Maine Coastal Program's Mapping Initiative

Maine Coastal Program and Maine Geological Survey

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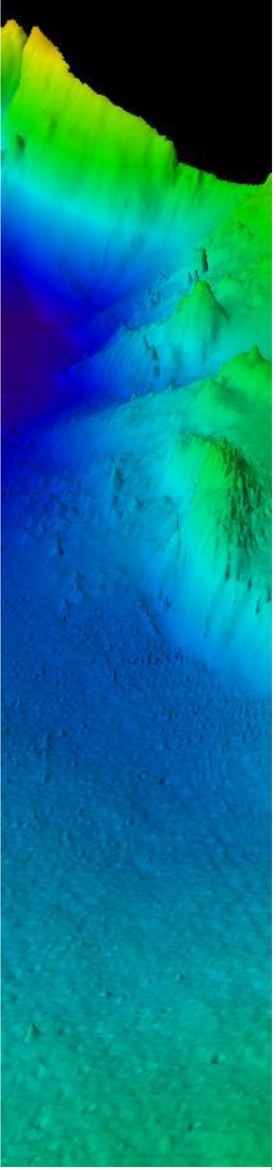
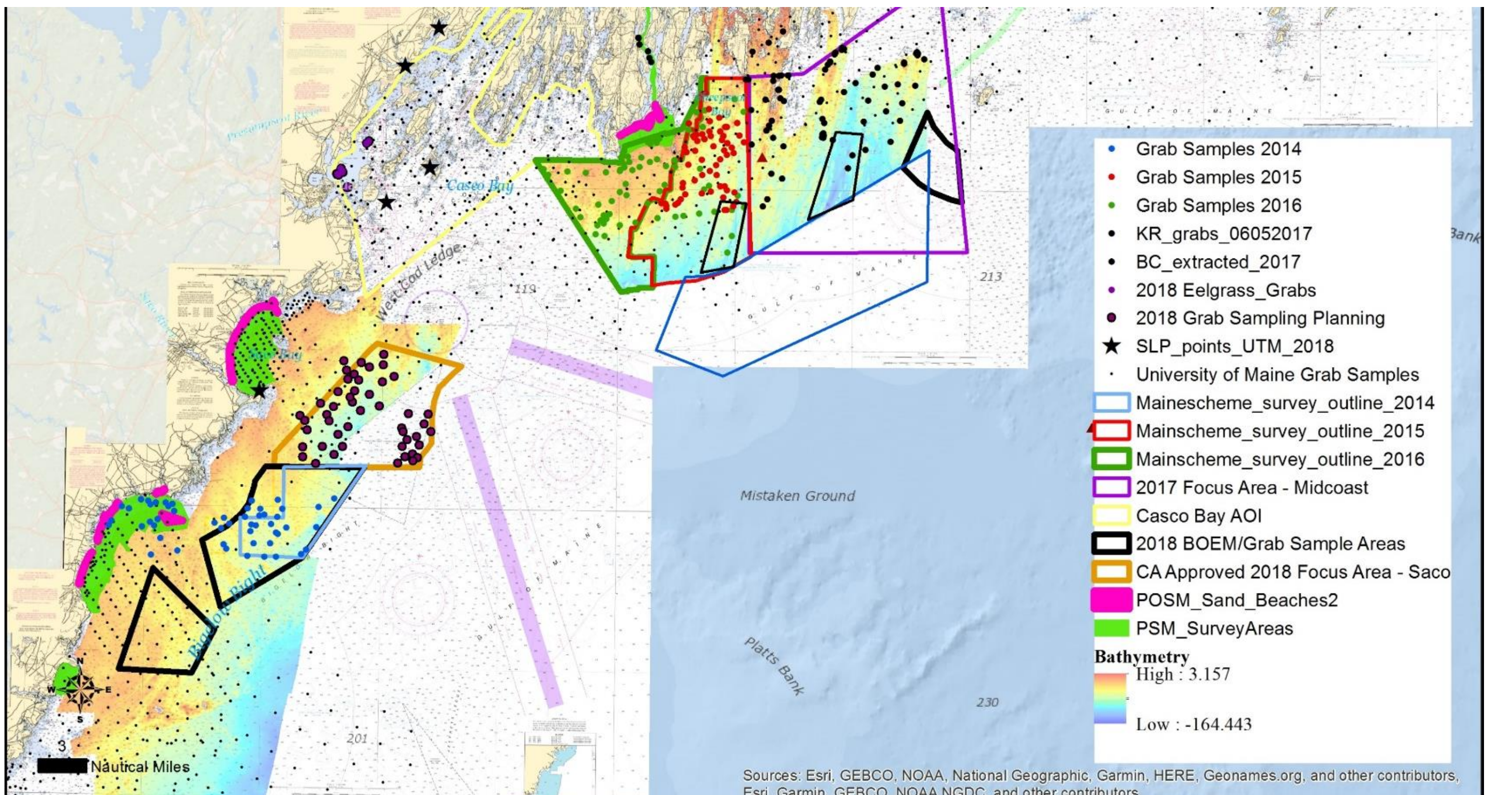
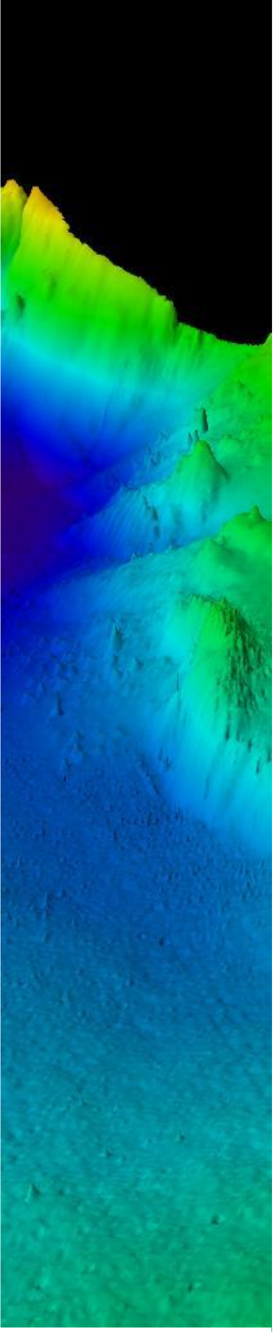


