

Remote Sensing for Oyster Habitat in Texas

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Department

Sonar/Acoustics

- Need to identify extent and change in oyster habitat for resource management and restoration
- Turbid bays necessitate use of sonar
- Shallow bays (< 5 m) present challenges to traditional sonar use
- Two approaches
 - Scientific sonar for system-wide surveys
 - Recreational sonar for rapid assessments



Single-beam Echosounder: Biosonics DTX
120 kHz

Deployment

RECREATIONAL

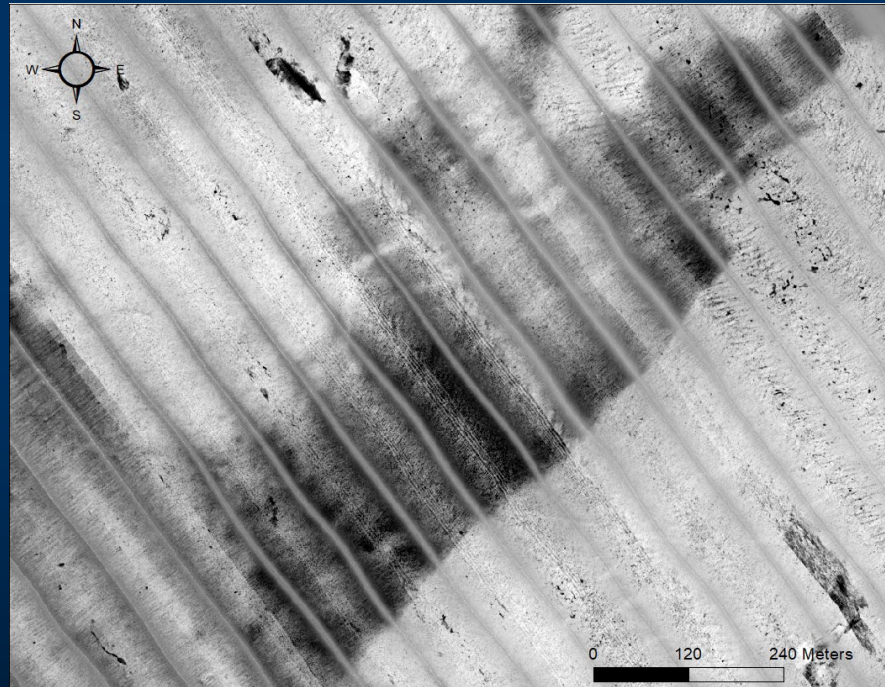


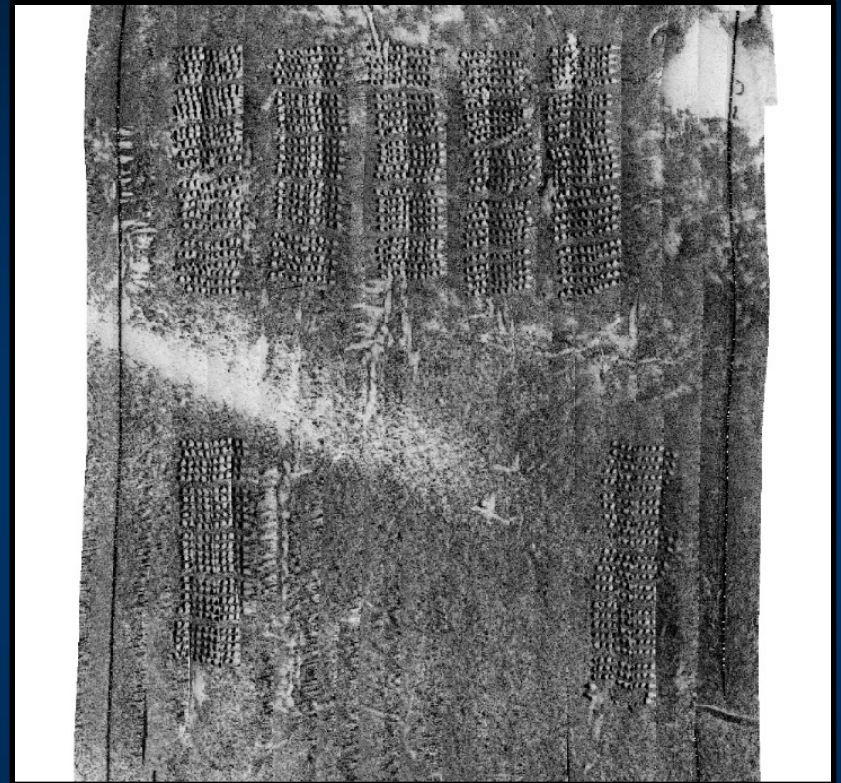
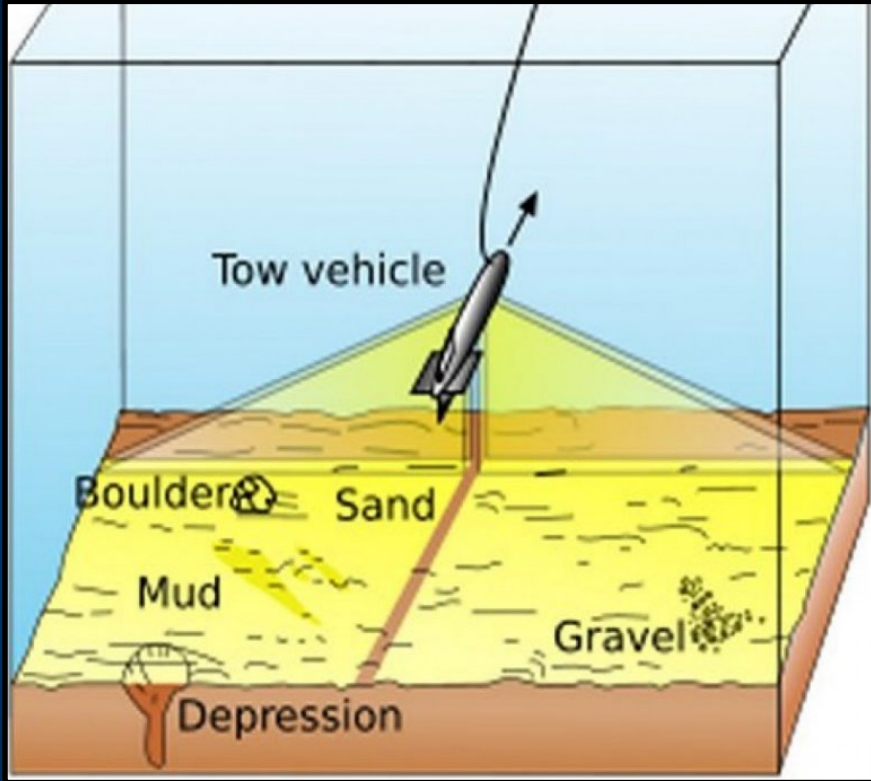
SCIENTIFIC



Sidescan sonar

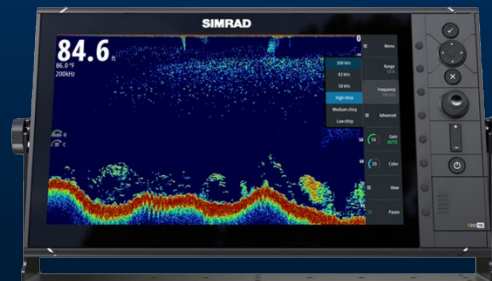
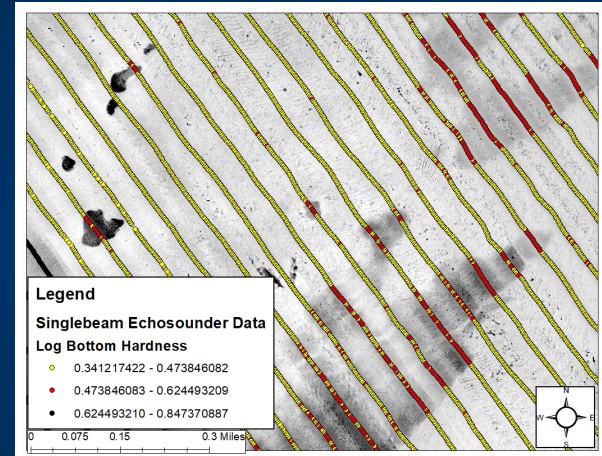
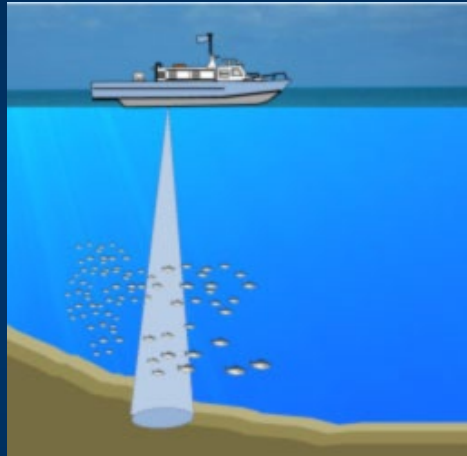
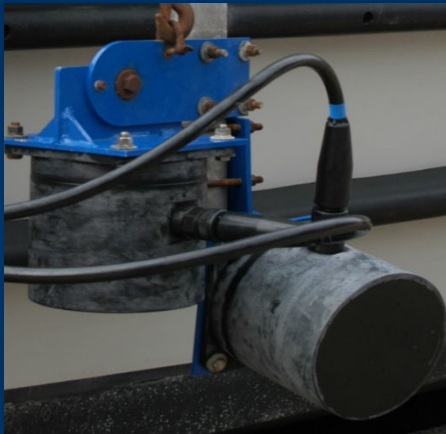
- Produces an image of the seafloor based on the backscatter of the acoustic signal
- “Uncalibrated”

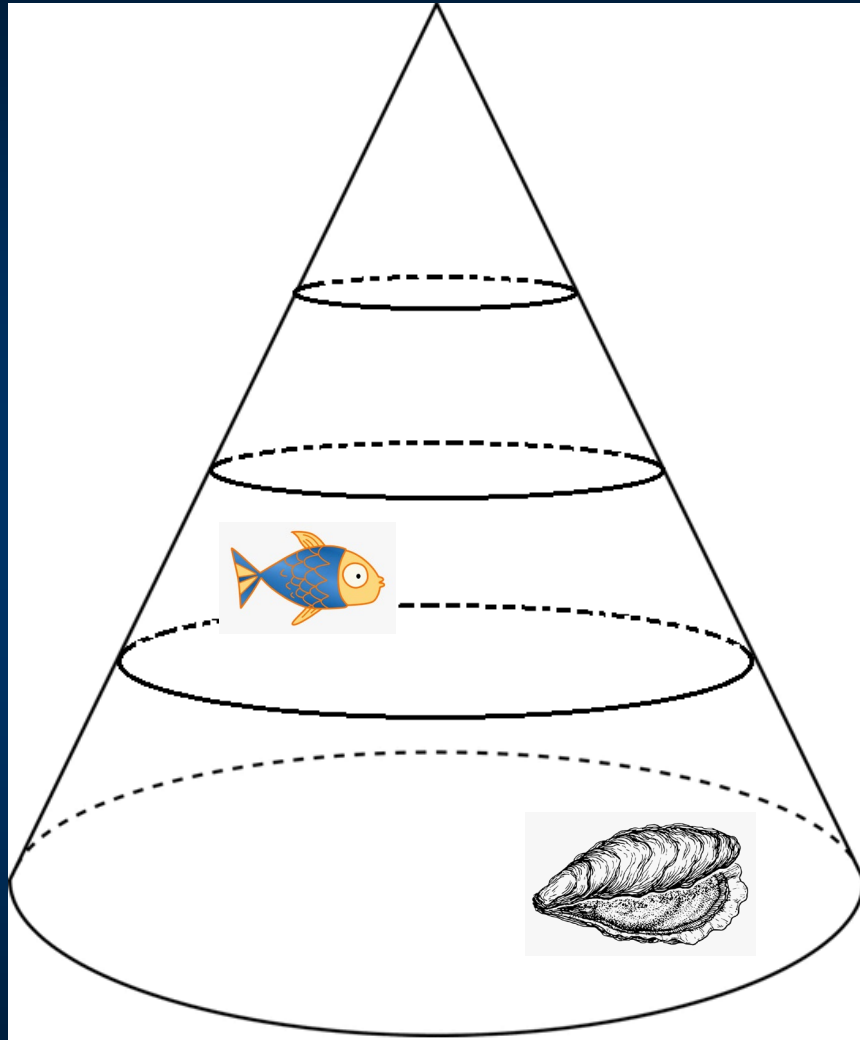




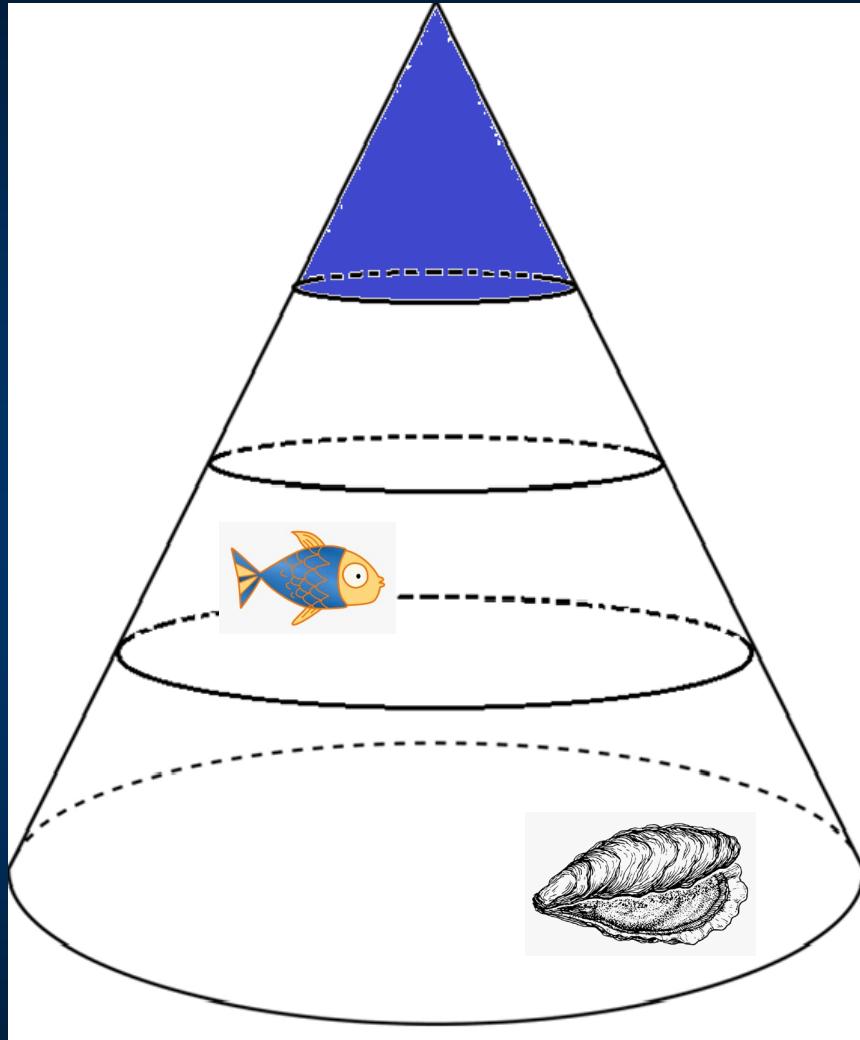
<https://gulfofmexico.marinedebris.noaa.gov>

