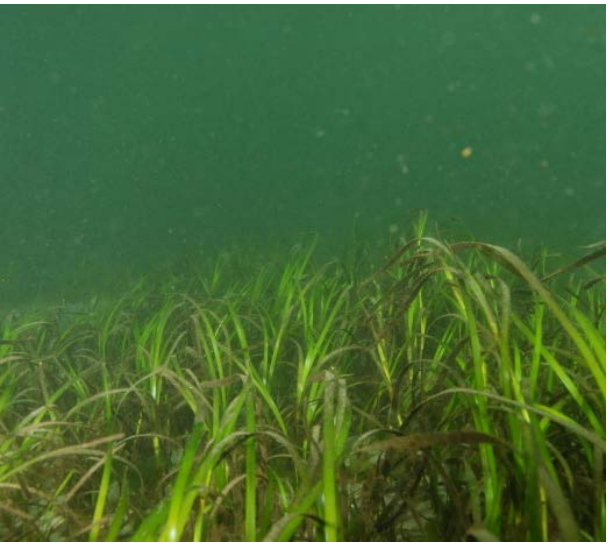
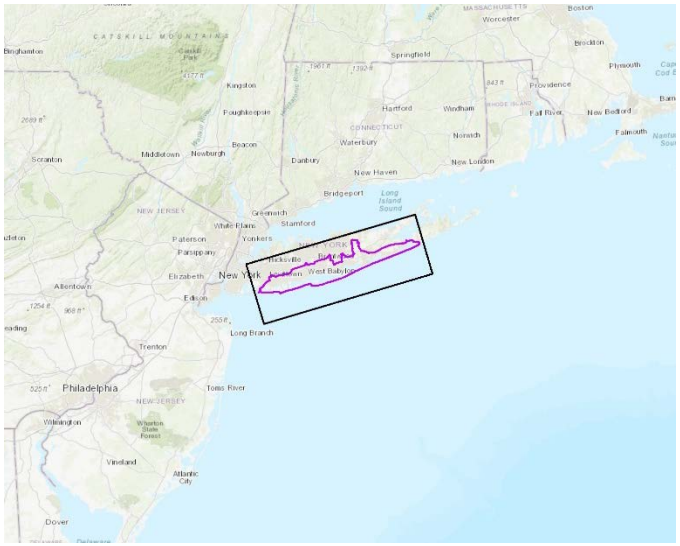




Implementing CMECS for the Long Island South Shore Estuaries Benthic Habitat Mapping Effort

Mark Finkbeiner, NOAA Office for Coastal Management
Chris Griesbach and Keith Patterson, Dewberry Engineers Inc.