MCMI Program Objectives

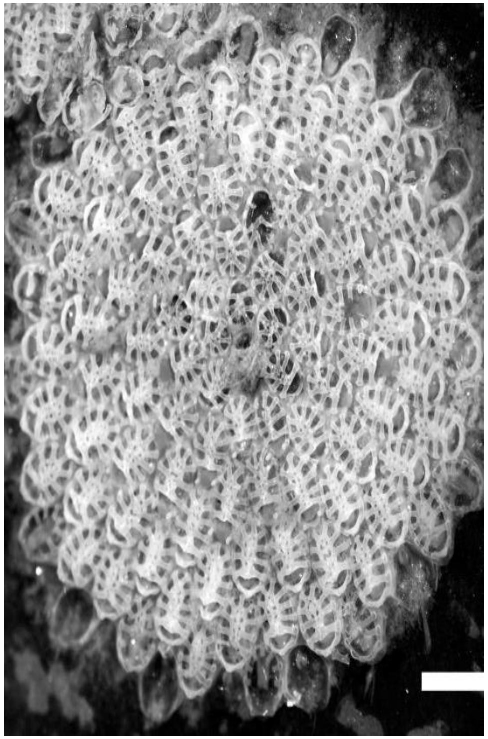
- Expand multibeam coverage for Maine's coastal waters/update nautical charts
- Refine existing seafloor substrate/textural maps
- Investigate sand & gravel resources for beach nourishment
- Classify and map Maine's subtidal benthic habitat and inventory biological communities
- Assess nearshore sediment transport

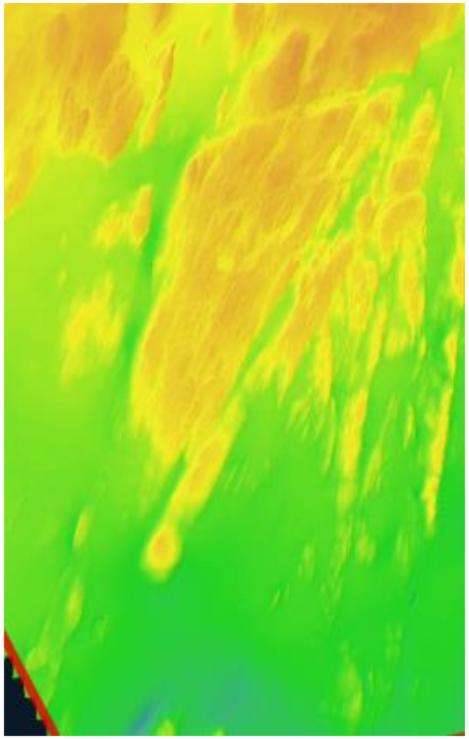


MCMI
Maine Coastal Mapping Initiative



Casco Bay Objectives





- Multibeam Echosounder (MBES) mapping in the outer bay: bathymetry, backscatter (bottom hardness), and ground truthing
- Eelgrass mapping: methods comparison
- Non-native species identification and spatial extent investigations

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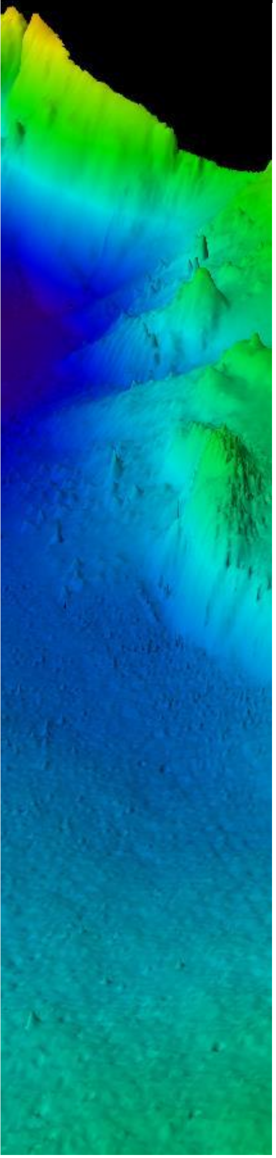
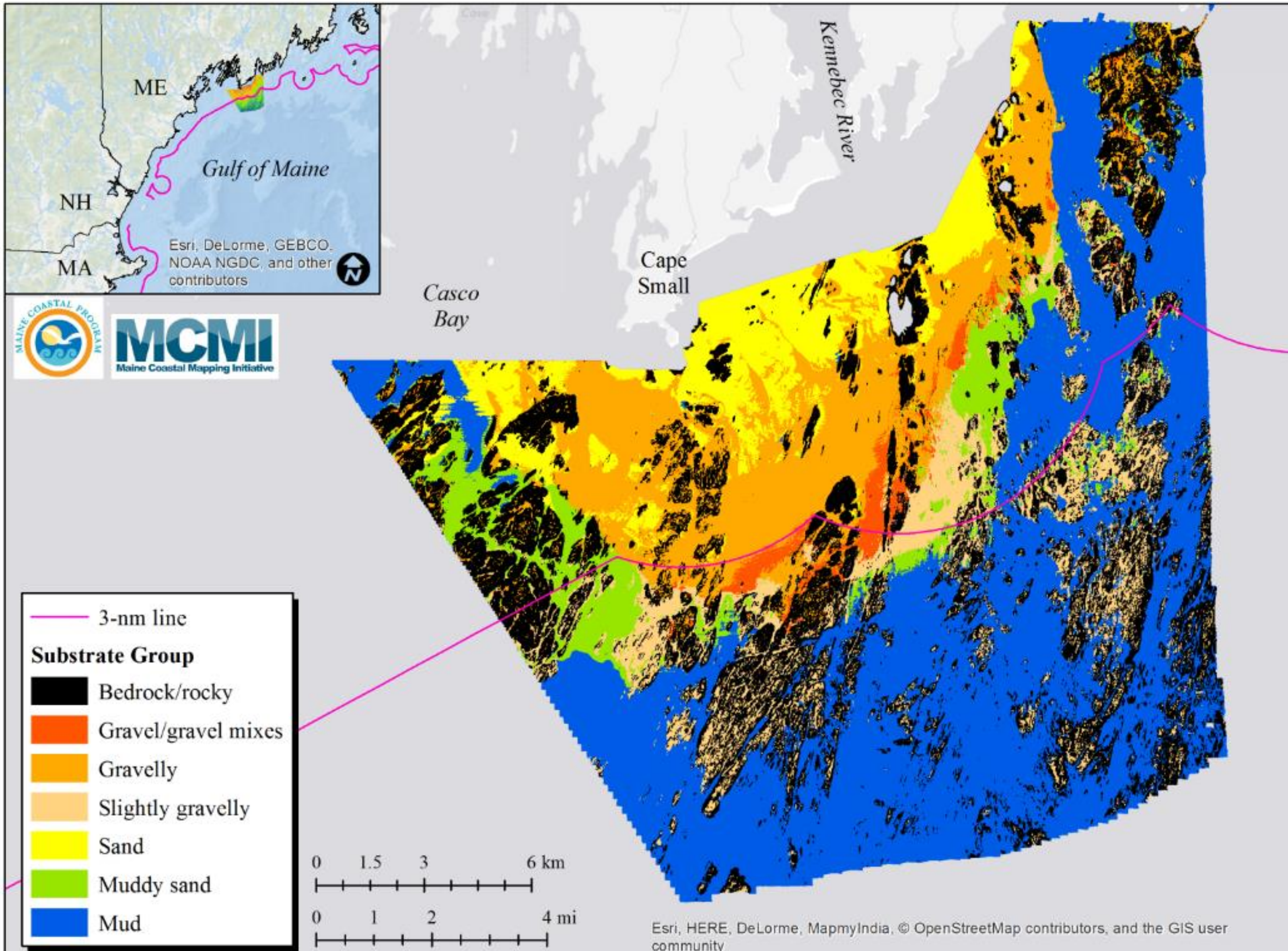
Textural Mapping