Single beam echosounders or “Fish Finders”

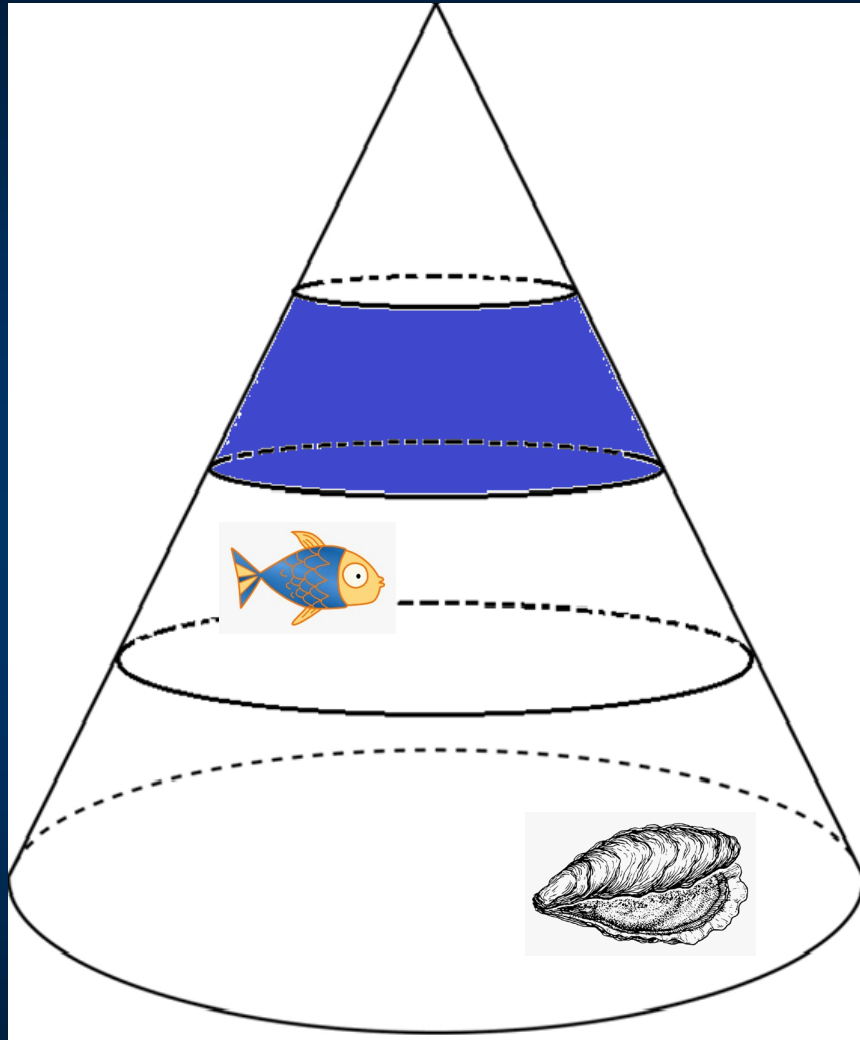




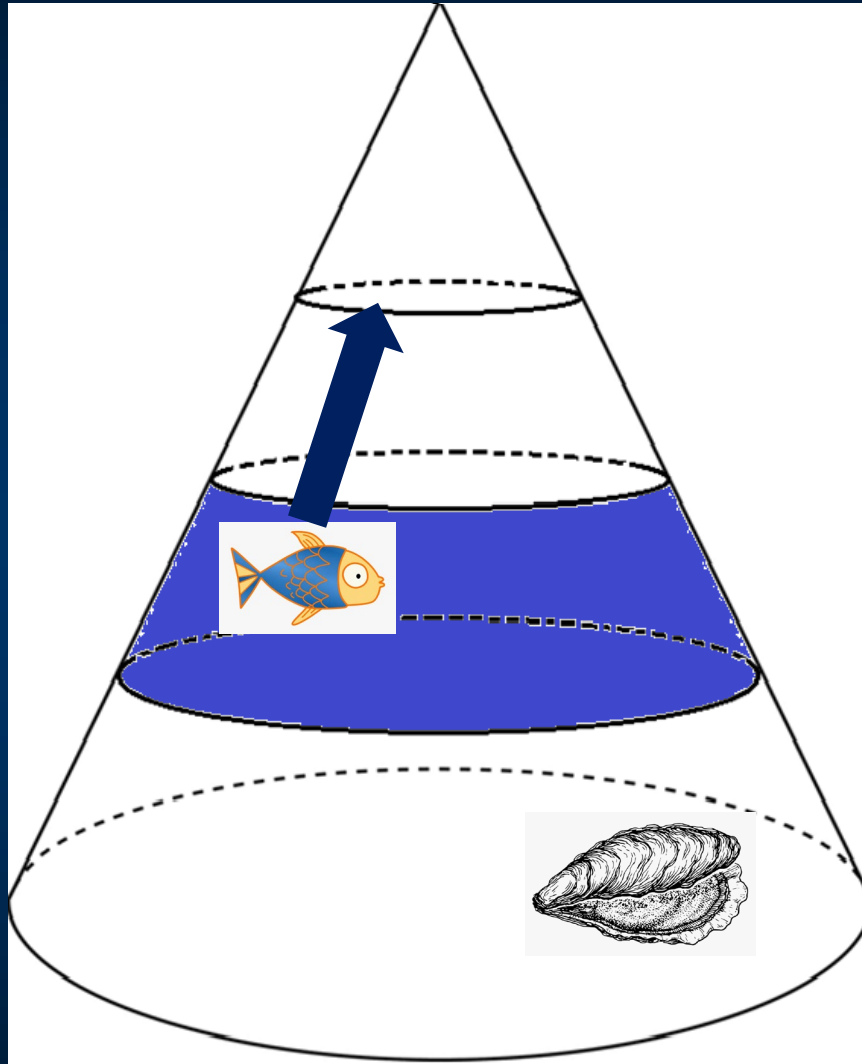
Pulse of Sound



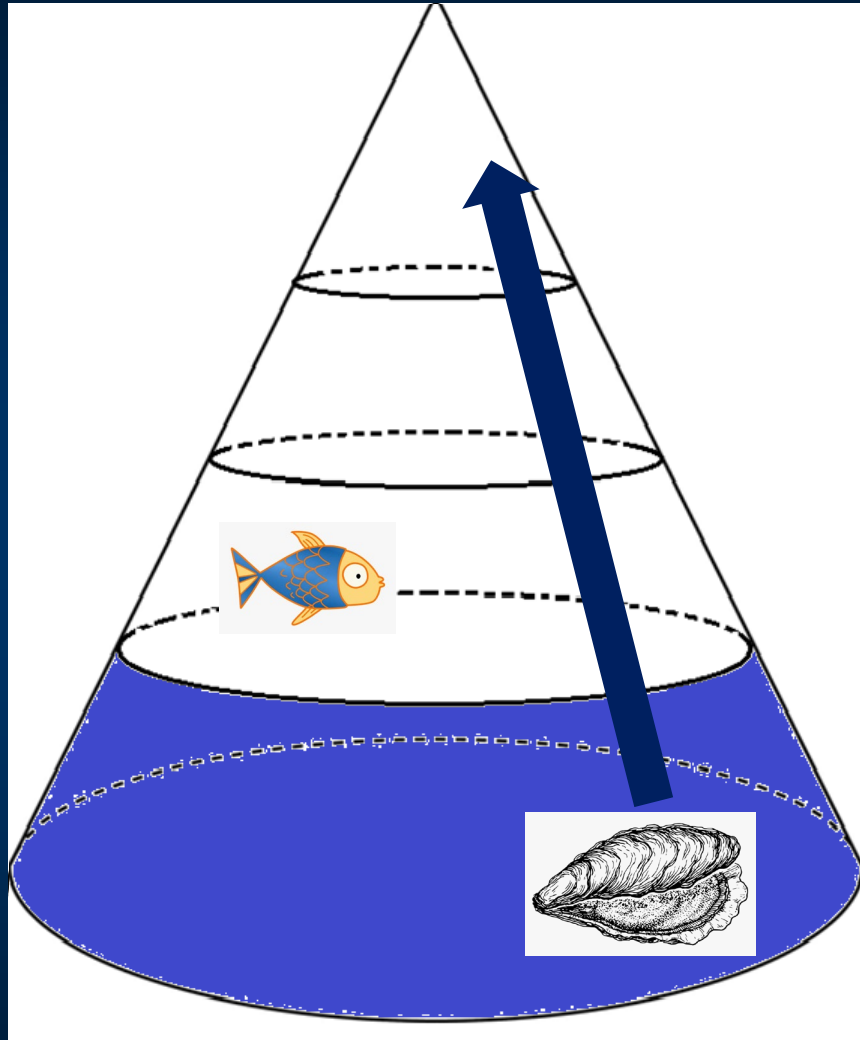
**Pulse of
Sound**



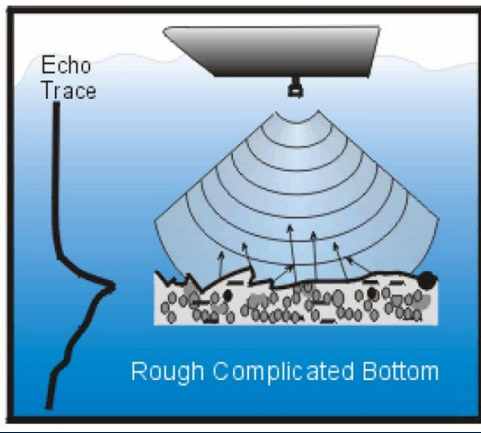
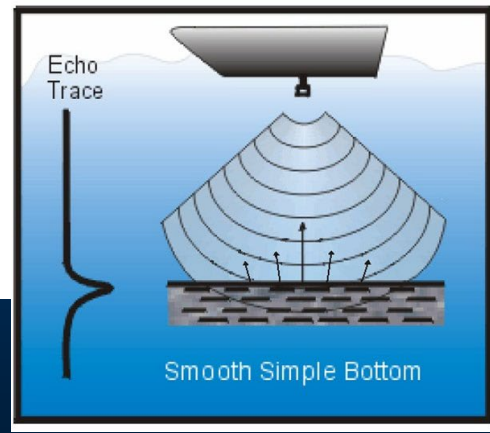
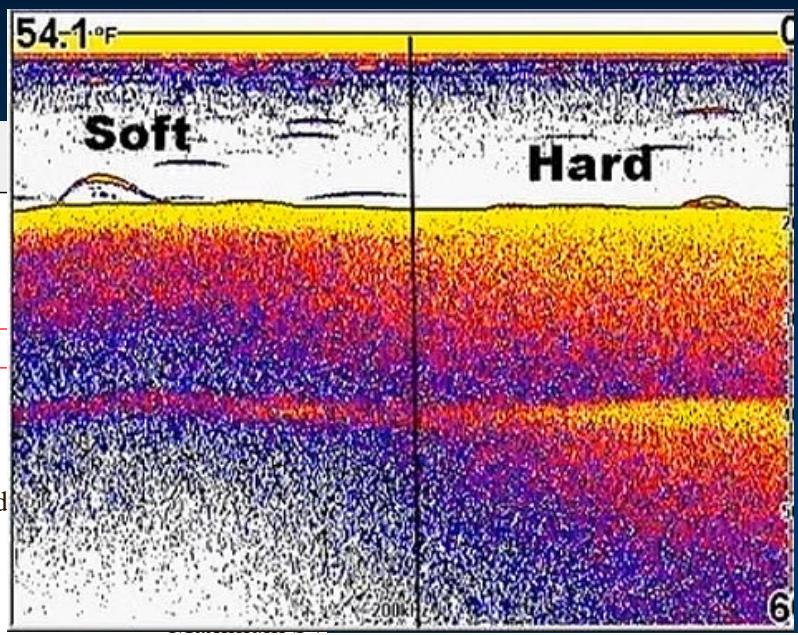
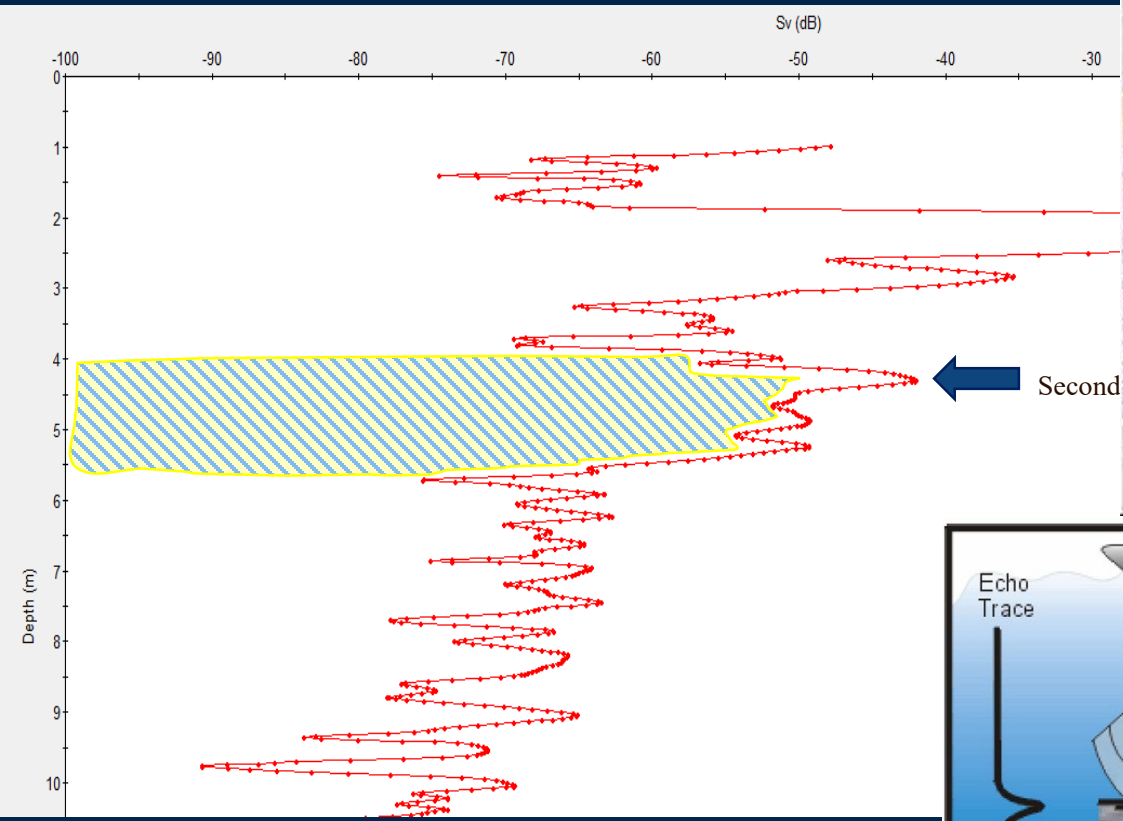
Pulse of Sound