2018 Survey

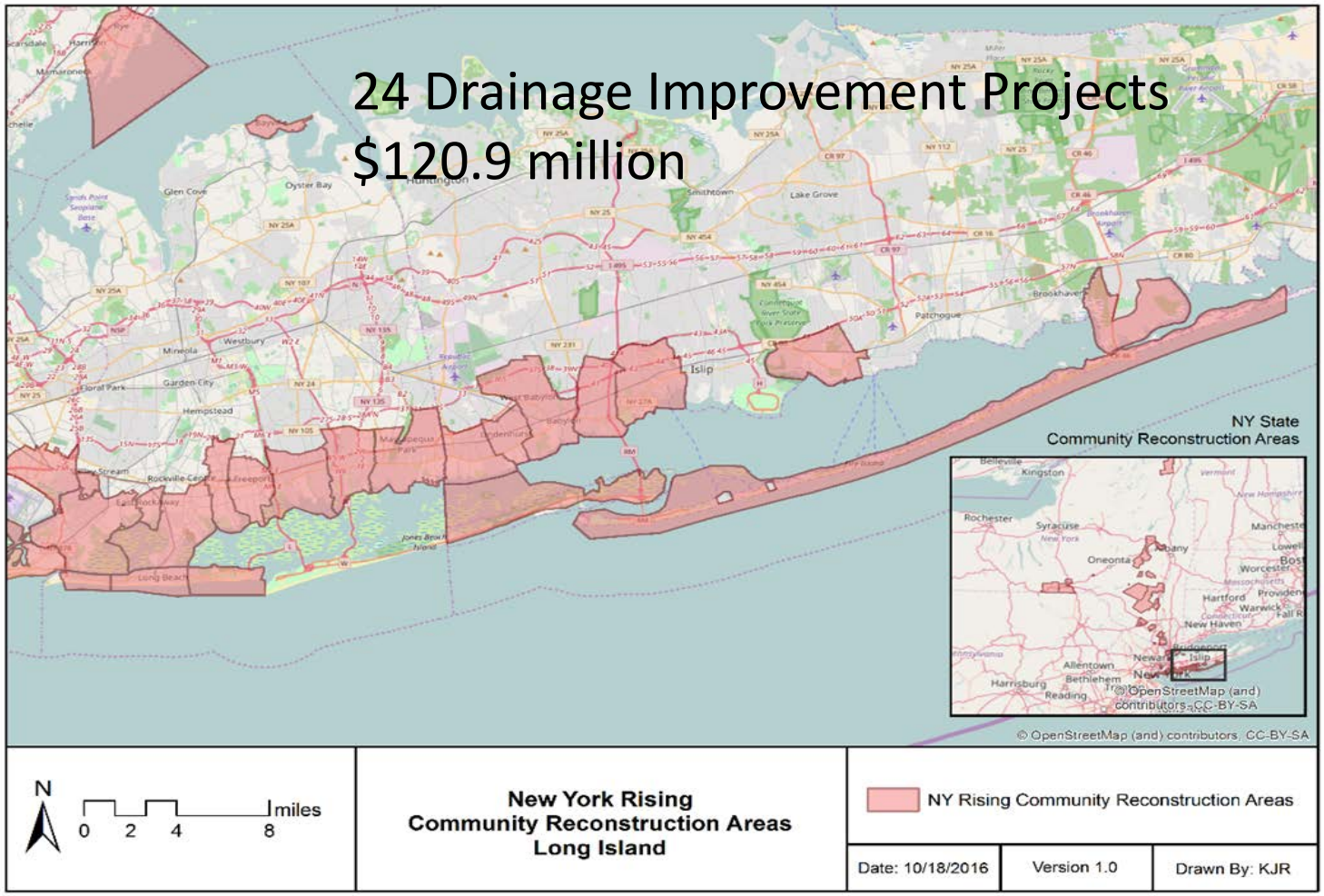
Governor's Office of Storm Recovery

Involved Agencies:

- New York Governor's Office of Storm Recovery (GOSR)
- National Oceanic and Atmospheric Administration
- NY Department of Environmental Conservation (DEC)
- NY Department of State (DOS)

Survey will establish baseline ecological conditions for the projects that GOSR will be funding in and around the Long Island South Shore Estuary

Community Reconstruction Program: Long Island Region



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Why Map Benthic Habitats?