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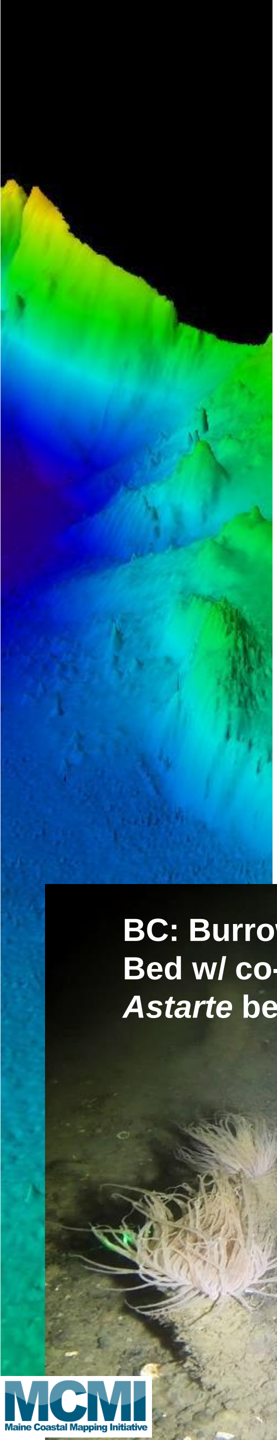
Marine Habitat Classification



Communities classified:

- Water column data
- Geoform (terrain type)
- Substrate
- Biological Community

MCMI Maine Coastal Mapping Initiative

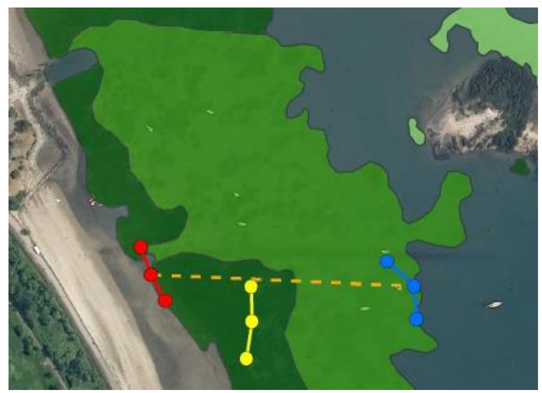
Eelgrass Mapping: Methods Comparison

The Maine Coastal Program
Maine Department of Environmental Protection
Nearview LLC
Southern Maine Community College
Maine Geological Society
Casco Bay Estuary Partnership

Dive Surveys

Aerial Images & Groundtruthing

Side-Scan Sonar



Drone High-Resolution Images

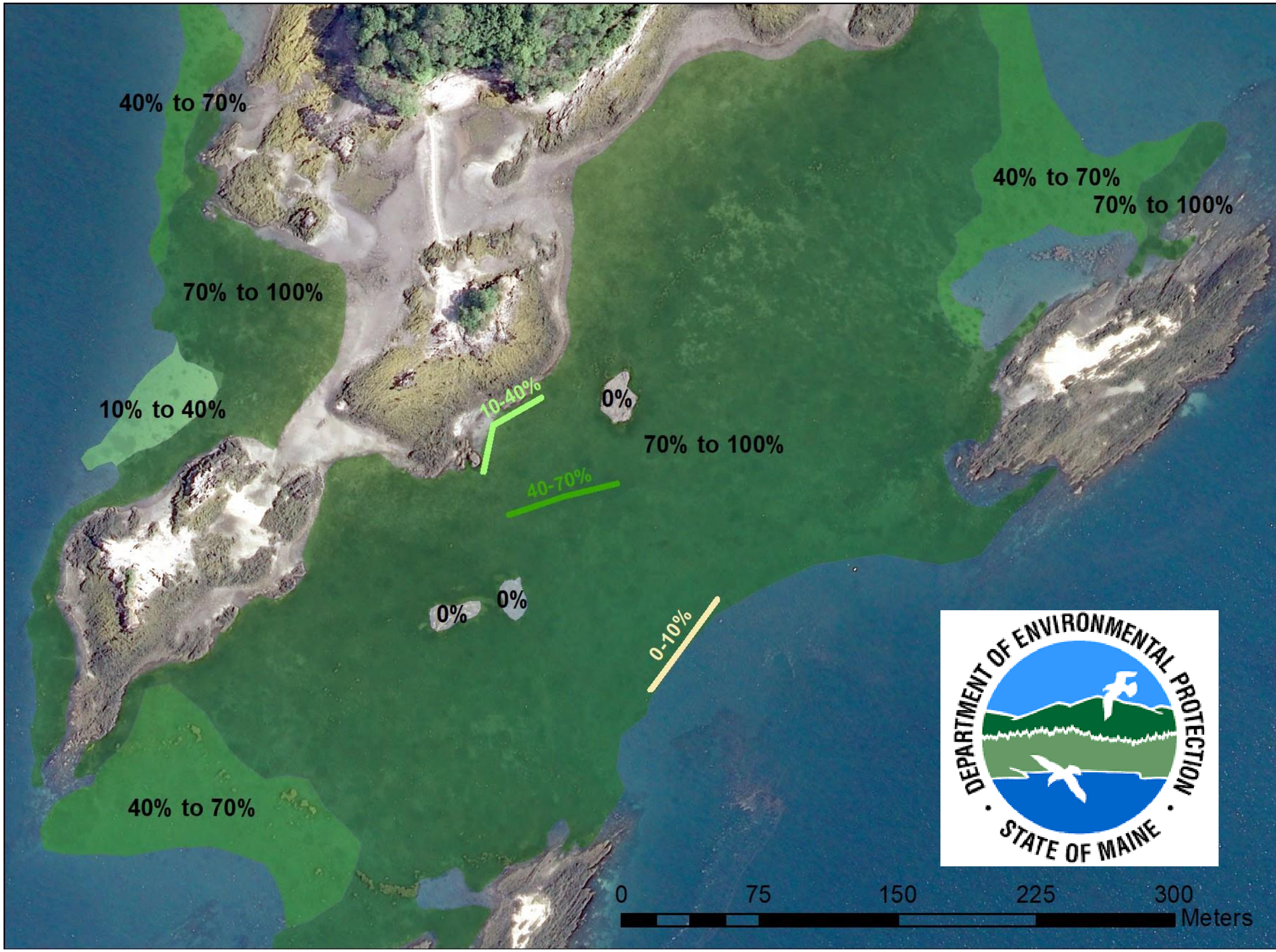
Single-Beam Sonar

MBES and grab sampling

Objective:

Evaluate the differences in detection, accuracy, data collection feasibility, ease of equipment deployment, operational costs, and time required to conduct the survey work

METHODS COMPARISON

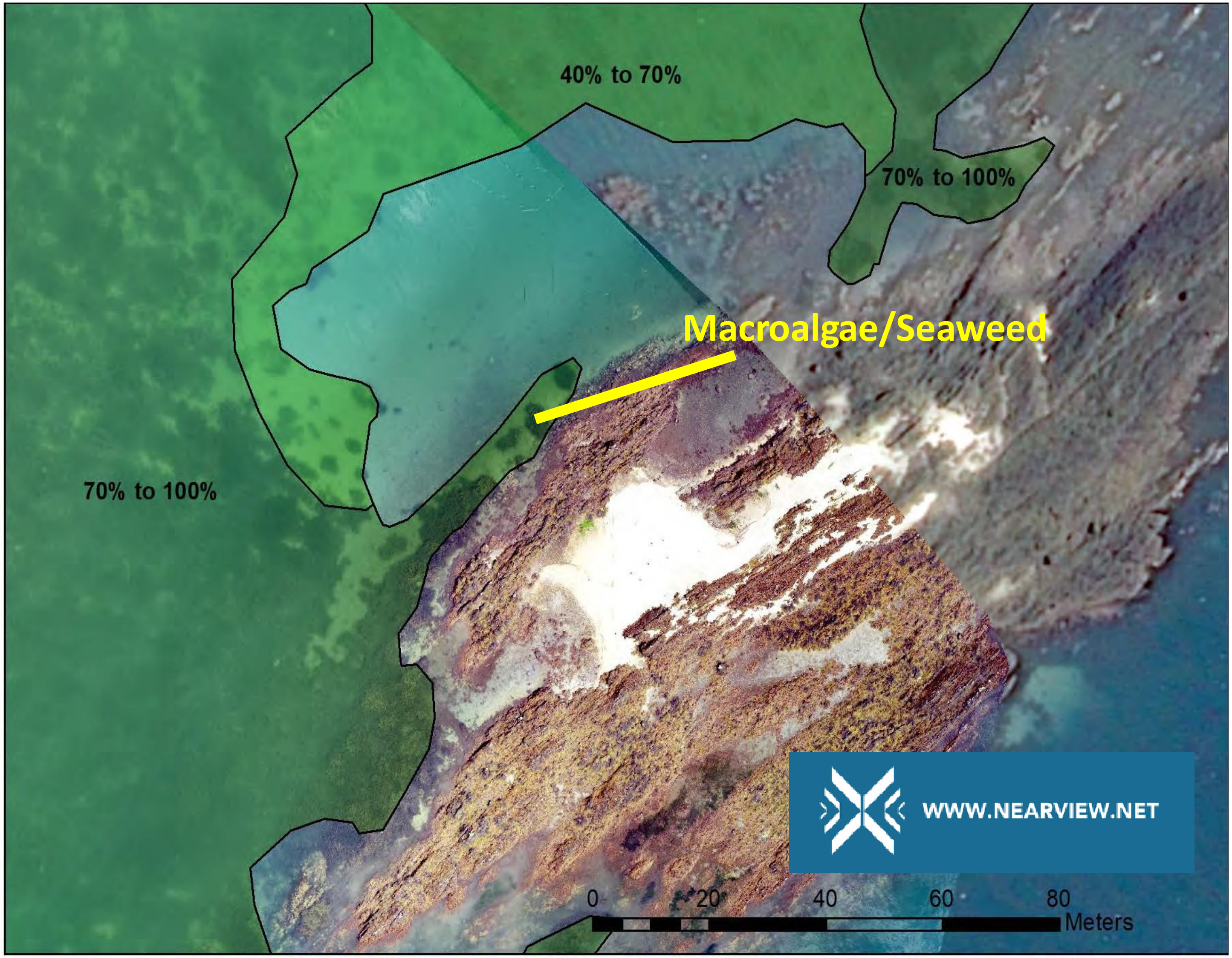


2018 aerial imagery, eelgrass cover, and ground-truthed transects.

METHODS COMPARISON

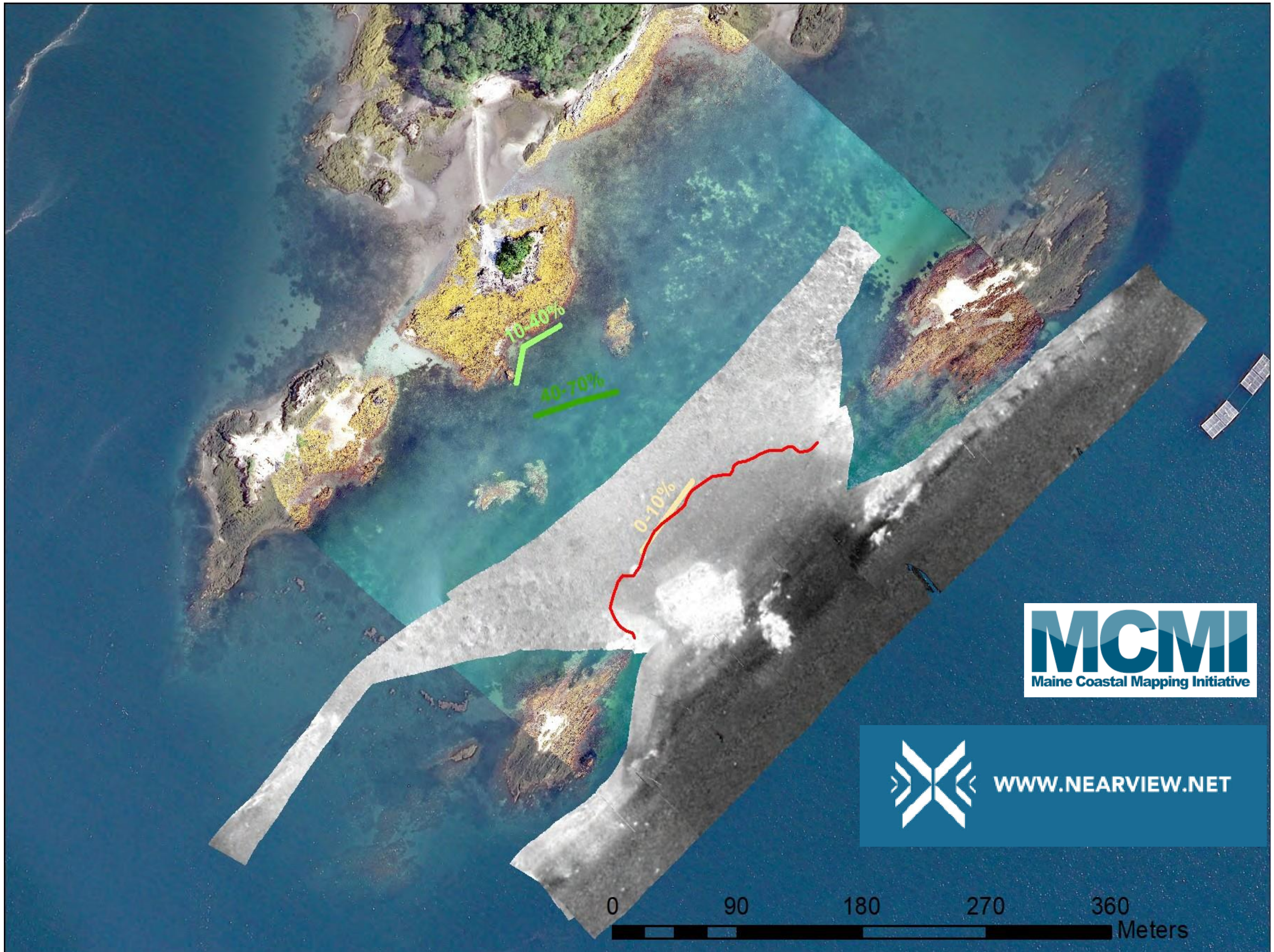
UAS orthomosaic, eelgrass cover map, and ground-truthed transects.