**Pulse of
Sound**



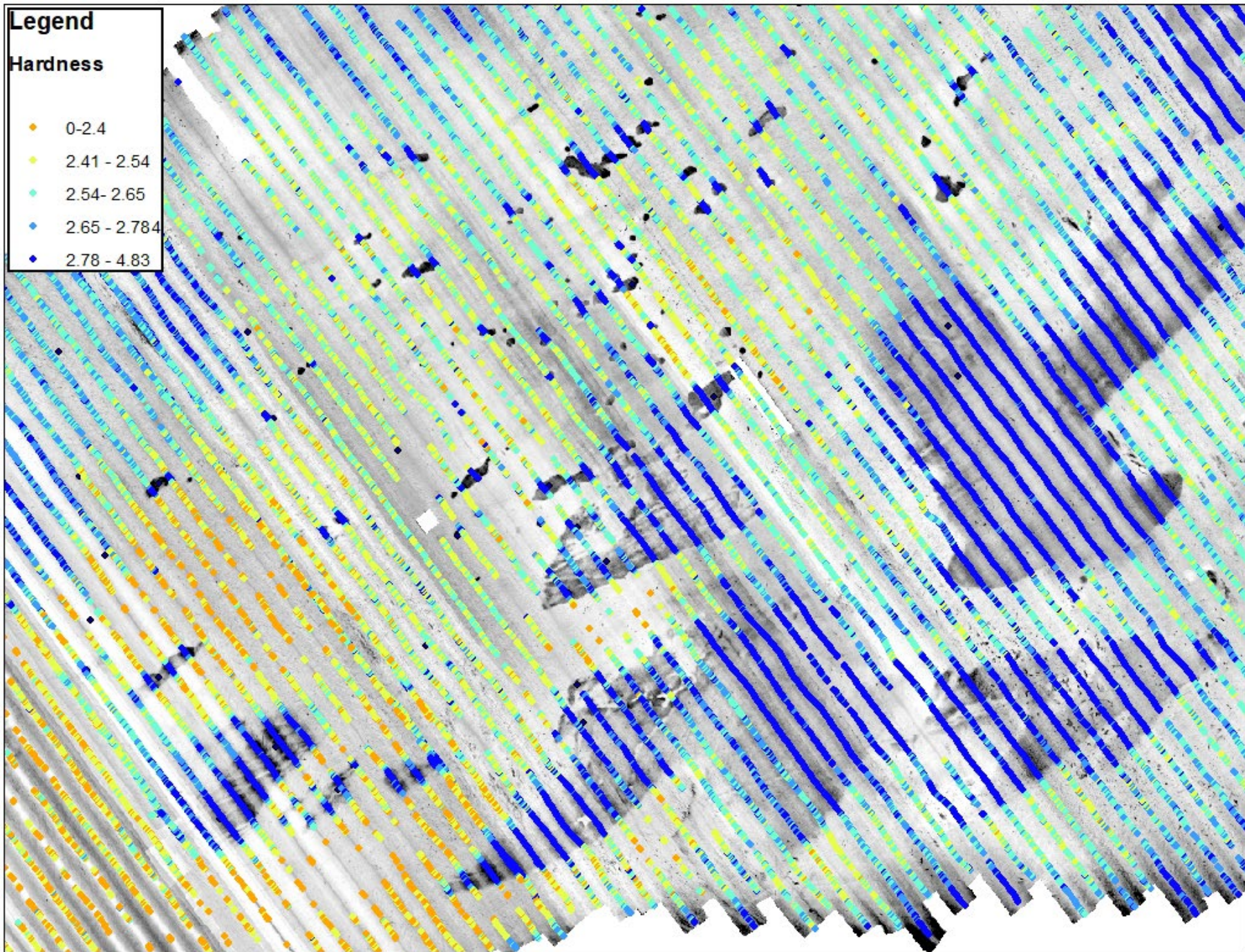
**Pulse of
Sound**



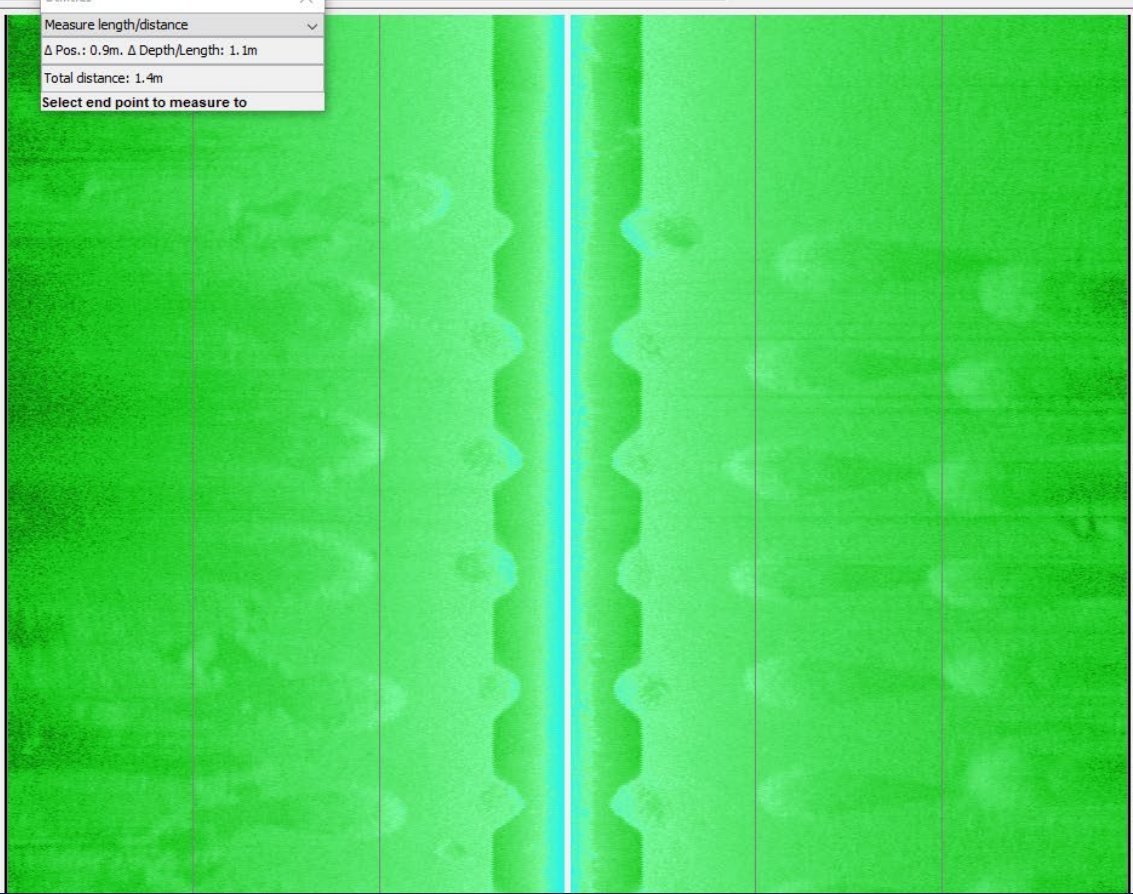
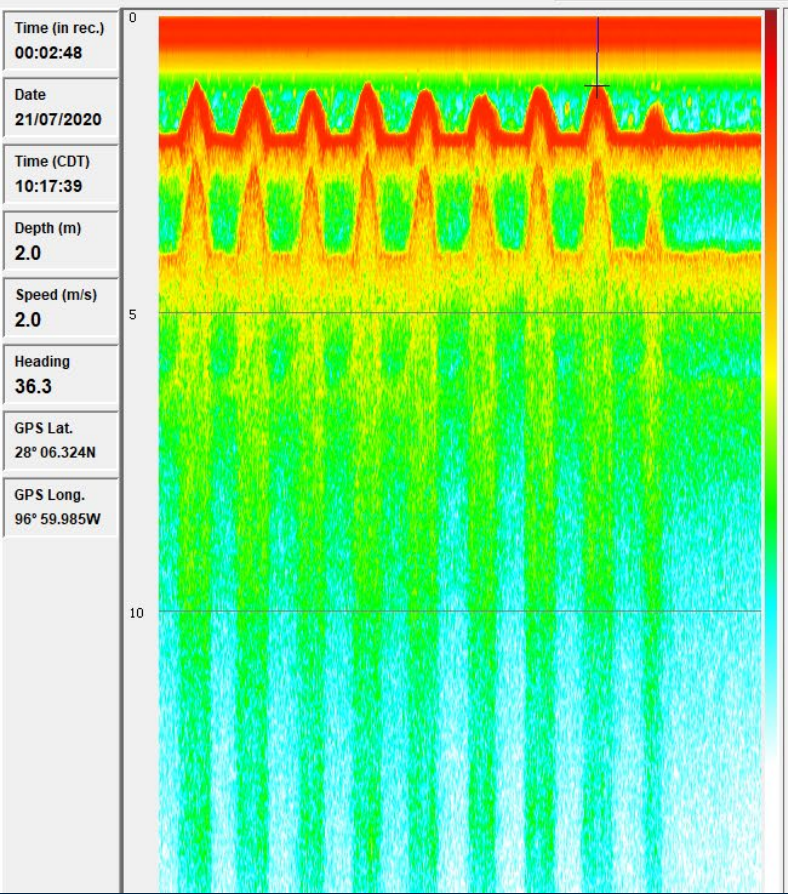
Legend