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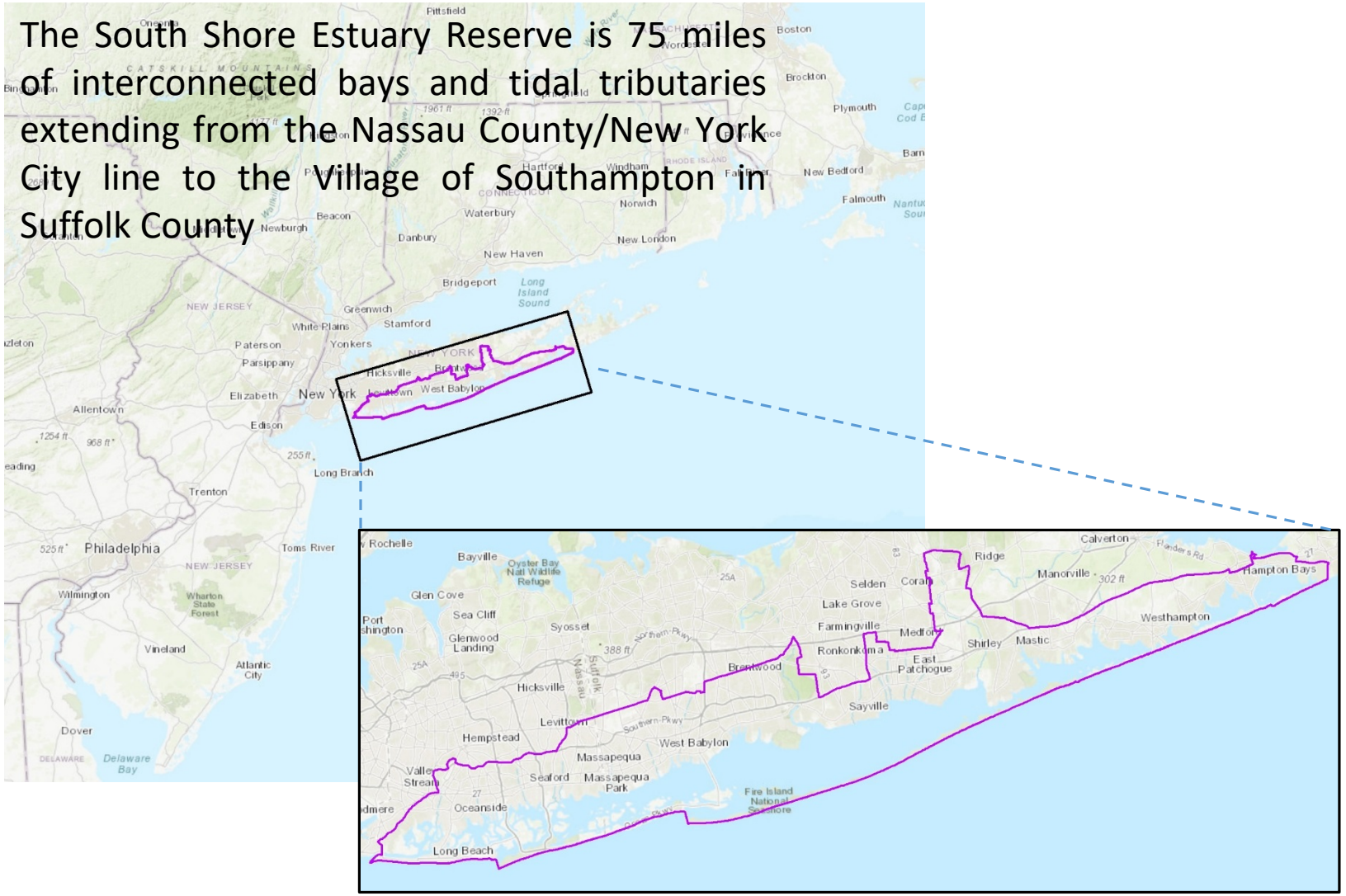
PROJECT AREA – Long Island South Shore Estuary

The South Shore Estuary Reserve is 75 miles of interconnected bays and tidal tributaries extending from the Nassau County/New York City line to the Village of Southampton in Suffolk County