METHODS COMPARISON



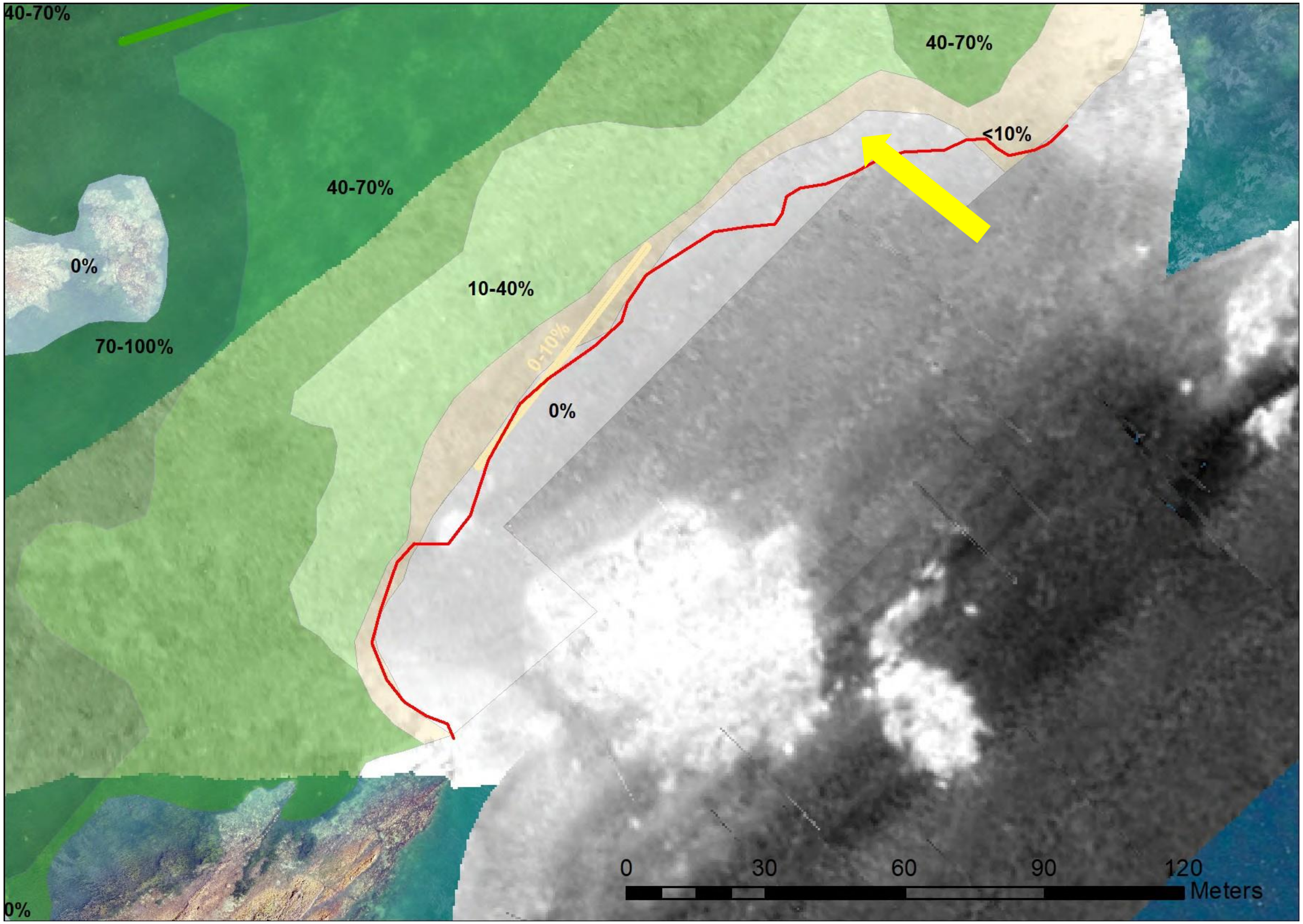
DEP 2018 classification. Note misclassification of seaweed as eelgrass.

Methods Comparison



MBES backscatter, UAS orthomosaic, and ground-truthed transects, red line indicates deep boundary of eelgrass.

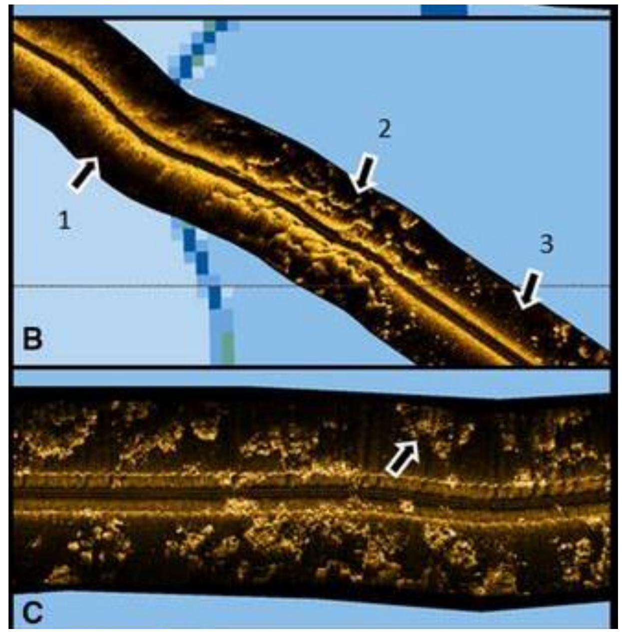
Methods Comparison



Boundary line of eelgrass derived from MBES with 2018 UAS classification. Note boundary gap (arrow) in UAS imagery.