Hardness

- 0-2.4
- 2.41 - 2.54
- 2.54- 2.65
- 2.65 - 2.784
- 2.78 - 4.83



3 View Grid Wayp. hh mm ss 00 02 48 Speed 10 Play Backw. Utilities



USING SONAR FOR OYSTER RESTORATION

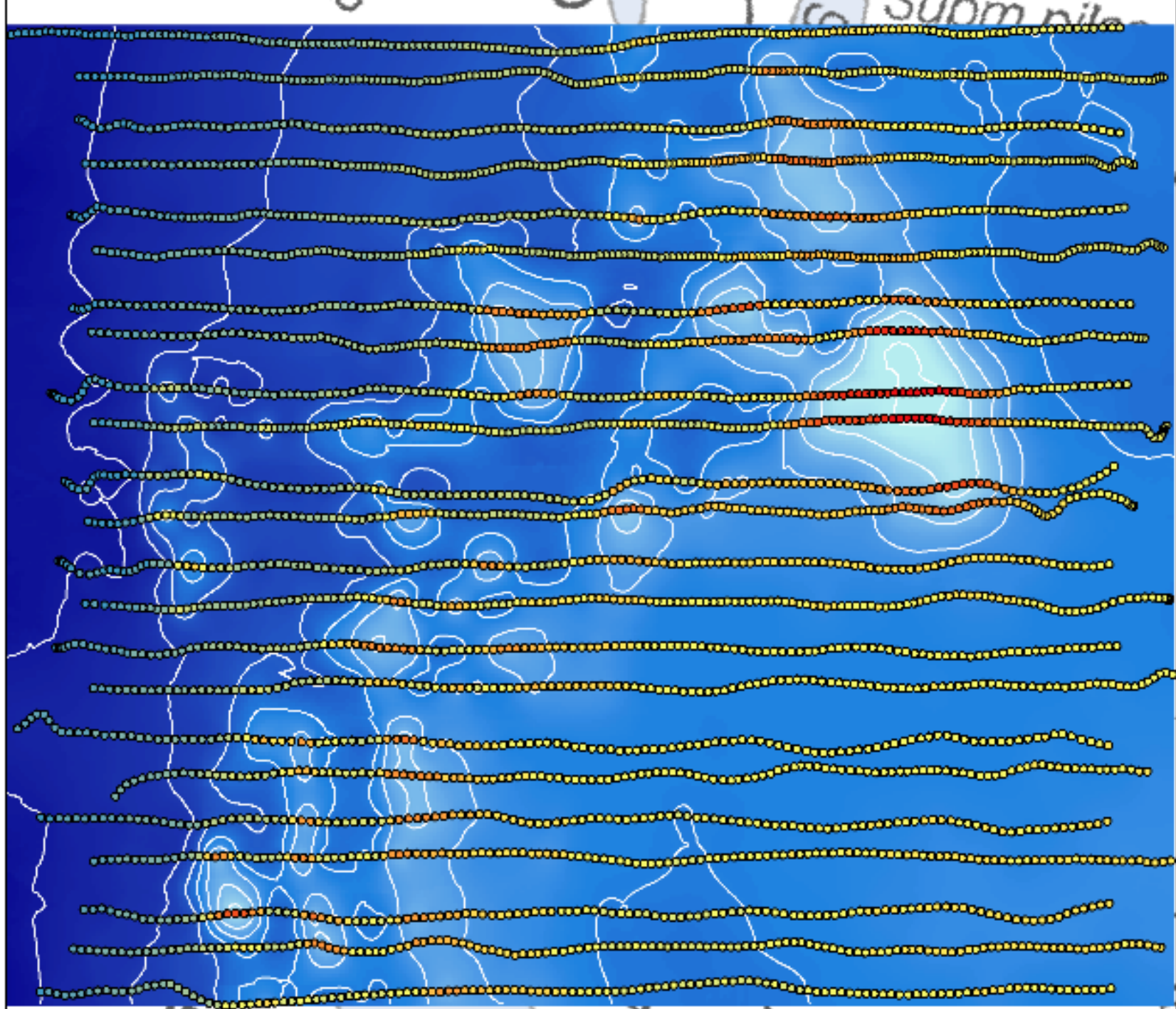
Site Selection

- Identify areas that have lost substrate and are “degraded”
 - Shell-hashy
 - Not too muddy
- Has firm bottom to support cultch placement
- Good water quality for oyster growth and survival
- Use & goals dependent on funding source
 - Harvestable vs sanctuary reef

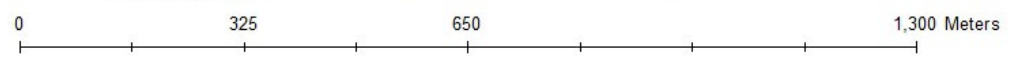
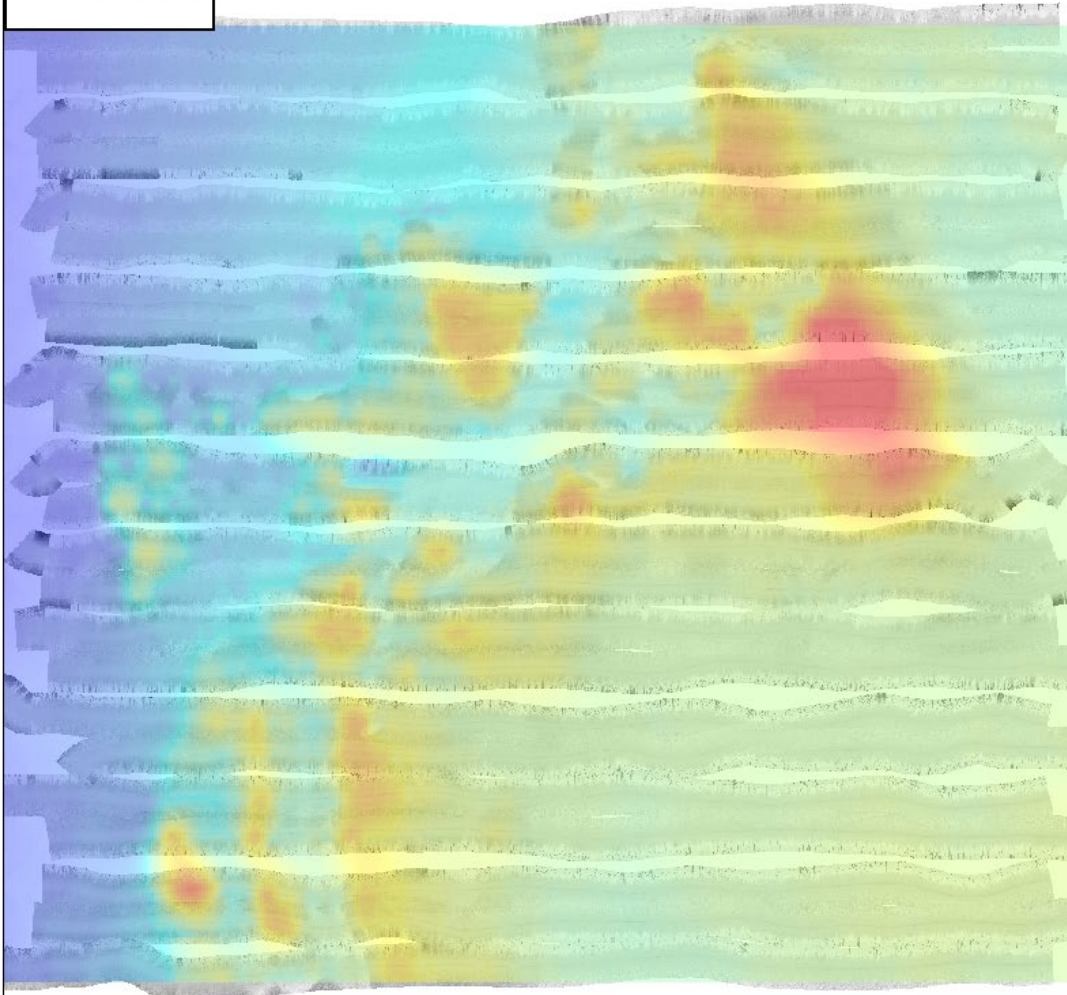
Site Selection Survey

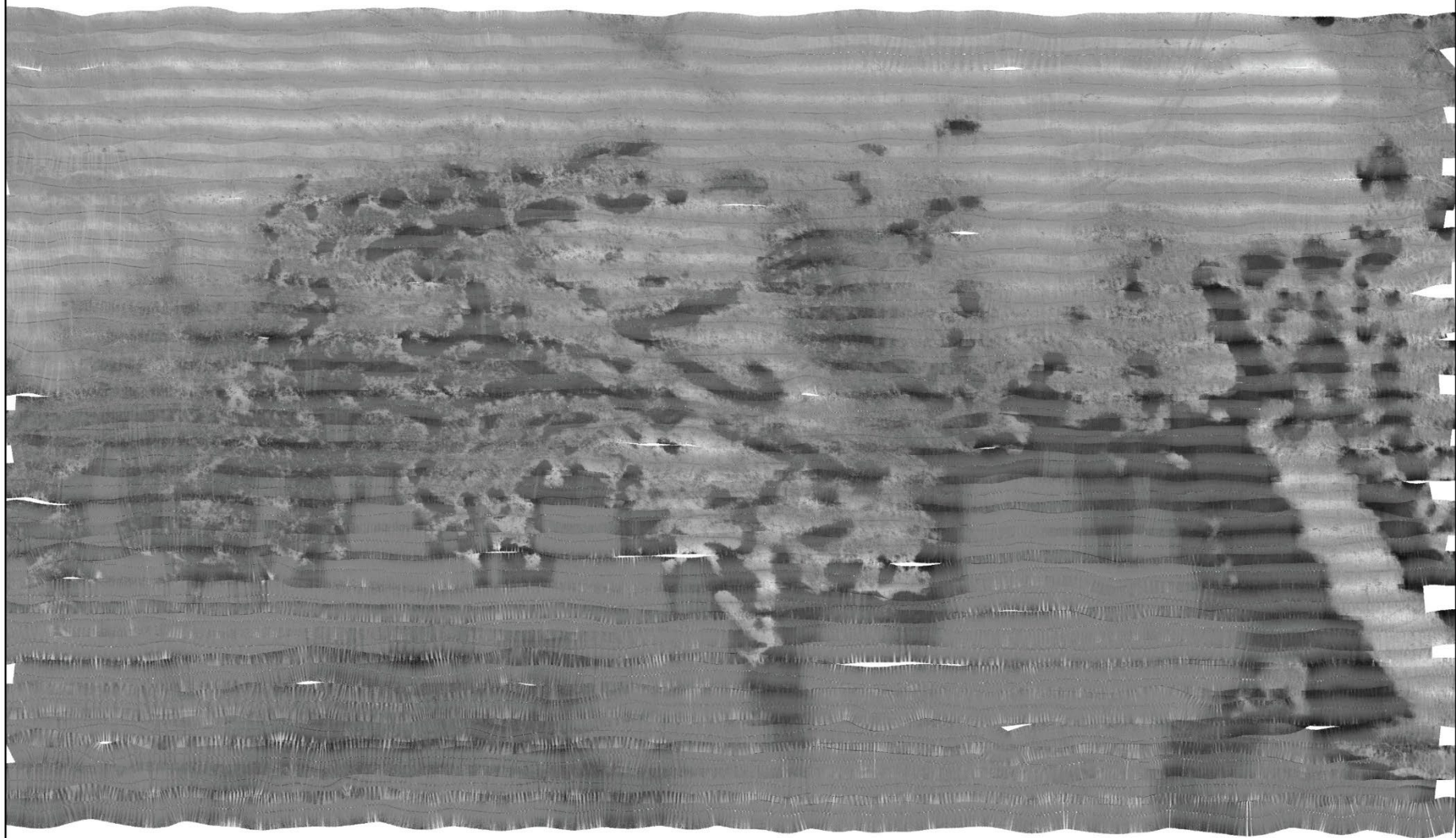
- Often use recreational sonar
 - Humminbird or Garmin
 - Low cost
 - Vessel availability
 - Rapid mobilization for exploratory surveying





Legend
grasskrig2
Value
High : 10.6791
Low : 4.27961





0

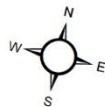
125

250

500

750

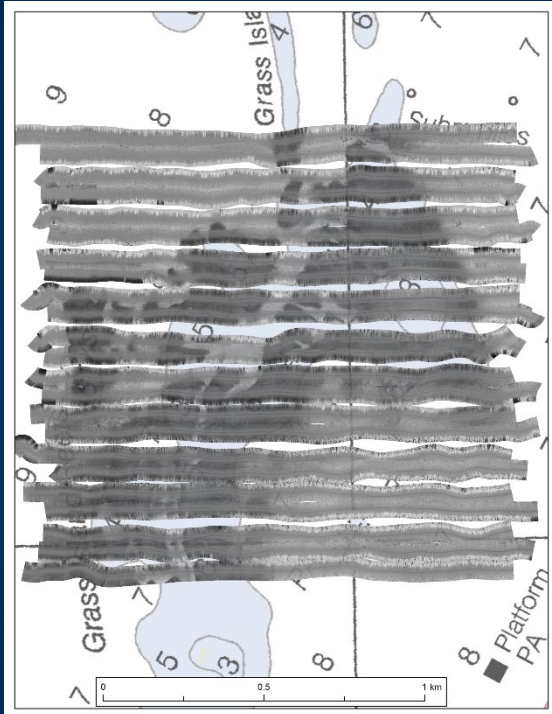
1,000
Meters



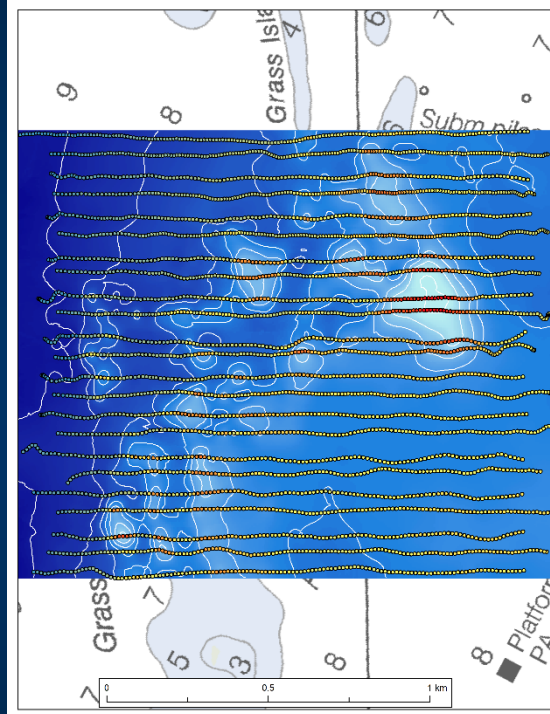
Restoration Planning

- Substrate extent (sss)
 - “Footprint” of the restoration (recreational sonar)
- Water depth (echosounder)
 - Project design, reef height (recreational sonar)
- Depth of refusal (in-situ)
 - Depth of cultch placement / avoidance areas
- Live oyster abundance (in-situ)
 - Avoid smothering