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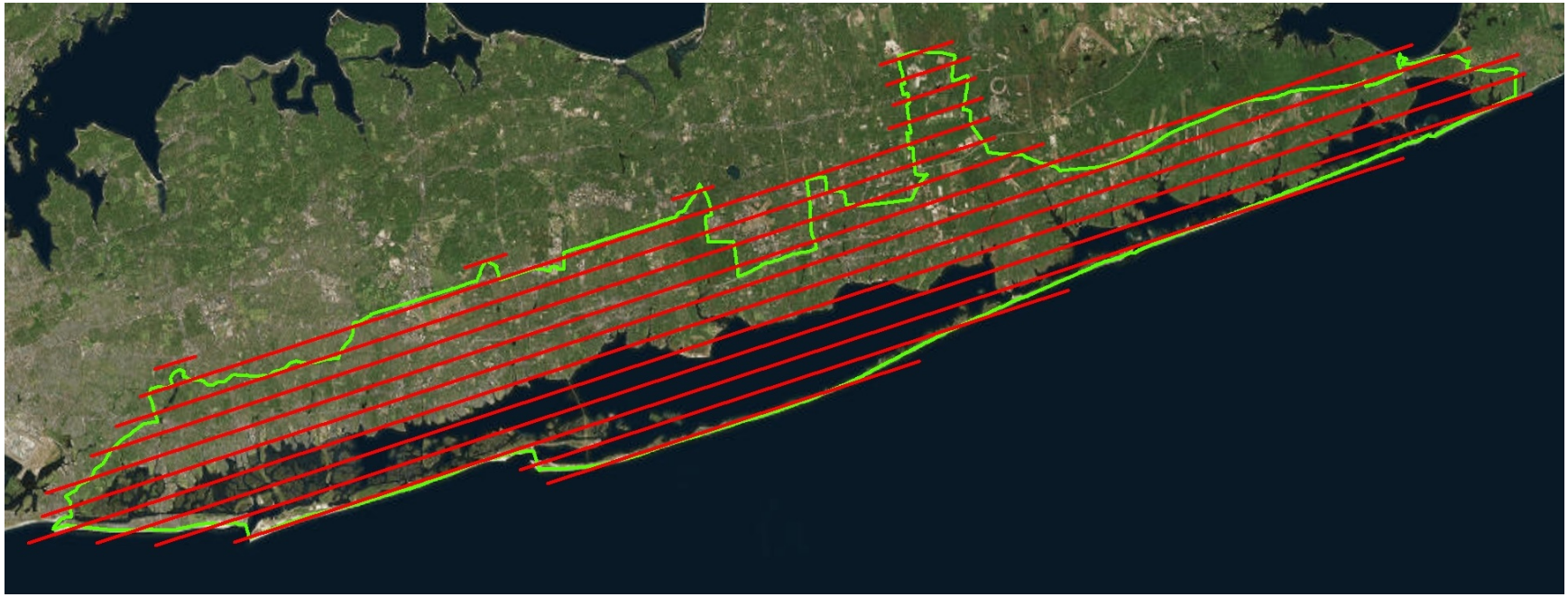
Imagery Acquisition Flight Plan

Flight lines are planned according to the area of interest

- 15 cm x 15 cm pixel size/Ground Sample Distance (GSD)
- 4- Band Imagery
- 8-bit radiometric resolution



Optimal Imagery Requires Pre-flight Planning along with Daily Condition Monitoring

Pre-flight Scheduling

- **Weather, wind**
- **Biomass**
- **Sun angle below 30 degrees (glare)**

Pre-flight Water Condition Monitoring

- **Turbidity**
- **Tidal influence**
- **Water releases**
- **Rain/Cloud Cover**
- **Wave height (glint)**

Dewberry has a network of information providers to help with condition monitoring so that conditions are evaluated prior to flying.

Limited collection window each day

Date	Day	Time	Pred (ft.)	High/Low	Sun Angle (degrees)
5/7/2018	Mon	11:37	0.21	L	65.98
5/8/2018	Tue	12:28	0.21	L	65.28
5/9/2018	Wed	13:18	0.21	L	60.37
5/10/2018	Thu	14:09	0.19	L	52.8
5/11/2018	Fri	14:58	0.16	L	44.36
5/12/2018	Sat	15:46	0.13	L	35.6
5/13/2018	Sun	16:32	0.1	L	27.05
5/14/2018	Mon	17:18	0.08	L	18.55
5/15/2018	Tue	18:02	0.06	L	10.61
5/17/2018	Thu	7:55	0.1	L	35.53
5/18/2018	Fri	8:45	0.1	L	45
5/19/2018	Sat	9:37	0.1	L	54.42
5/20/2018	Sun	10:30	0.1	L	62.87
5/21/2018	Mon	11:24	0.1	L	68.66
5/22/2018	Tue	12:19	0.09	L	69
5/23/2018	Wed	13:14	0.07	L	63.56
5/24/2018	Thu	14:07	0.05	L	55.37
5/25/2018	Fri	14:58	0.04	L	46.36
5/26/2018	Sat	15:47	0.03	L	37.3
5/27/2018	Sun	16:32	0.04	L	28.91
5/28/2018	Mon	17:14	0.07	L	21.16