Methods Comparison

Side-Scan Sonar



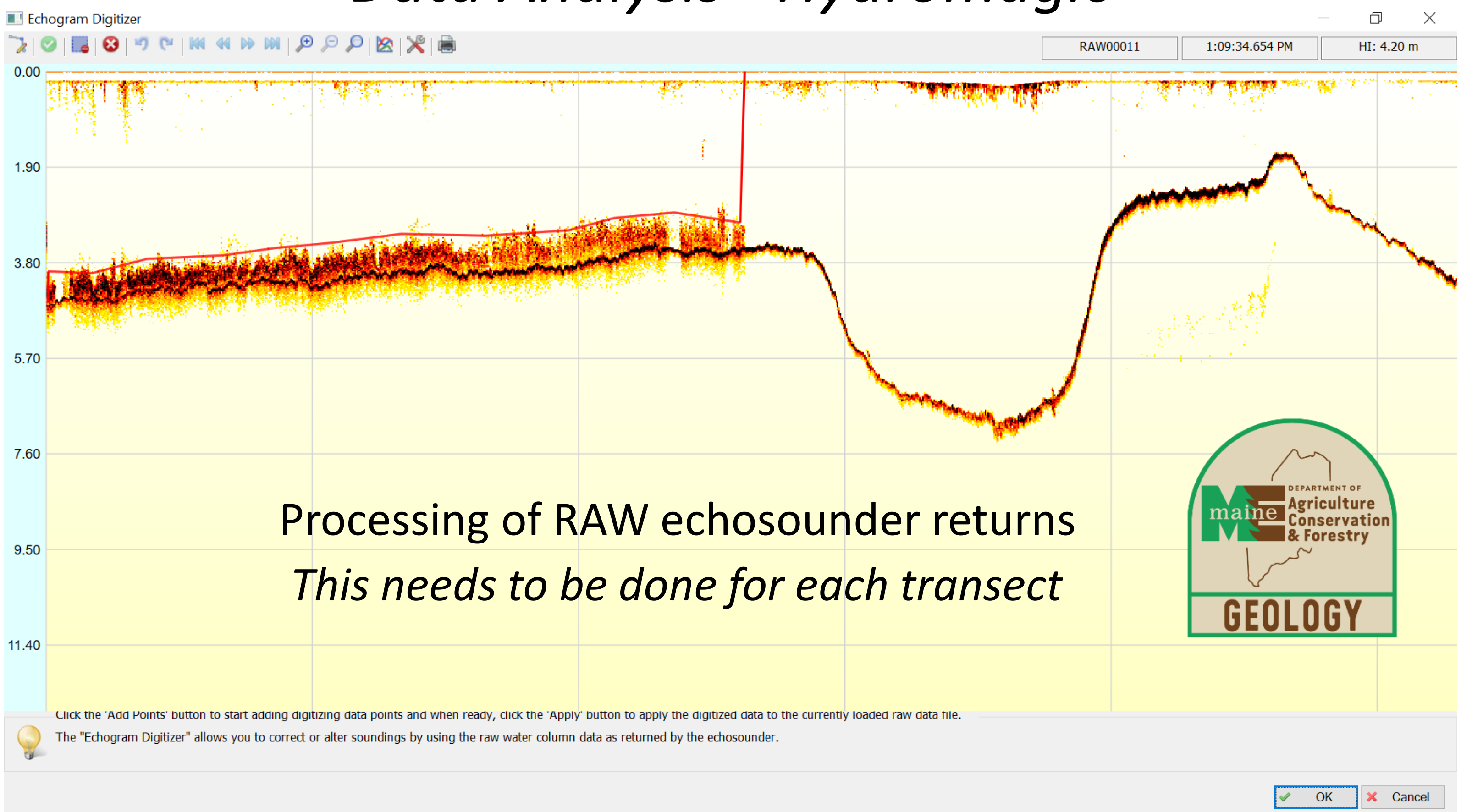
Provides image of eelgrass with potential to determine height and density

Issues with the local system because of GPS accuracy and learning curve of data collection and processing

Methods Comparison

MGS Nearshore Survey System (“NSS”)