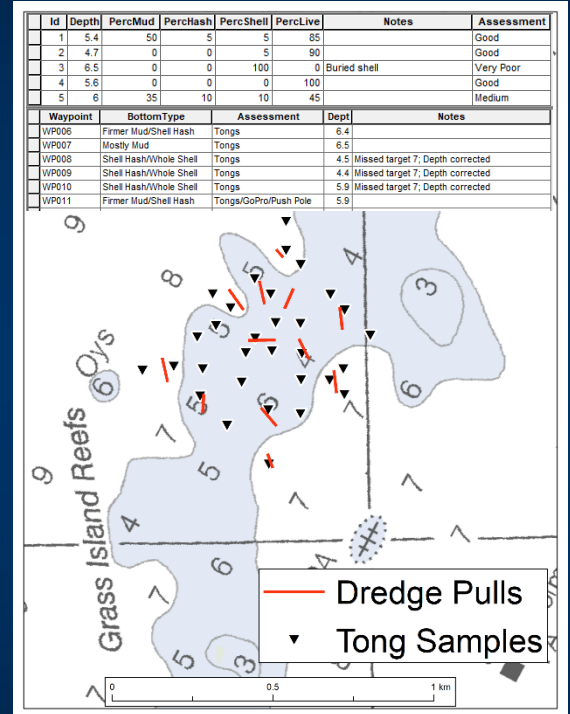
Sidescan Survey

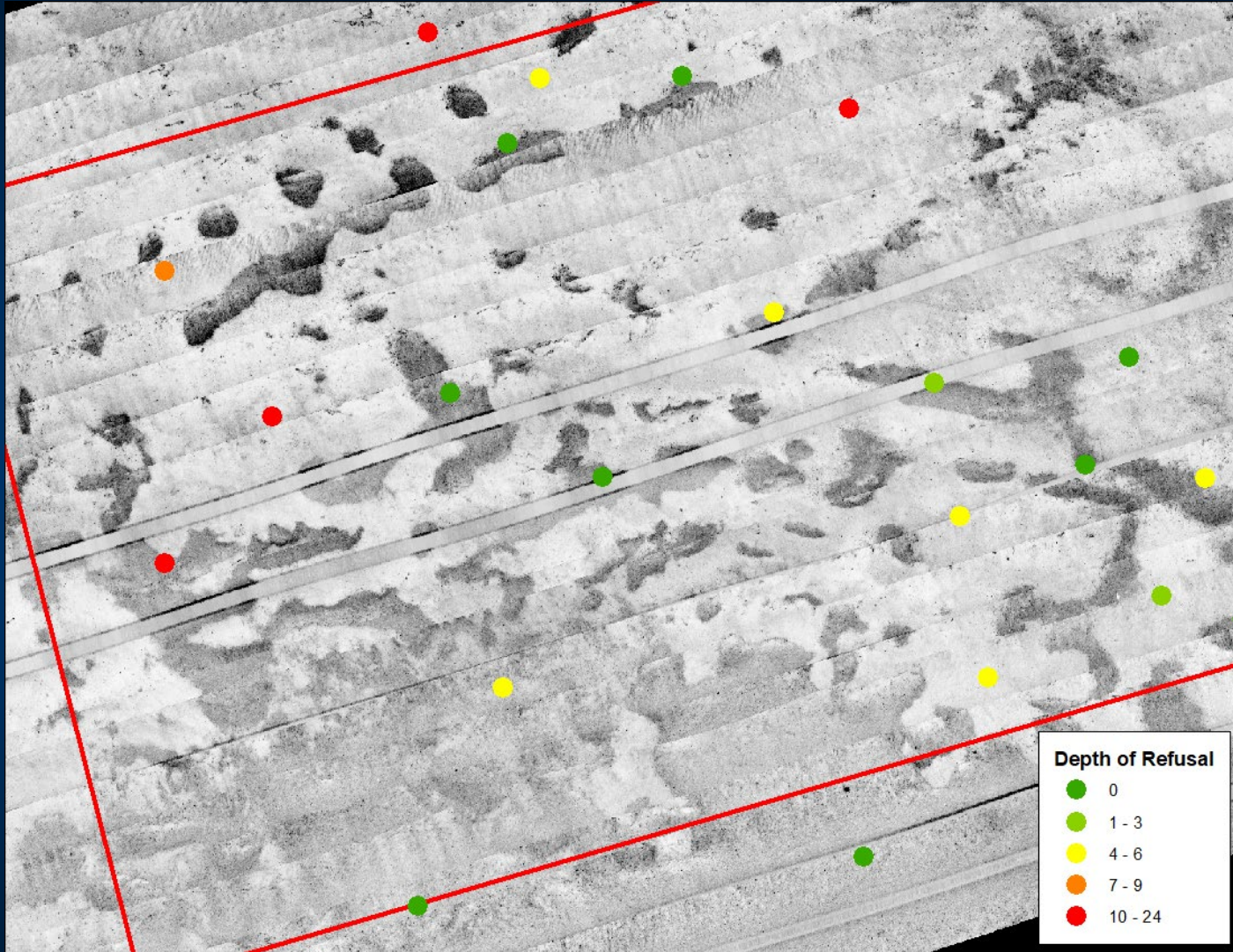


Bathymetry Survey



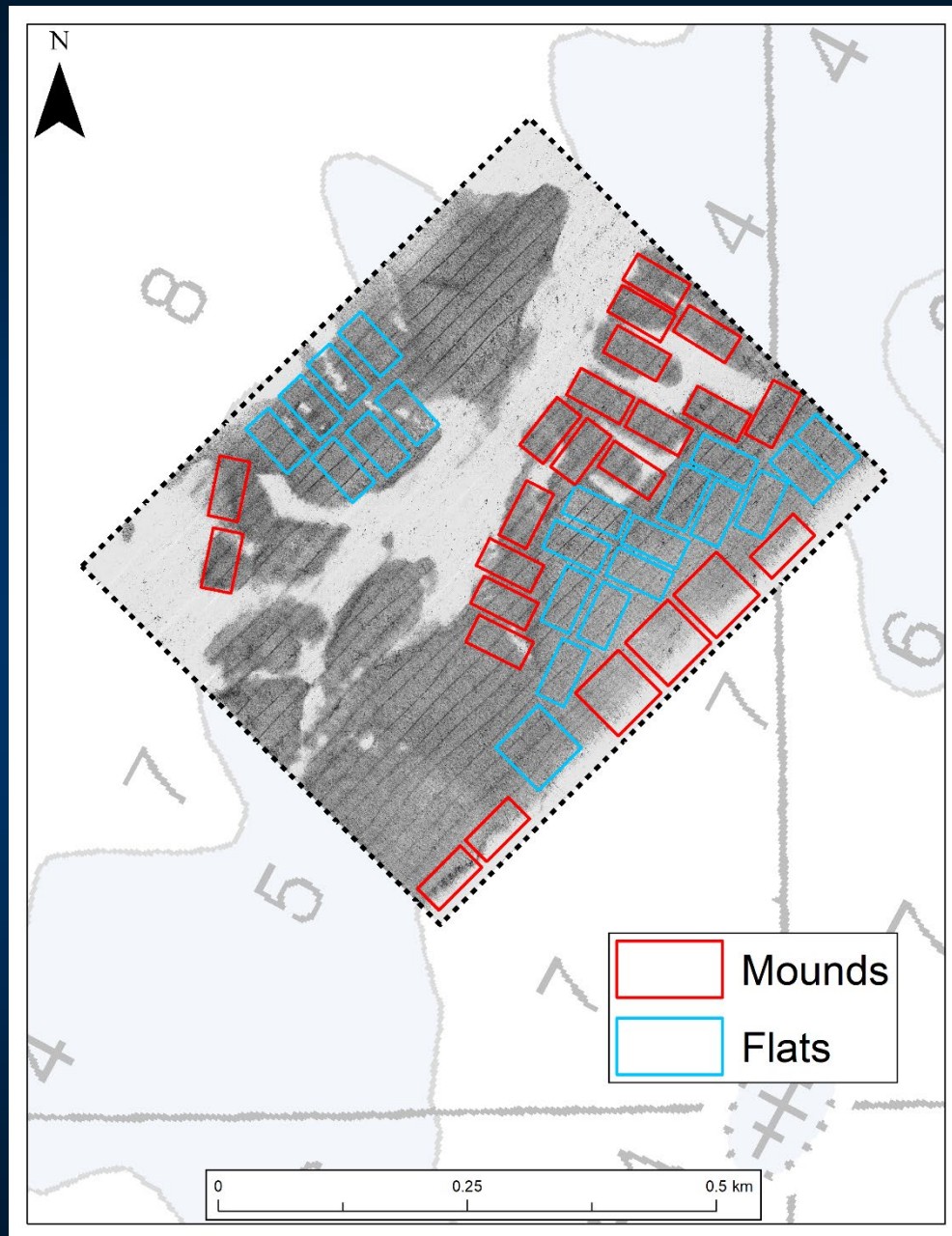
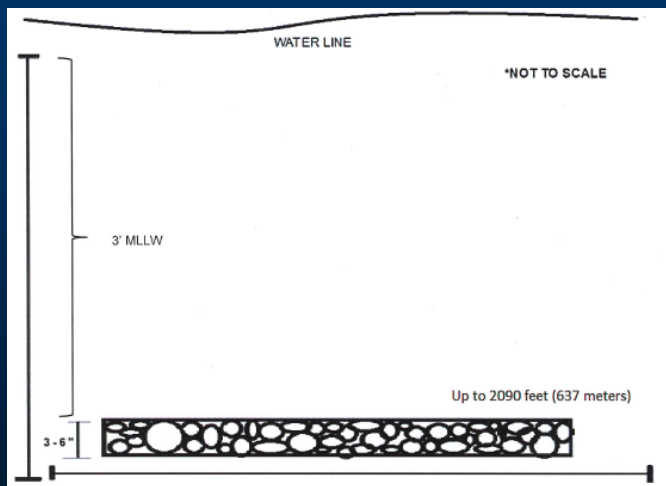
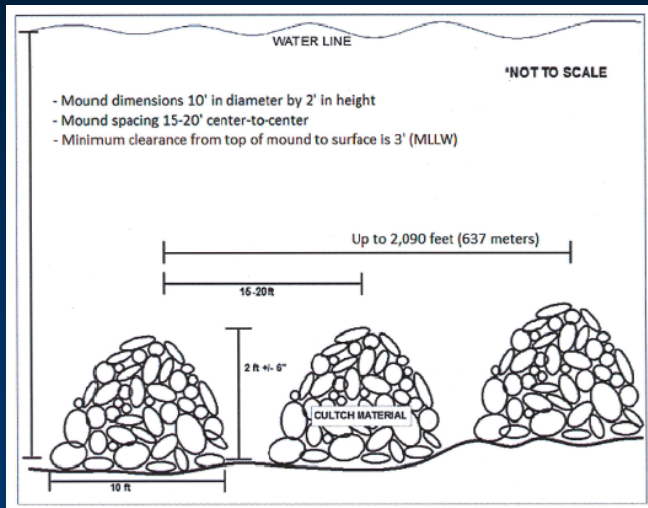
Pre-Restoration Sampling

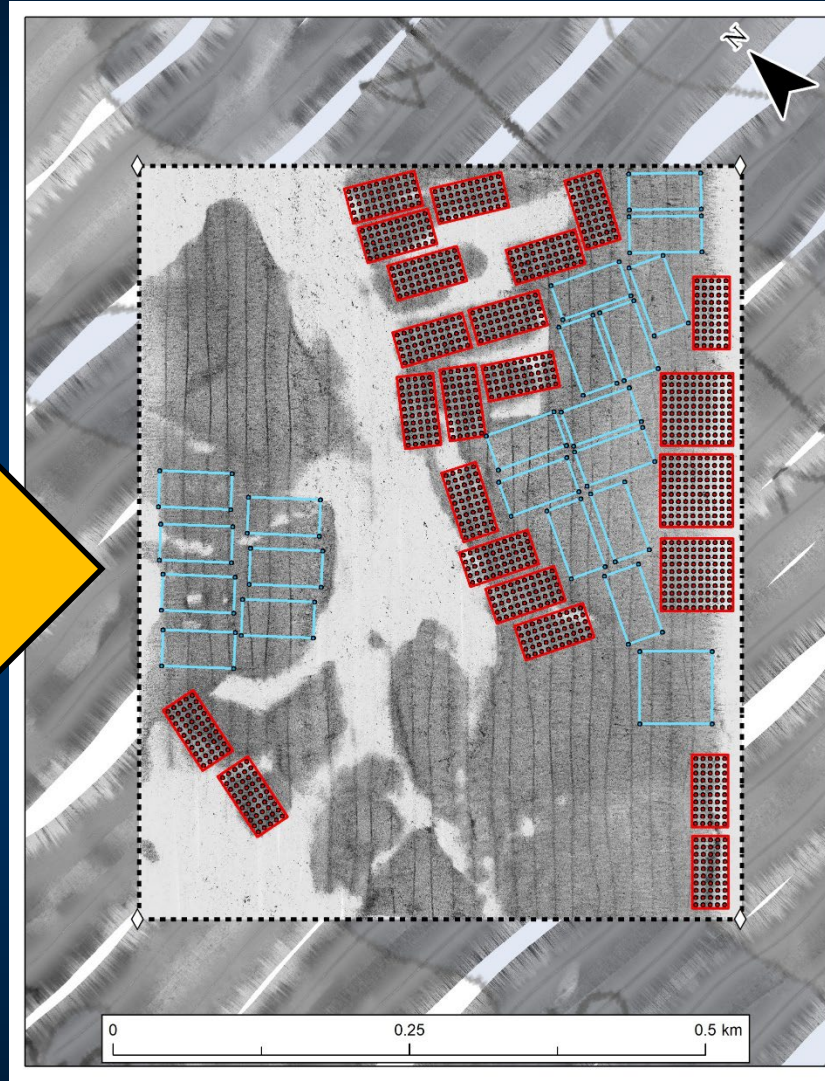
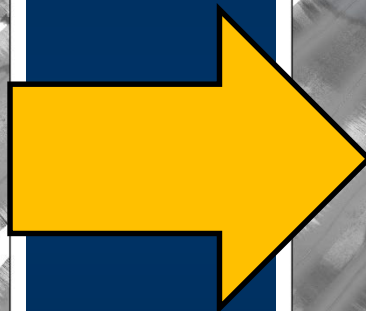
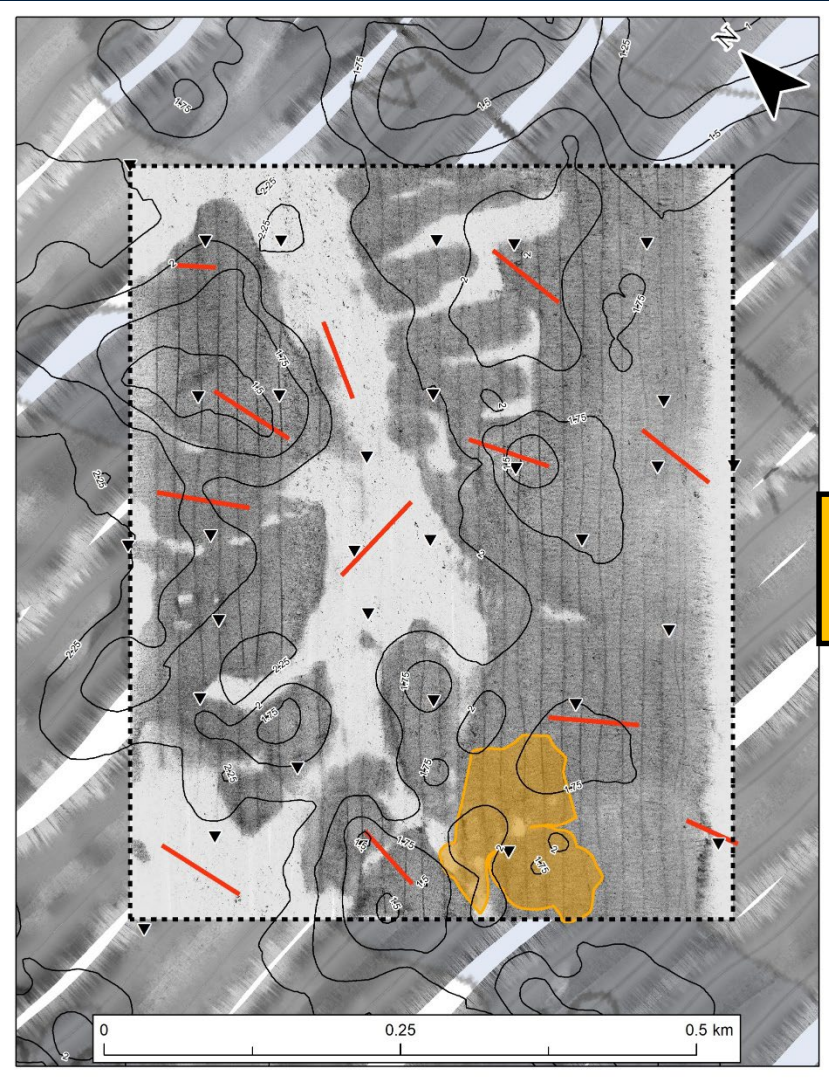




