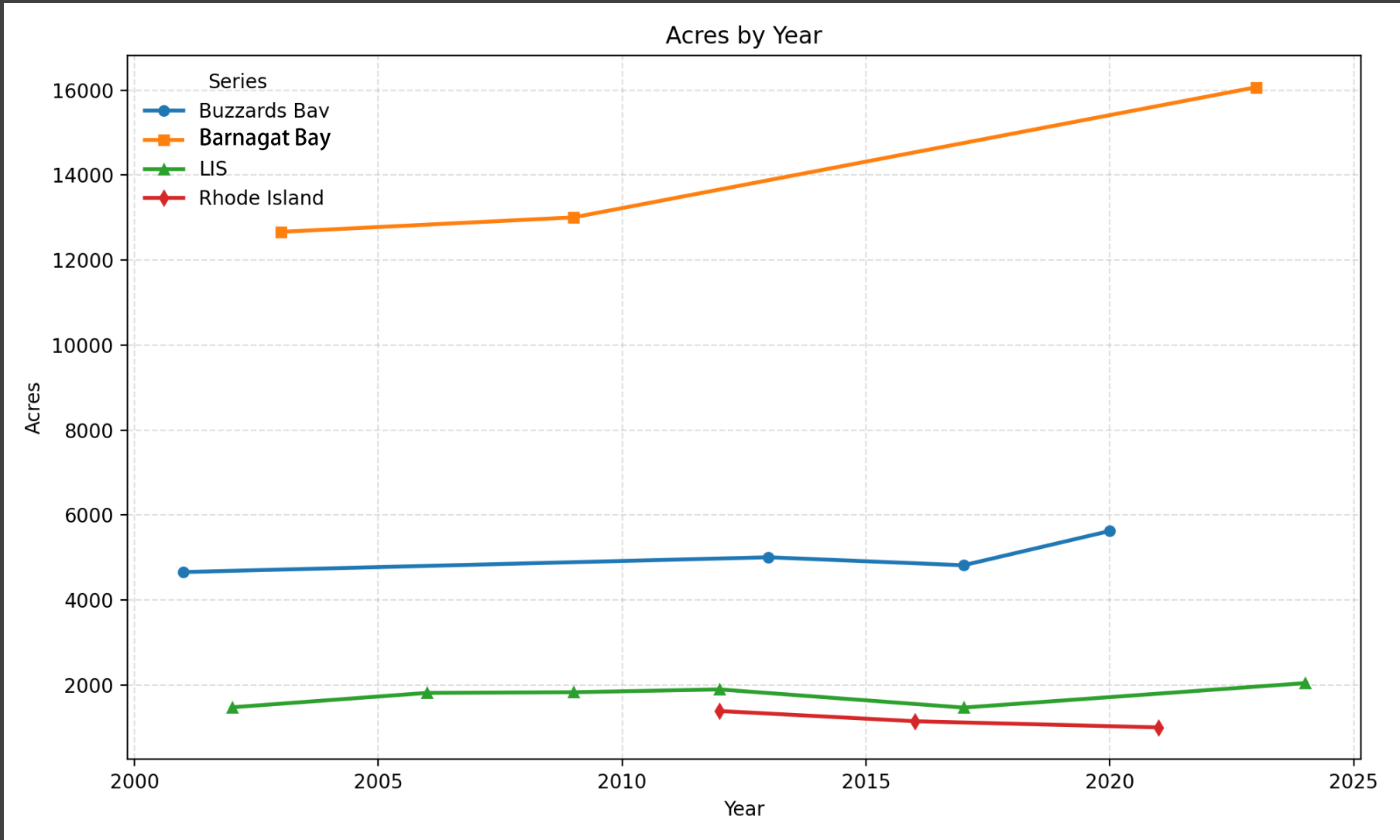
Mapping Method	Users v Producers Accuracy Matrix
Aerial	84%
Satellite	67%

MONITORING PLAN FREQUENCY

Disturbance	Frequency
Hurricanes or Extra Tropical Cyclones	Could happen yearly
Disease	Could happen yearly
Coastal development	Yearly
Sea level rise	Ongoing
Marine heat waves	Every 3 years (?)



Source: https://psl.noaa.gov/marine-heatwaves/


Acres by Year
Series
Buzzards Bav
Barnagat Bay
LIS
Rhode Island
16000
14000
12000
10000
8000
6000
4000
2000
Acres
2000
2005
2010
2015
2020
2025
Year

LIS EELGRASS MONITORING PLAN

- No longer muli-scalular or tiered
- Each method will produce individual results
- When taken collectively, they can provide consistent, comprehensive, and comparable results to be interpreted
- Comparable results can be used in a yearly dashboard of eelgrass trends

Monitoring Method	Frequency	Extent	Metric
Drone	yearly	3-5 sites	% cover; accuracy assessment
Satellite	yearly	Region wide	Area and extent
Dive surveys	2x / year	2-3 sites	Seasonal % cover
Underwater video surveys	yearly	Region wide	Accuracy assessment
Aerial	Once every 3 years	Region wide	Area and extent

QUESTIONS?