Data Analysis - Hydromagic

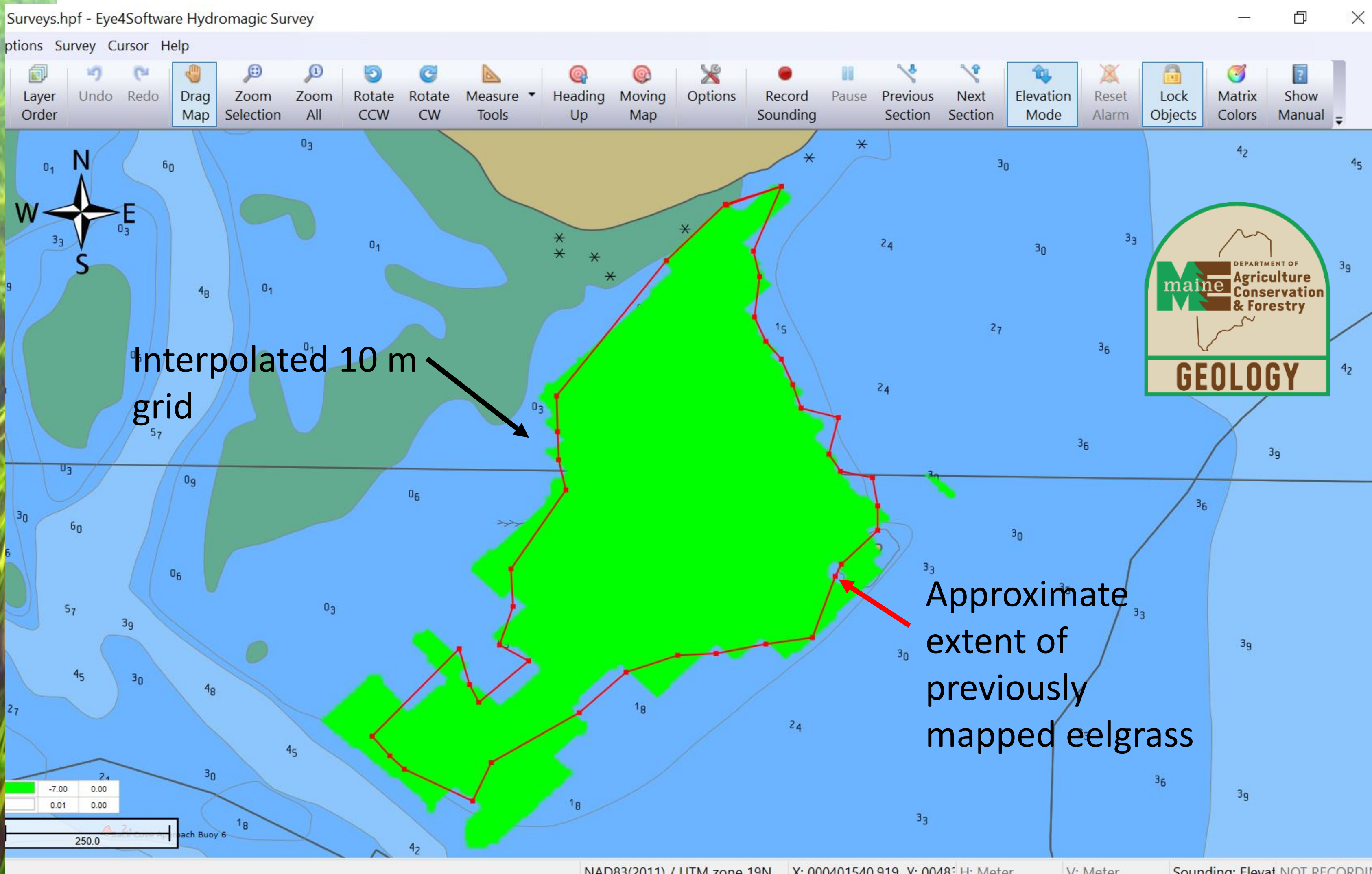


Processing of RAW echosounder returns

This needs to be done for each transect

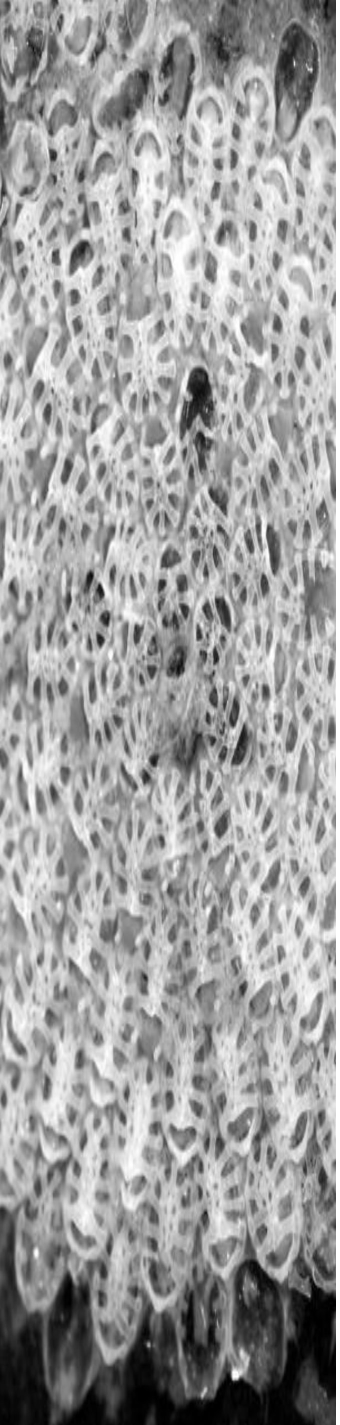
Methods Comparison

MGS Nearshore Survey System ("NSS")

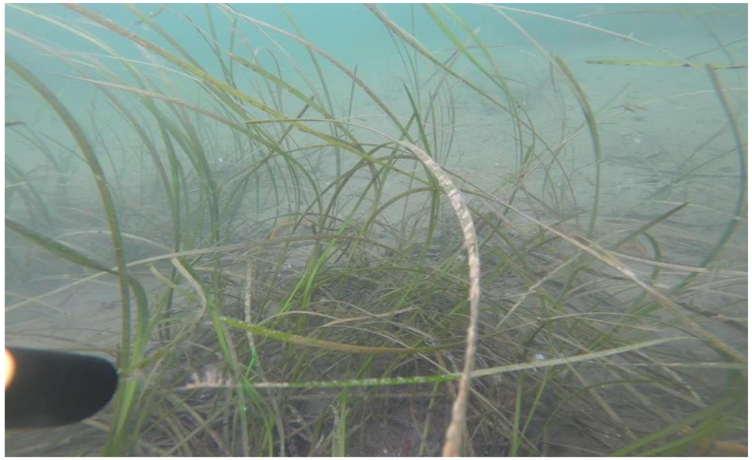


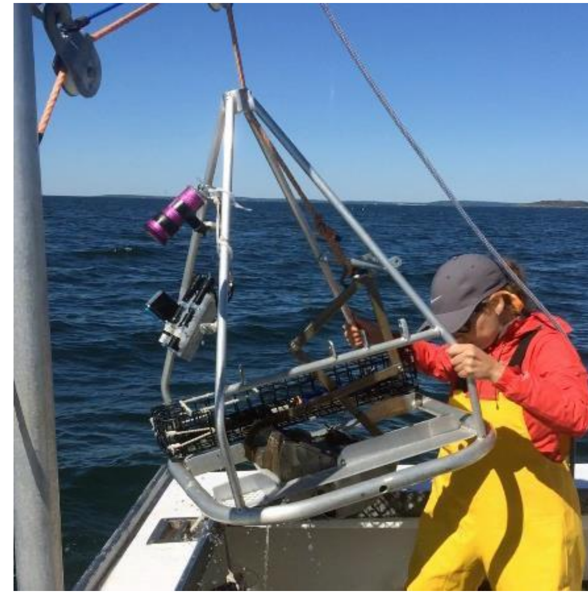
METHODS COMPARISON

	Aerial Images &Ground Truthing	Dive Surveys	UAV (drone)	Side-Scan Sonar	Single-Beam Sonar	MBES and grab sampling
Area Best Covered	Shallow to Mid	Entire Bed	Shallow *only*	Deep Edge *only*	Shallow to Mid	Deep Edge *only*
Logistical Considerations	Intensive	Intensive	Intensive, FAA regs and tide dependent	Moderate, tide dependent	Moderate, tide dependent	Moderate, tide dependent
Time of Data Collection	Least to Moderate (comparatively)	Intensive	Moderate	Intensive	Moderate	Intensive
Post-Processing	Intensive, manual	Light to Moderate effort	Intensive, manual	Learning curve, but still requires manual work	Intensive, manual	Learning curve, could be automated
Cost	*Not yet compared*					
Value added information	Large scale mapping possible	Height, density, shoot density, …	High-res images identify SAV type	Height, density	Height, density	Height, density
Other Considerations	Turbidity, Depth, and other SAV can obsure analysis	Provides data of an entirely different scale	Can only use images tied to a point on land	Learning curve for collection and processing	Best for Presence /Absence	Provides good image for deep edge and turbid waters