Research Question

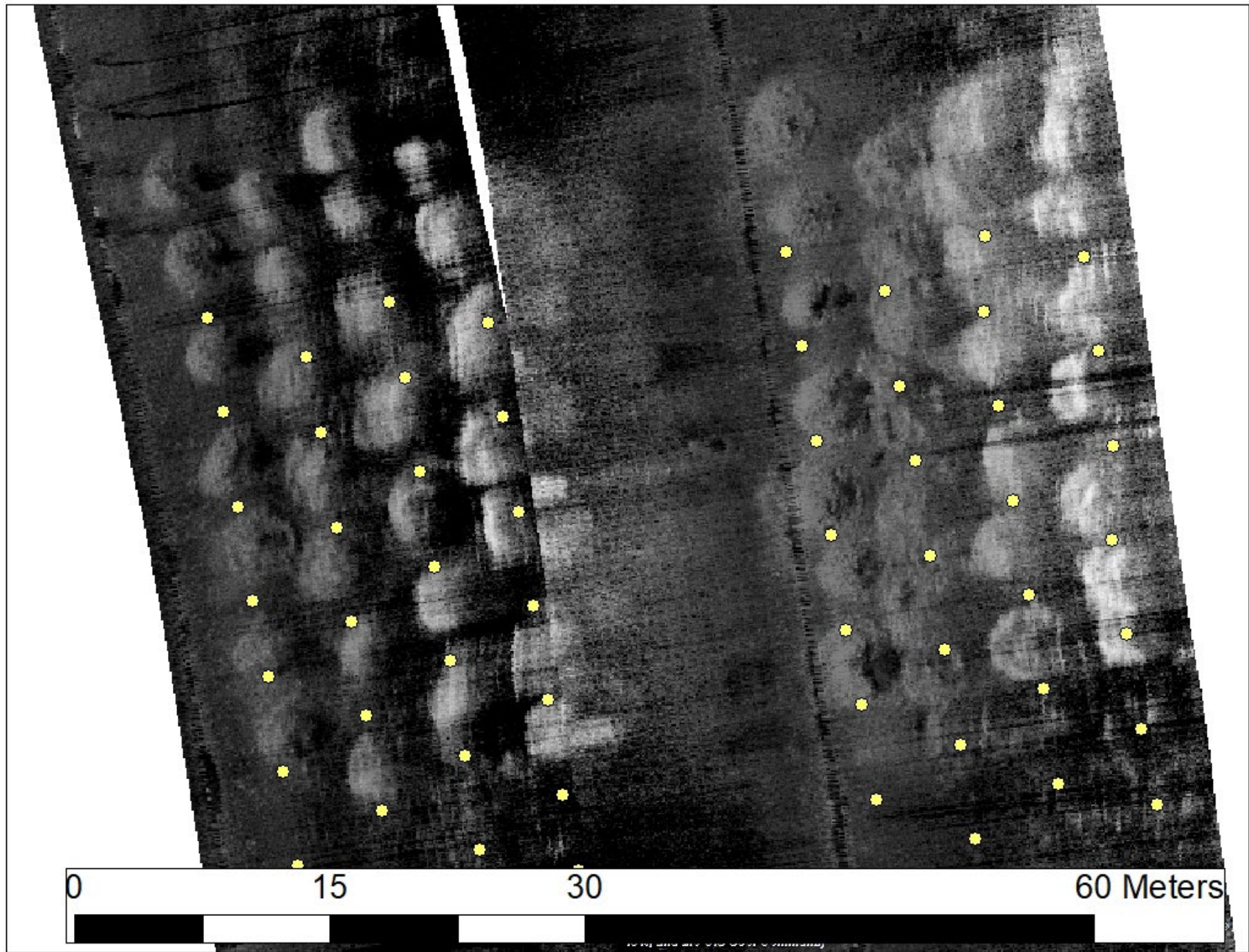
FLATS vs MOUNDS





Construction / Verification

- Vendors place cultch in assigned locations
- TPWD confirms it was placed correctly in terms of
 - Location
 - Dimensions
 - Vertical relief
 - Both recreational and scientific sonar used