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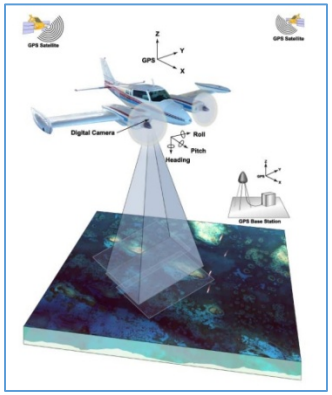
Aerial Triangulation (AT)

PURPOSE: Removes distortion from the imagery and accomplishes georeferencing to the Earth



Inputs to the aerial triangulation solution:

Airborne GPS/IMU data captured during flight records

GPS position / pitch, roll, yaw (heading) of the aircraft

Photo-identifiable ground control points are collected via ground surveying and are used to improve the aerial triangulation result.

Sensor calibration information specific to the geometric properties of the camera is considered within the AT solution.

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QUALITY CONTROL
Spatial Accuracy Assessment

PURPOSE: Spatial accuracy is tested before mapping begins.

- **Otherwise: False changes in benthic habitat extents could be mapped**

- Surveyed “Check Points”
- Photo-identifiable features appearing on imagery are surveyed. The check points are then compared with the georeferenced imagery.
- Orthophotography is used as a backdrop on laptops in the field and within ArcGIS during photointerpretation and benthic habitat digitization.

Field Work

Purpose:

Imagery Signature Identification

- Ties imagery signatures (colors, tones, texture) to benthic habitat occurrence in the field

Groundtruthing

- Resolves photo interpretation questions and facilitates quality control
- Performed during photo interpretation

NY Field Work Contacts		
Field Work Date	**Time**	**Launch Location**
7/23/2018	8am	Patchogue
7/24/2018	8am	Moriches
7/25/2018	8am	Shinnecock
7/26/2018 - 7/27/2018	8am	Lindenhurst

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Field Work

PROCESS:

- Field points are mostly pre-selected while in the office
- The photo interpreters travel to and locate each pre-selected field point accurately via GPS.
- The benthic habitat at the field location is compared to the imagery and ongoing mapping using snorkeling and underwater video
- Benthic habitat classification and extent is documented while in the field using ArcMap.
- Local knowledge gained from boat captains is instrumental in understanding the effects that industry and recreational activities have on the benthic habitats.

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CMECS UNITS

Substrate Component Units

Rock Substrate
Unconsolidated Mineral Substrate
Organic Debris
Shell Substrate
Anthropogenic Substrate
    Anthropogenic Rock

Biotic Component Units

Mollusk Reef Biota
    Mussel Reef
    Oyster Reef
Benthic Macroalgae
Aquatic Vascular Vegetation
    Seagrass Bed
Emergent Tidal Marsh
Tidal Scrub-Shrub Wetland
Tidal Forest Wetland

Modifier Units

Percent Cover (for Seagrass Bed areas)