Eelgrass and Non-native Species



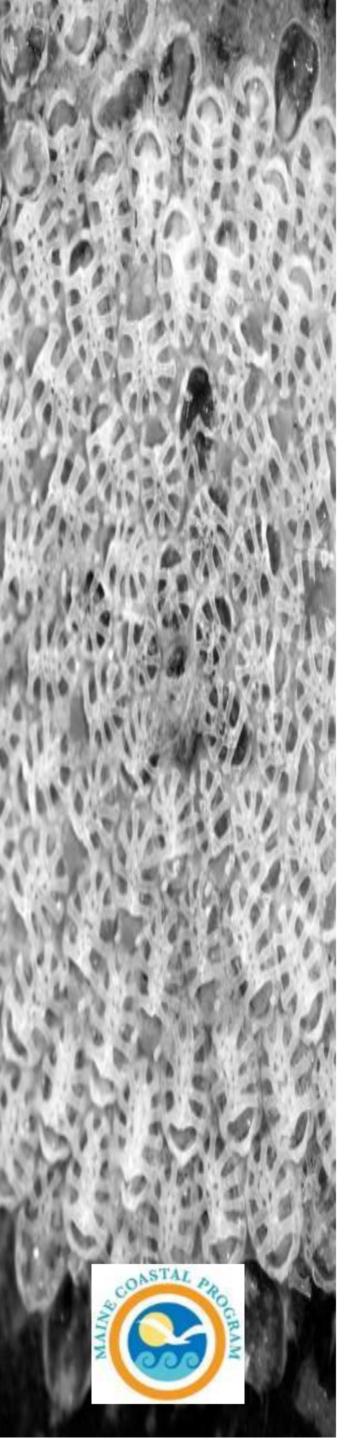


Physical Parameters

- Water Quality (ODO, Temperature, pH, Chlorophyll, Salinity, Depth)
- Sediment Grain Size

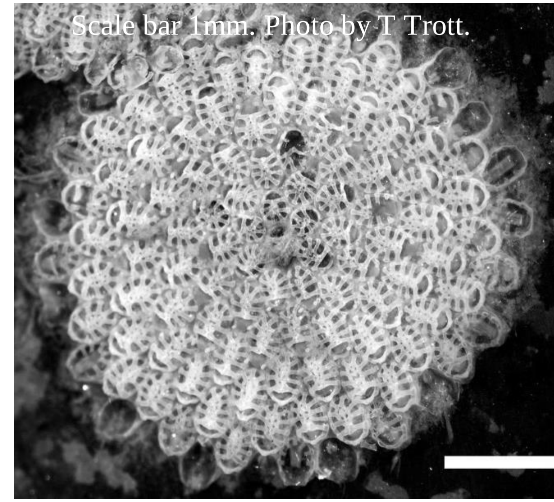
Biological Parameters

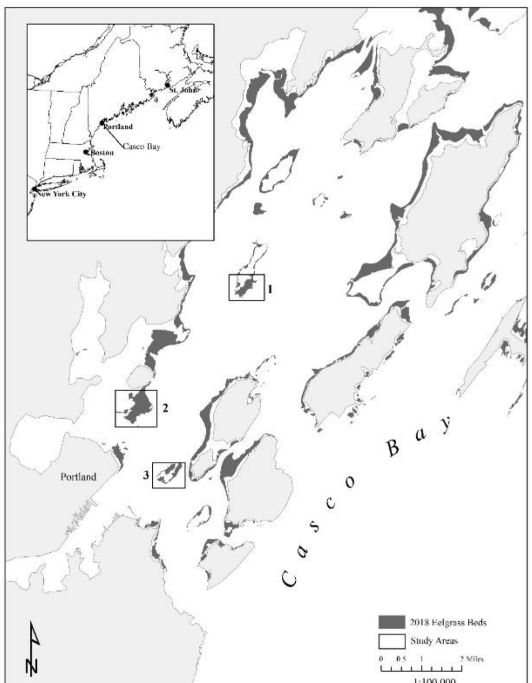
- Estimated Blade Density
- Species Assemblage
- Species Diversity
- Genetic Diversity

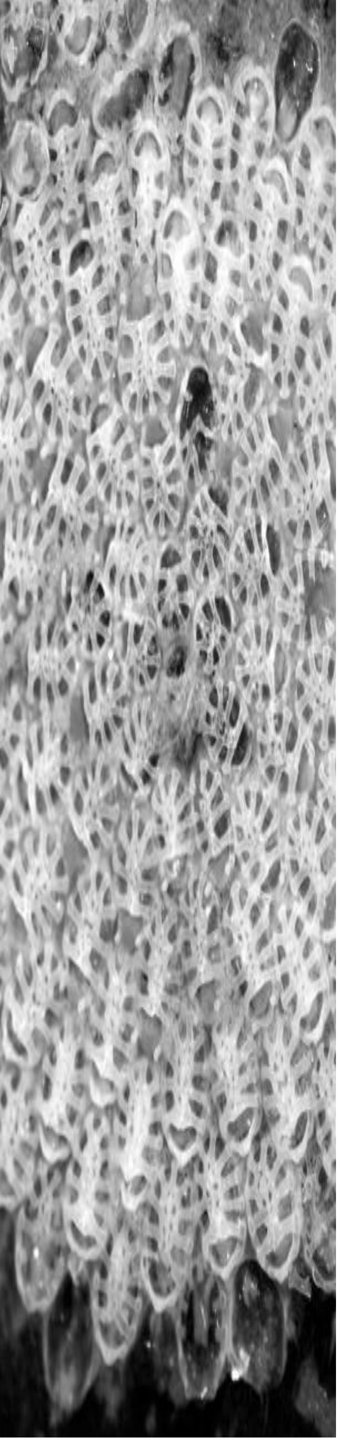


Cribulina mutabilis, new observation for Northwest Atlantic

- Encrusting bryozoan native to Japan
- Light pink, flat, circular colonies
- Three kinds of zooids, the frequency of each varying with season in Japan
- Eelgrass obligate, but found on fucoid and laminarian algae in other introduced regions







Grandidierella japonica, New Observation for the Northwestern Atlantic

- Estuarine gammarid amphipod native to Japan, China, and Russia
- Builds U-shaped tubes on muddy substrates
- Introduced populations are known from the West coast of North America, Australia, England and France
- Impacts on US West coast not well studied

Monitoring Tidal Marsh Resilience

- Marsh Resilience Monitoring
  - RSETS
  - Plant Community Analysis
  - Water level monitoring
- Tidal Restriction Database
- CoastWise