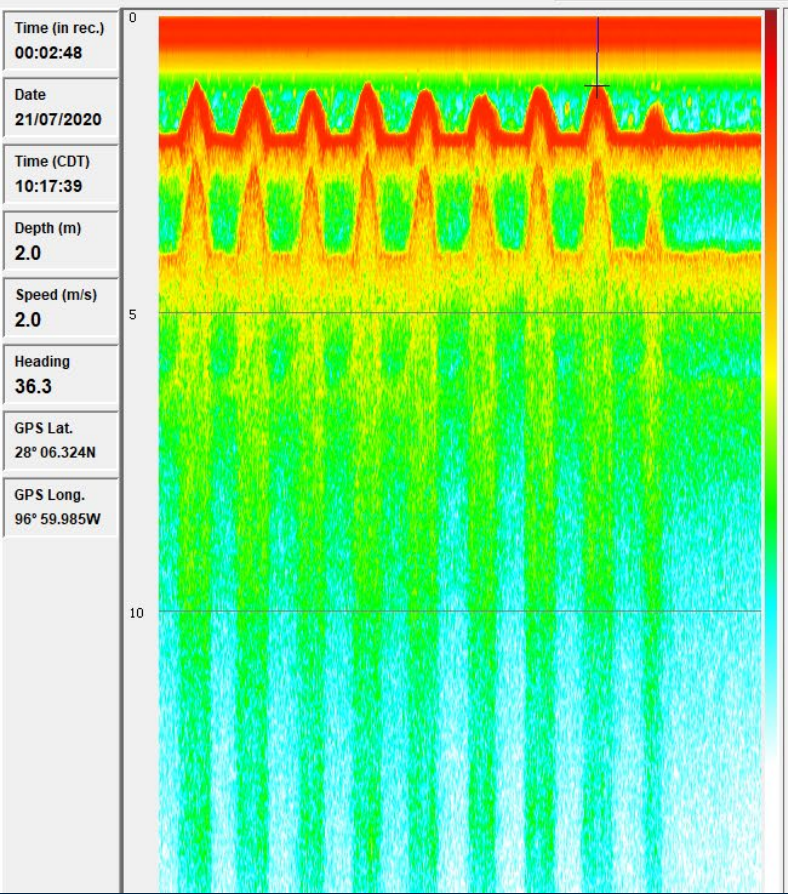
0

15

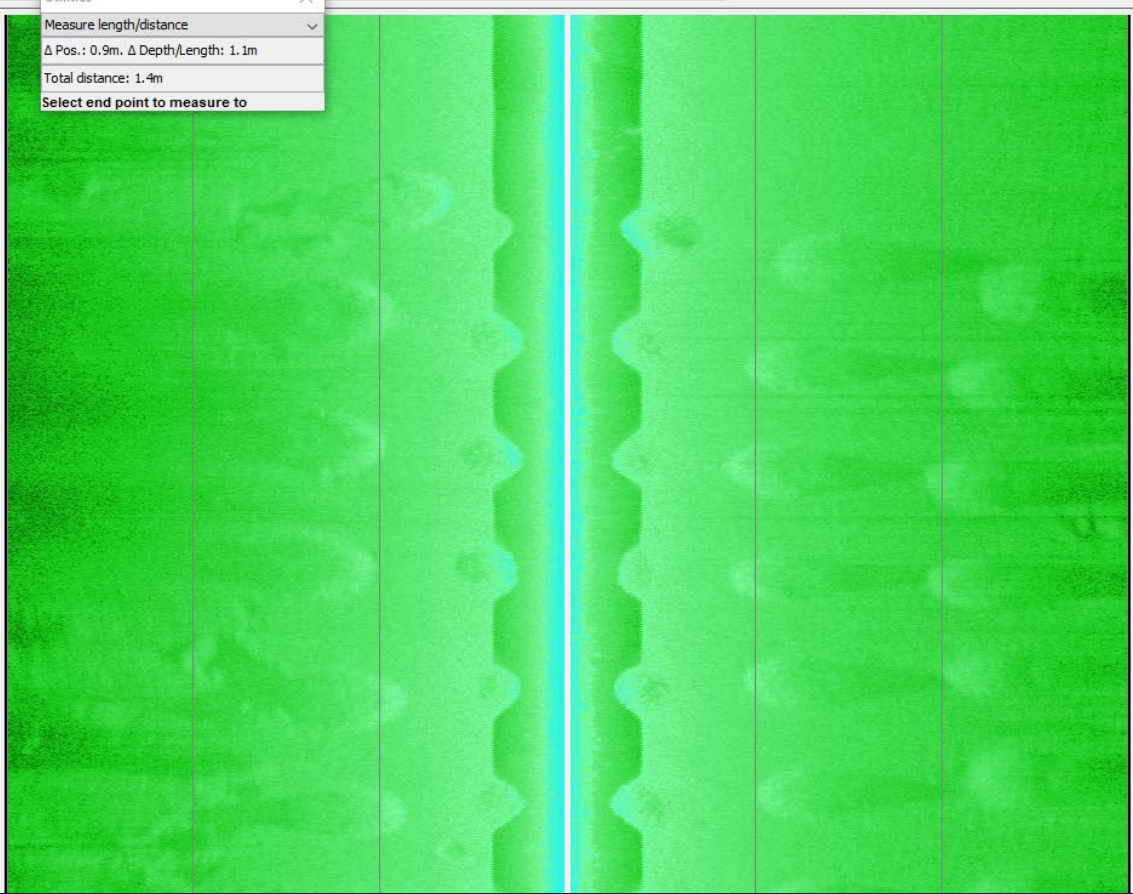
30

60 Meters

3 View Grid Wayp. hh mm ss Speed 10 Play Backw. Utilities

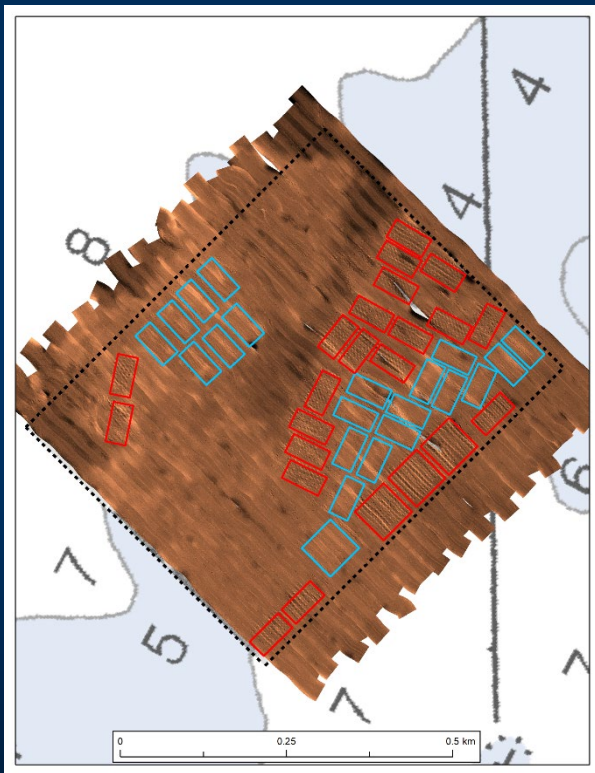


Utilities

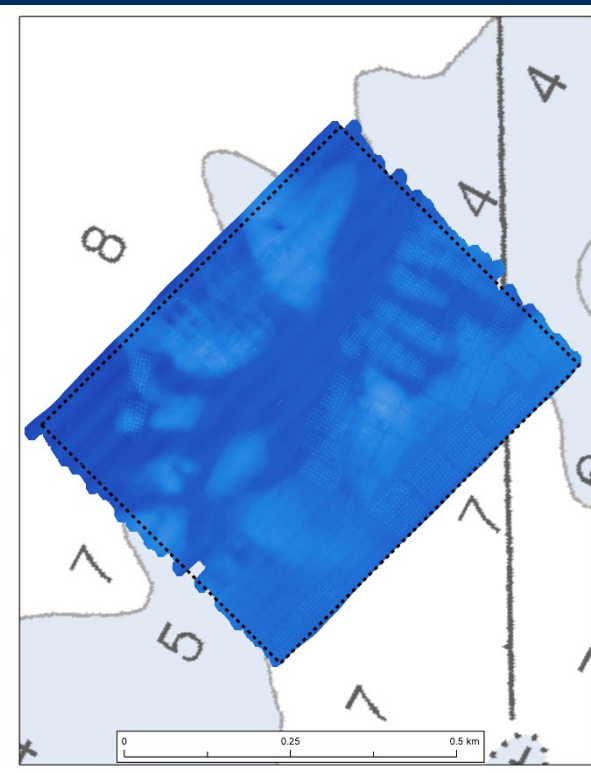
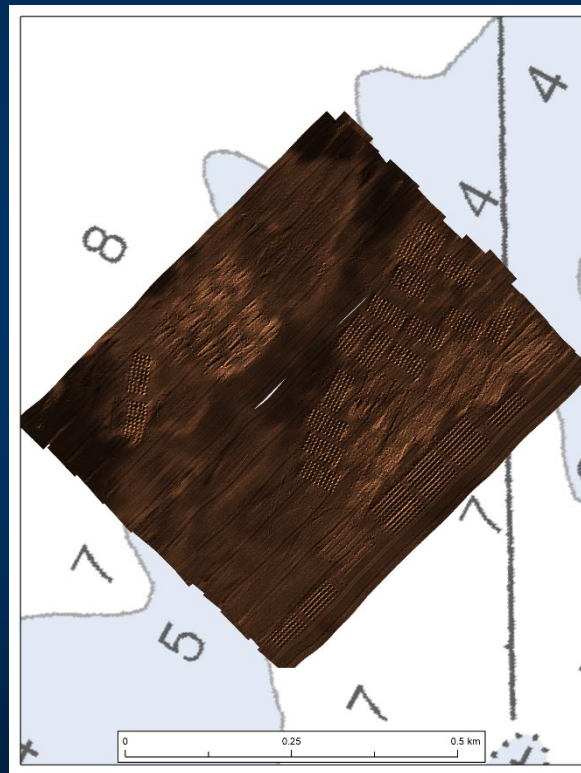


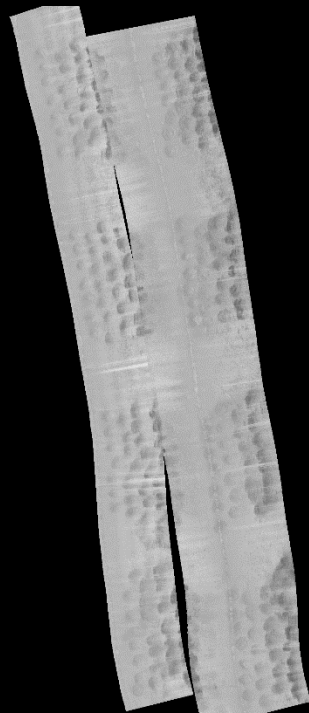
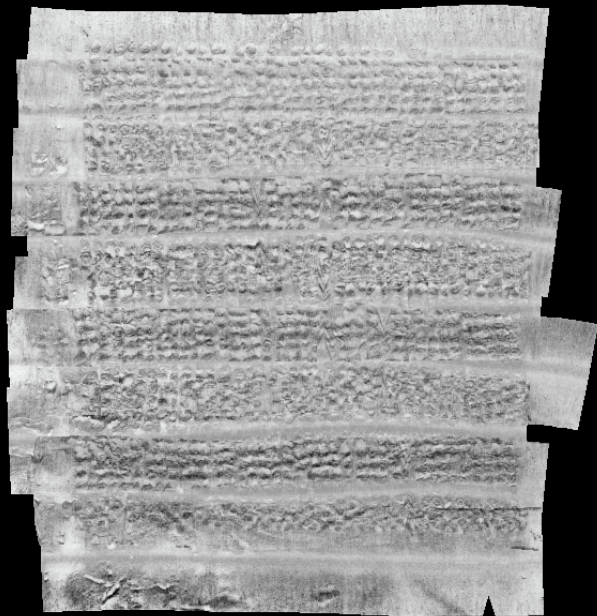
Post-Restoration Placement Verification

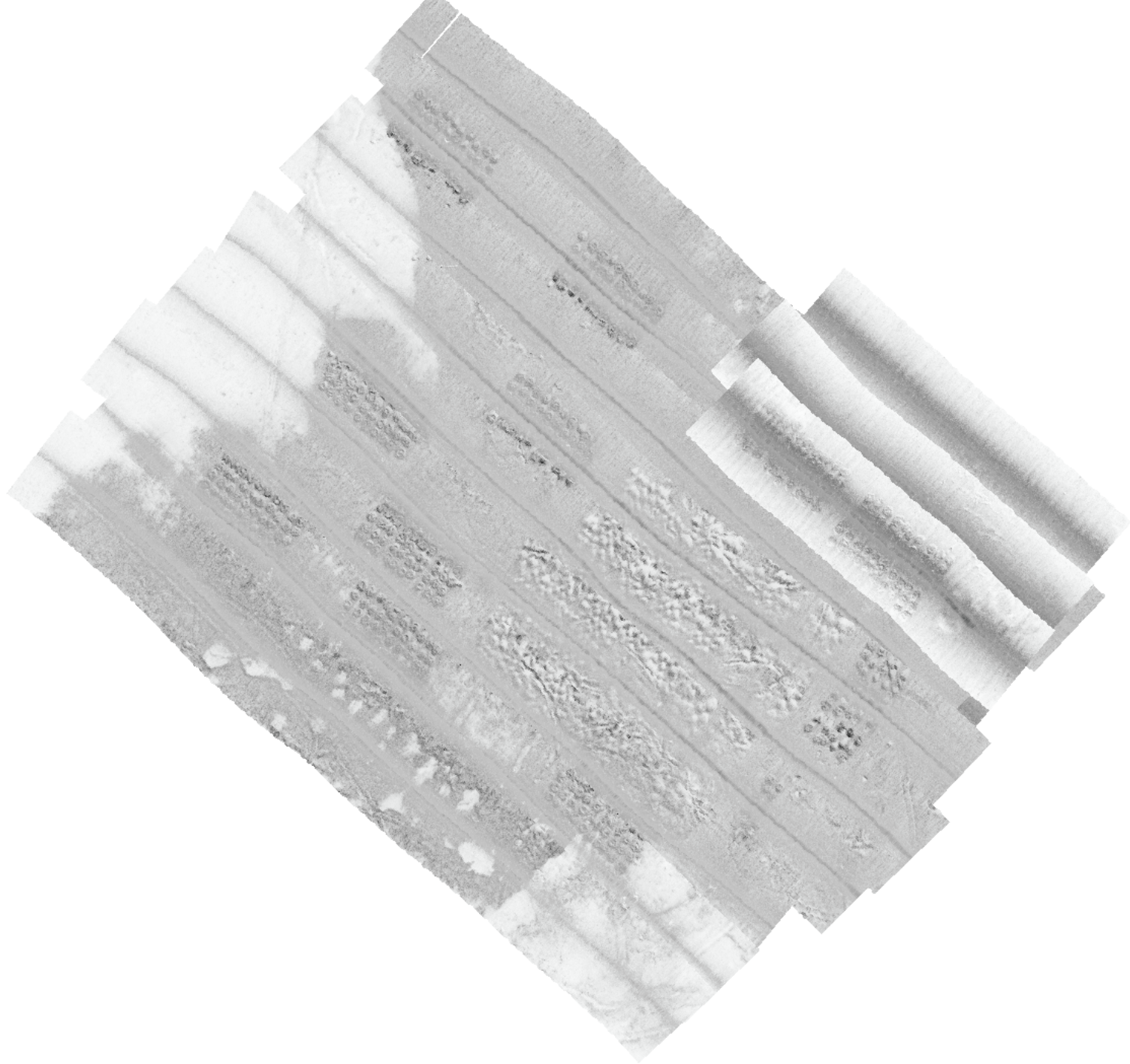
Rapid/Periodic Verification
Humminbird SS and
Echosounder

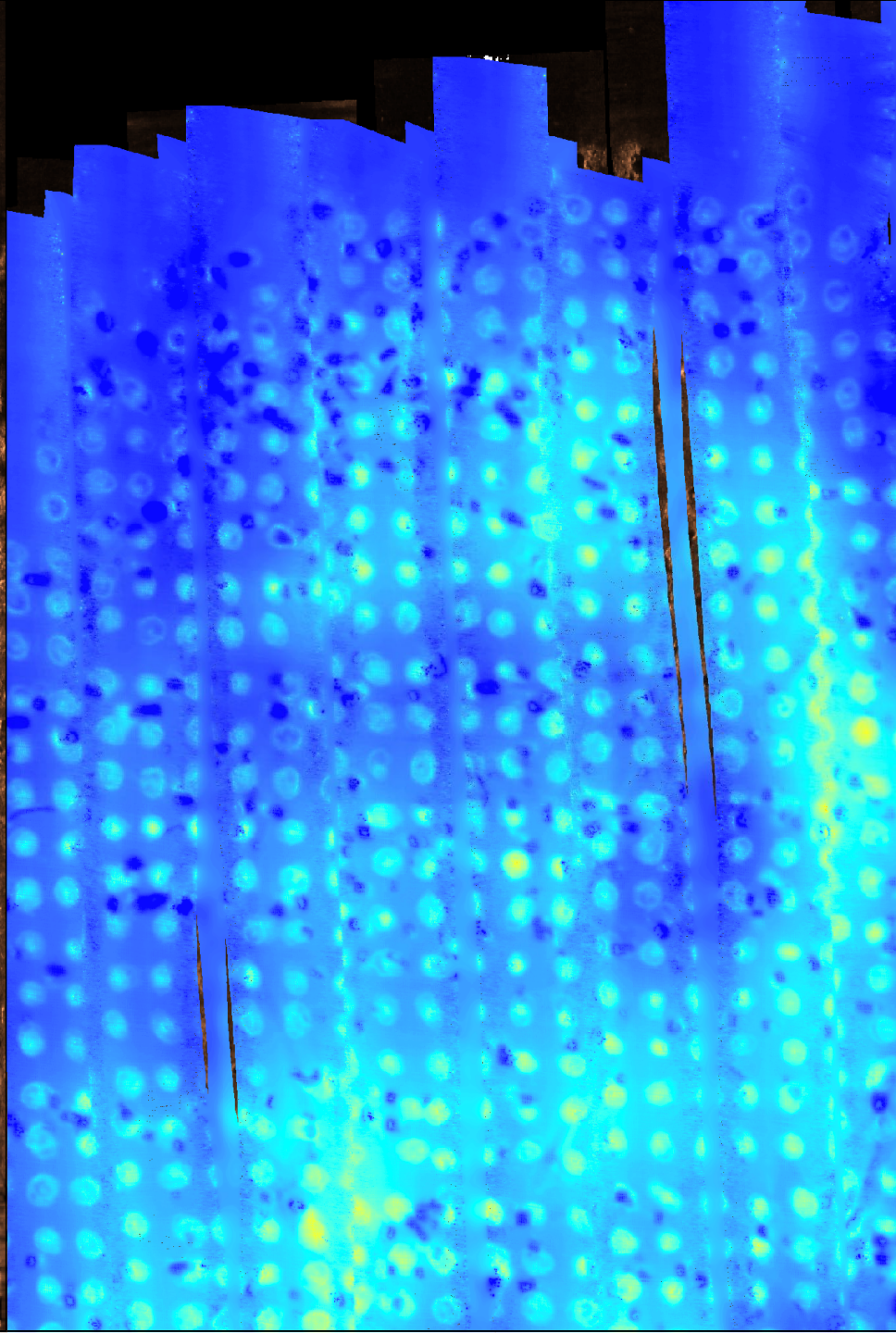
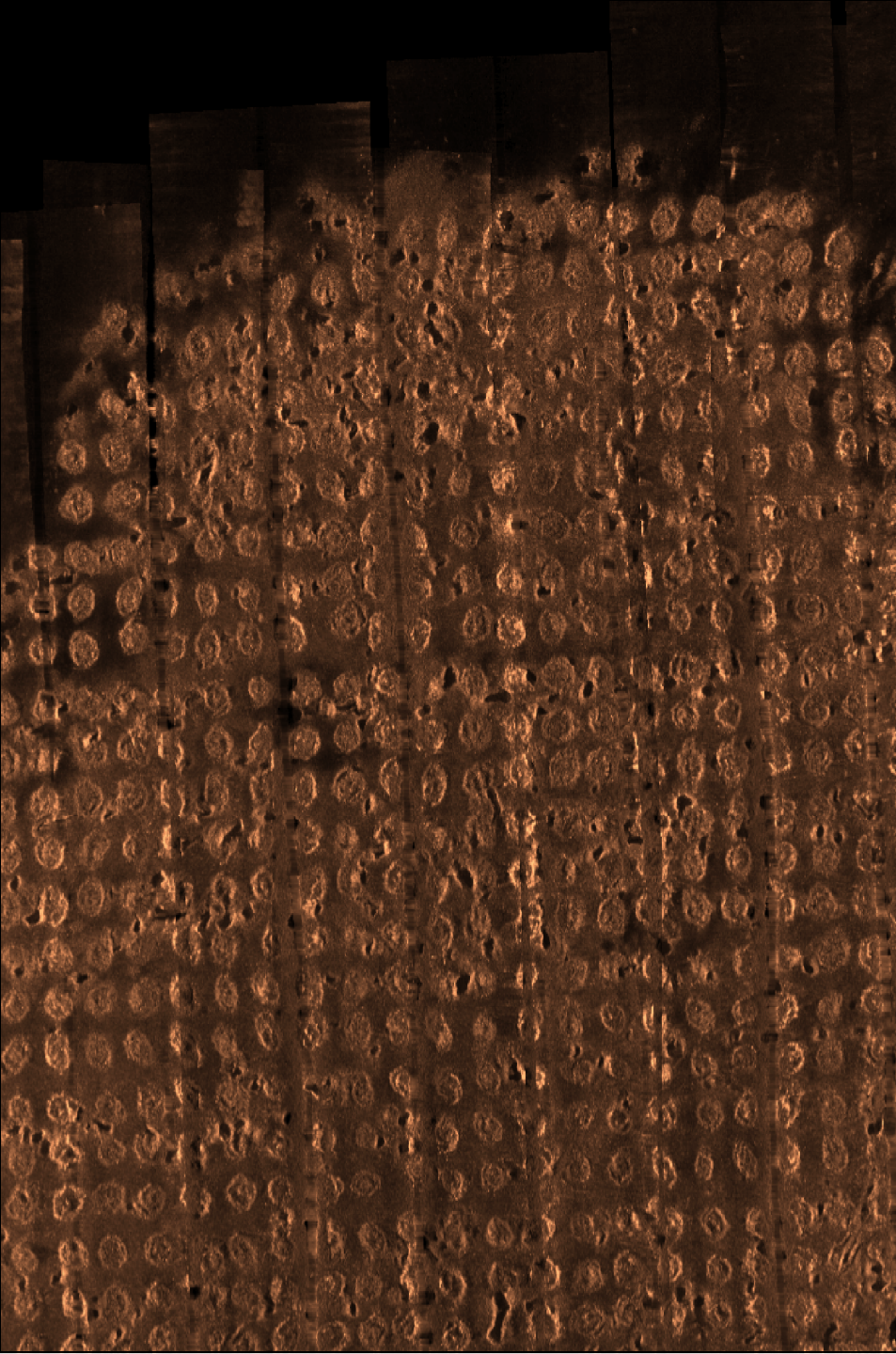