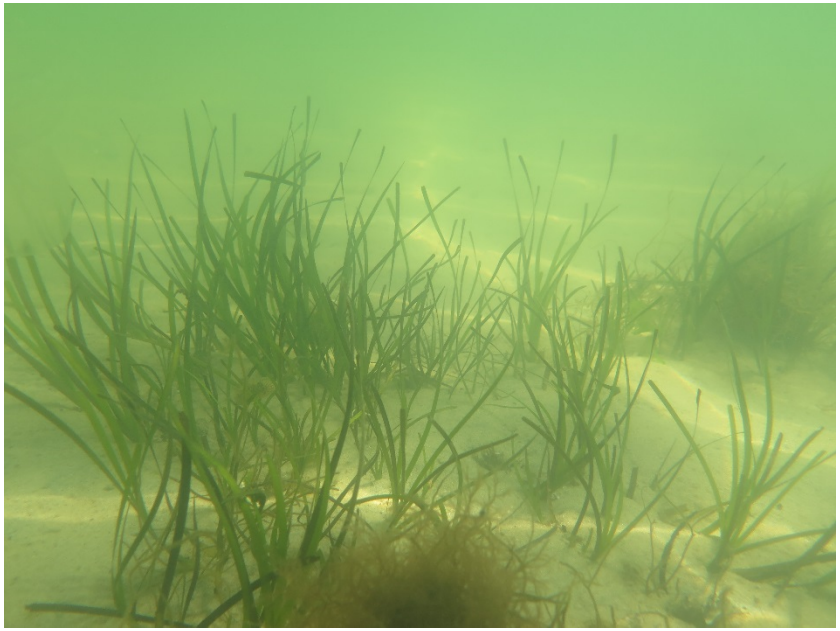

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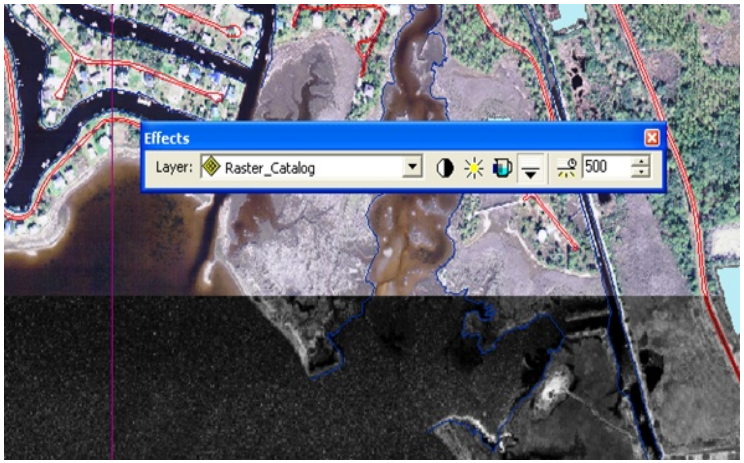
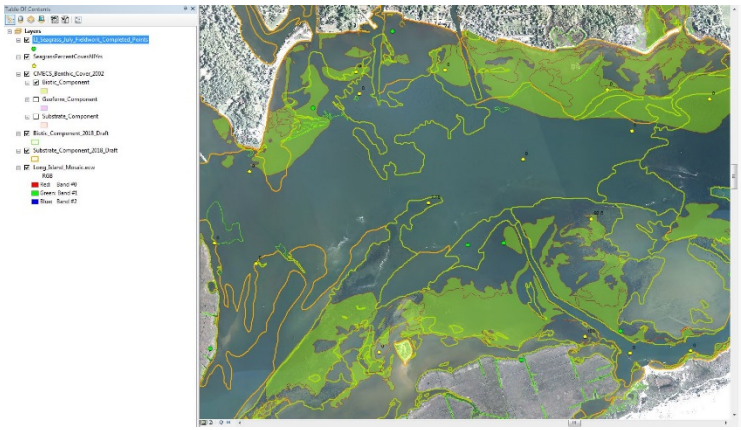
Photo Interpretation

- Prior linework and documentation compared to new imagery and edited for habitat changes
- Ancillary data is continually accessed
  - *Field data*
  - *Bathymetry*
  - *Historical imagery*
  - *Satellite imagery*
- Image histograms are adjusted for maximum visualization
- Mapped data is stored within ArcGIS
- Field visits are conducted during the photo interpretation phase to check habitat changes





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Inputs to Decision Making – Is it a valid change?


Biotic Component Classes 2018
Aquatic Vegetation Bed
Benthic Macroalgae
Mollusk Reef Biota
Wetland

THANK YOU!

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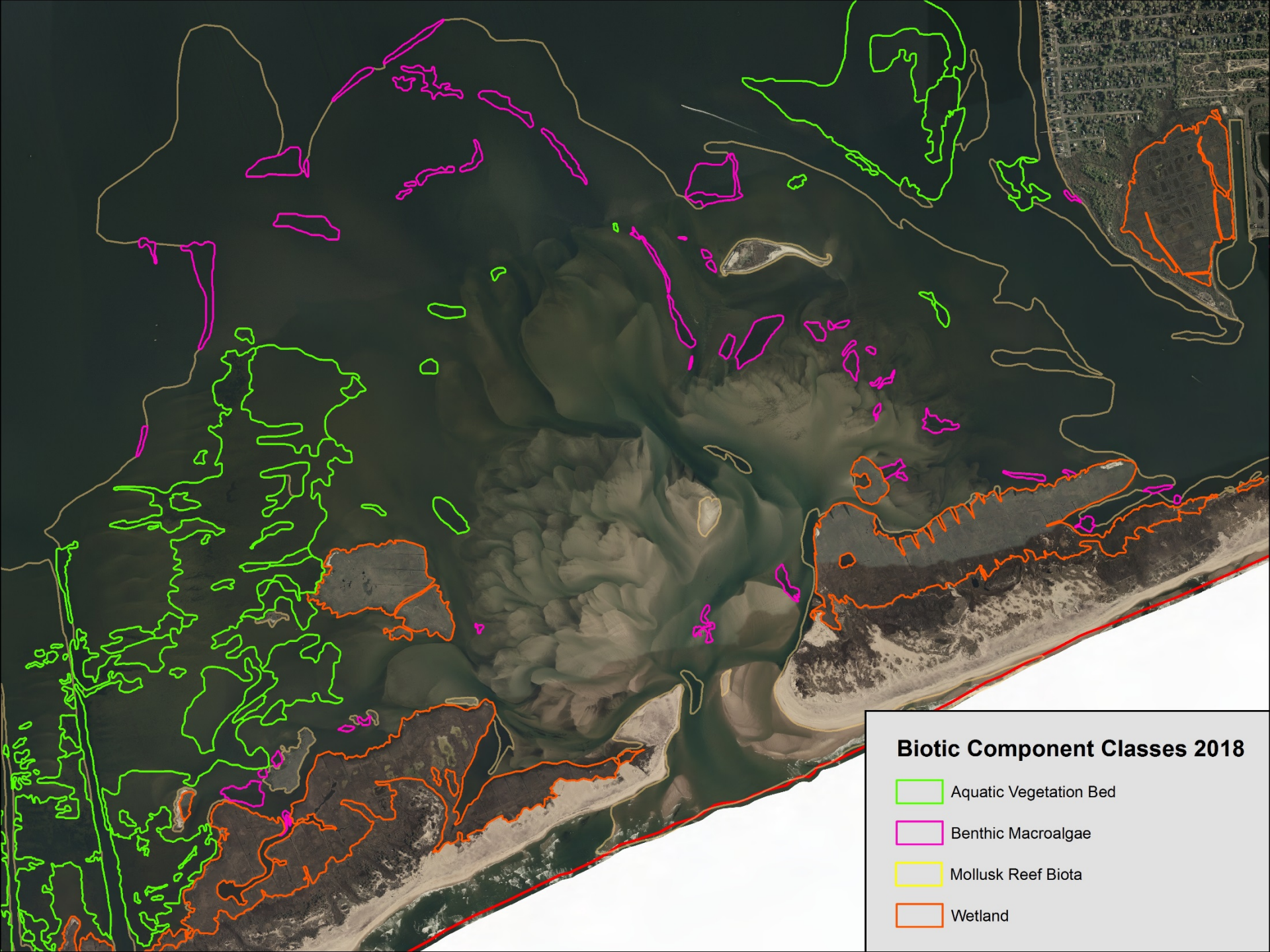
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