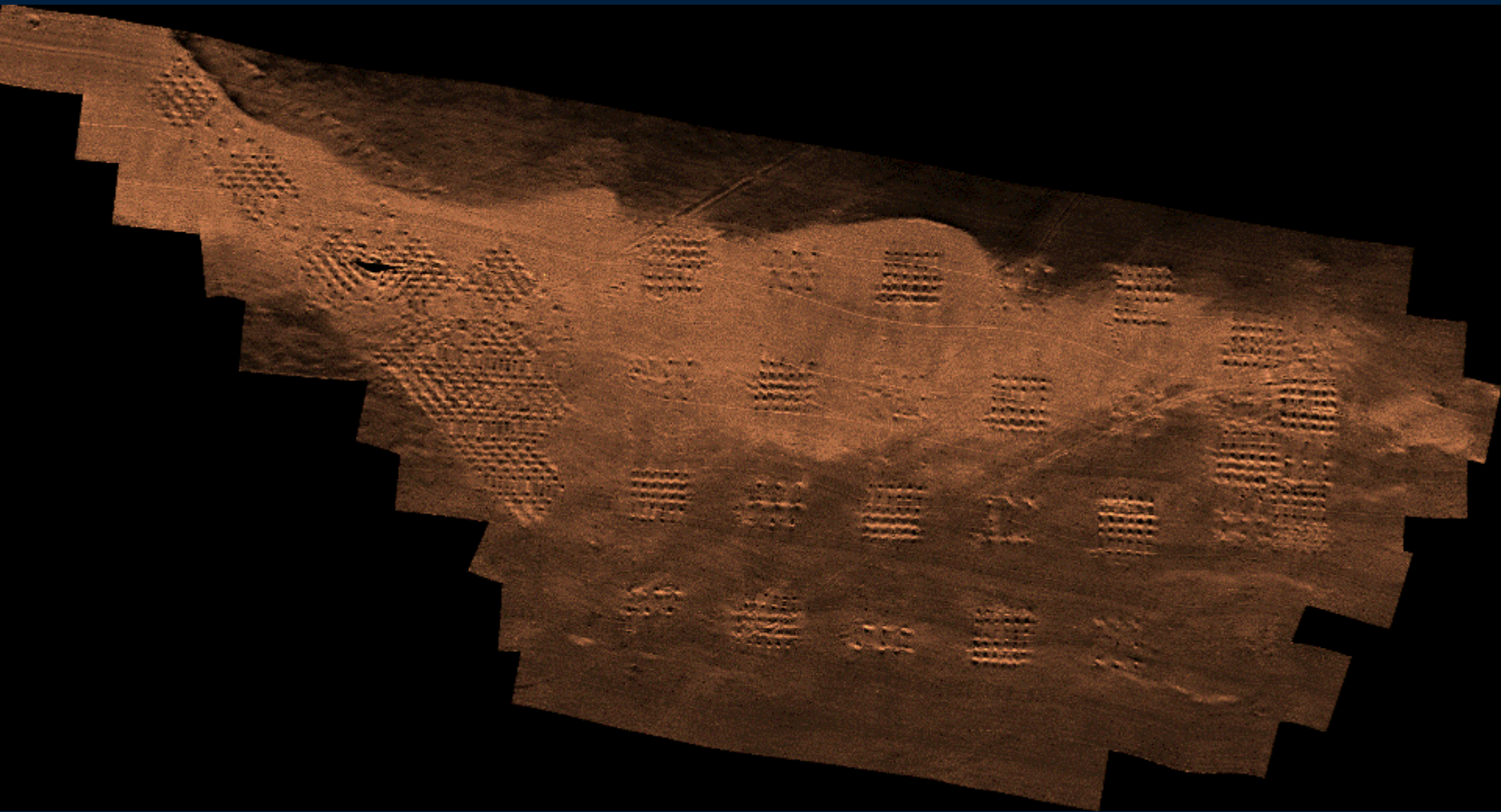
High-Resolution Verification
Edgetech SS and Multibeam



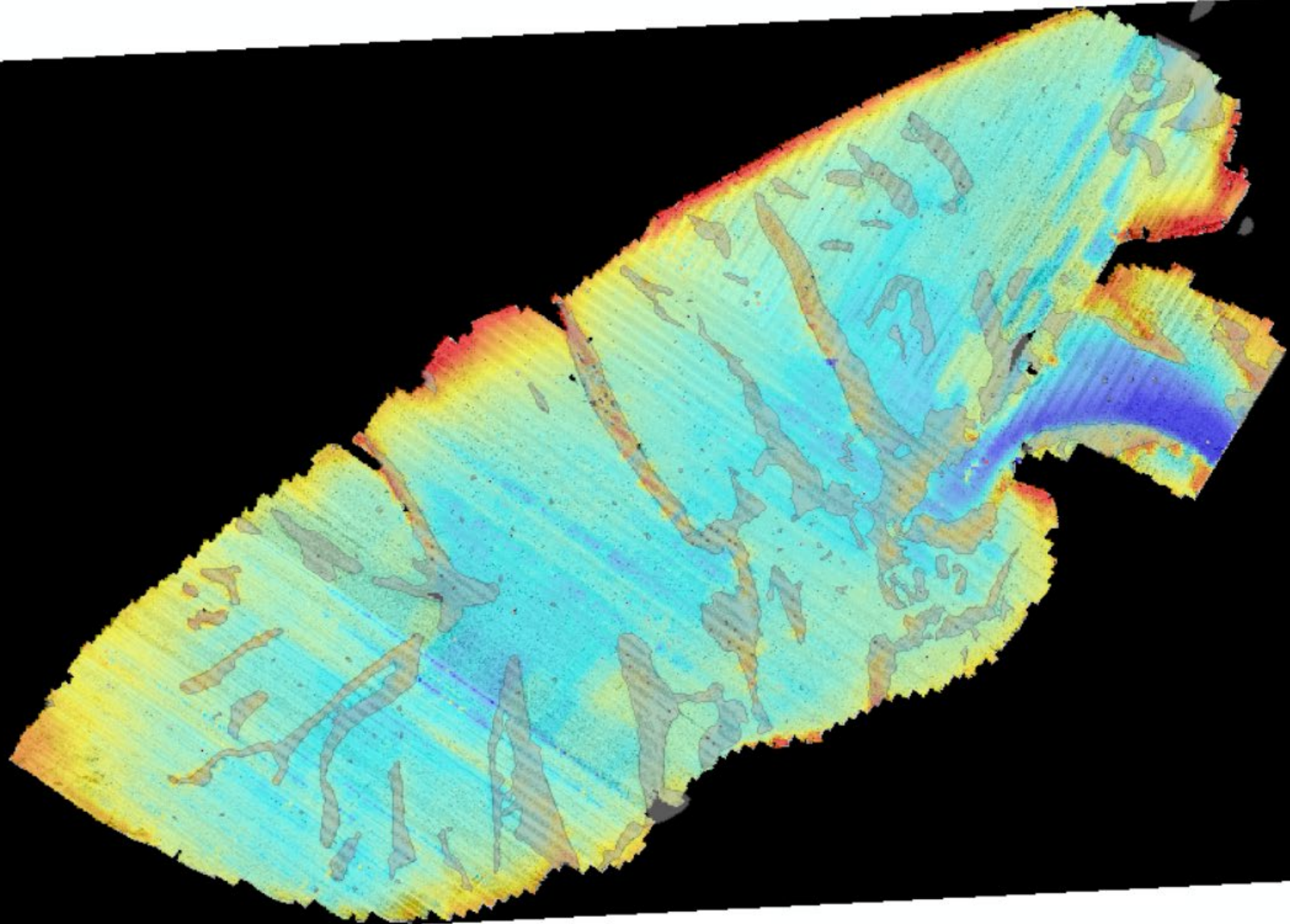


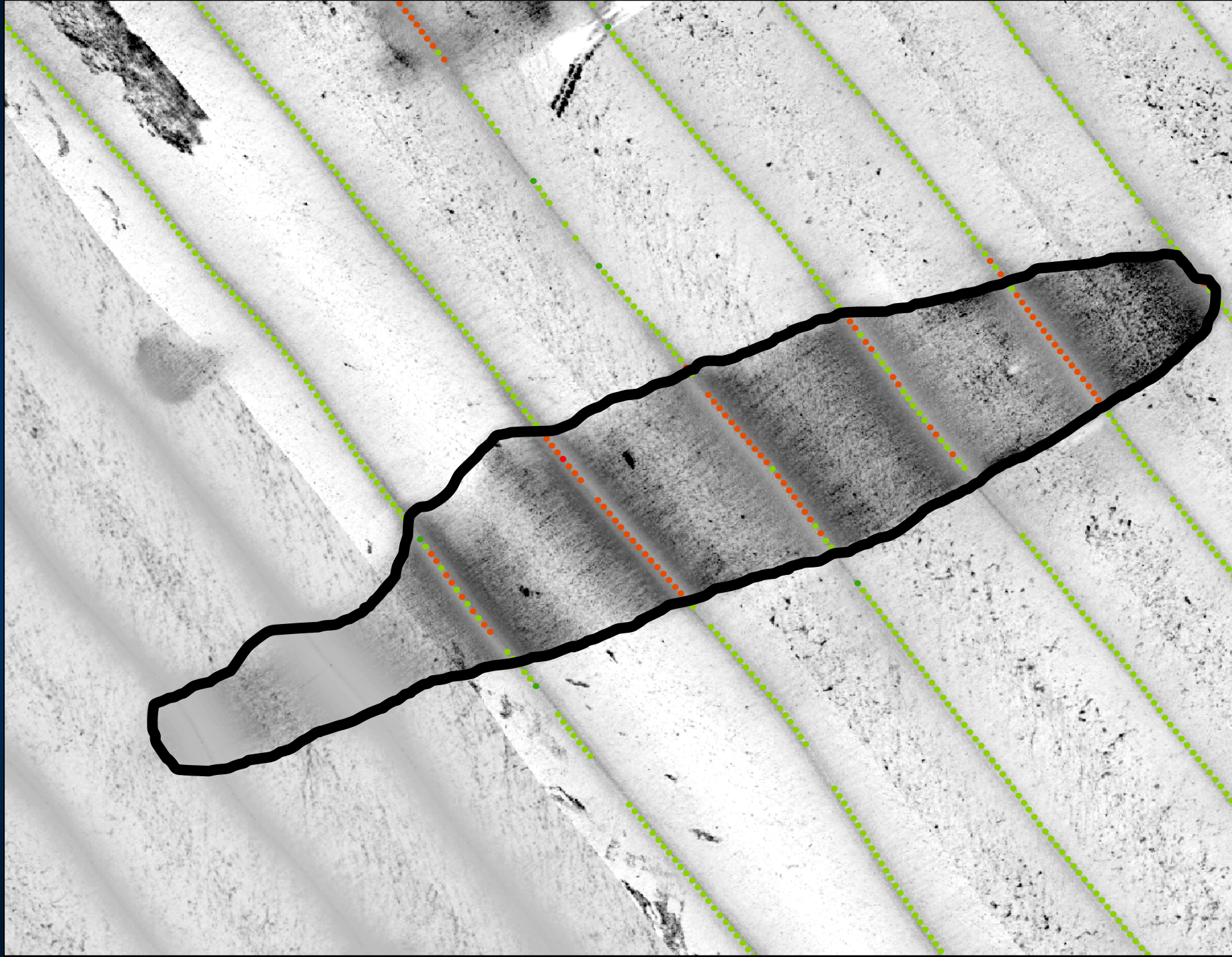


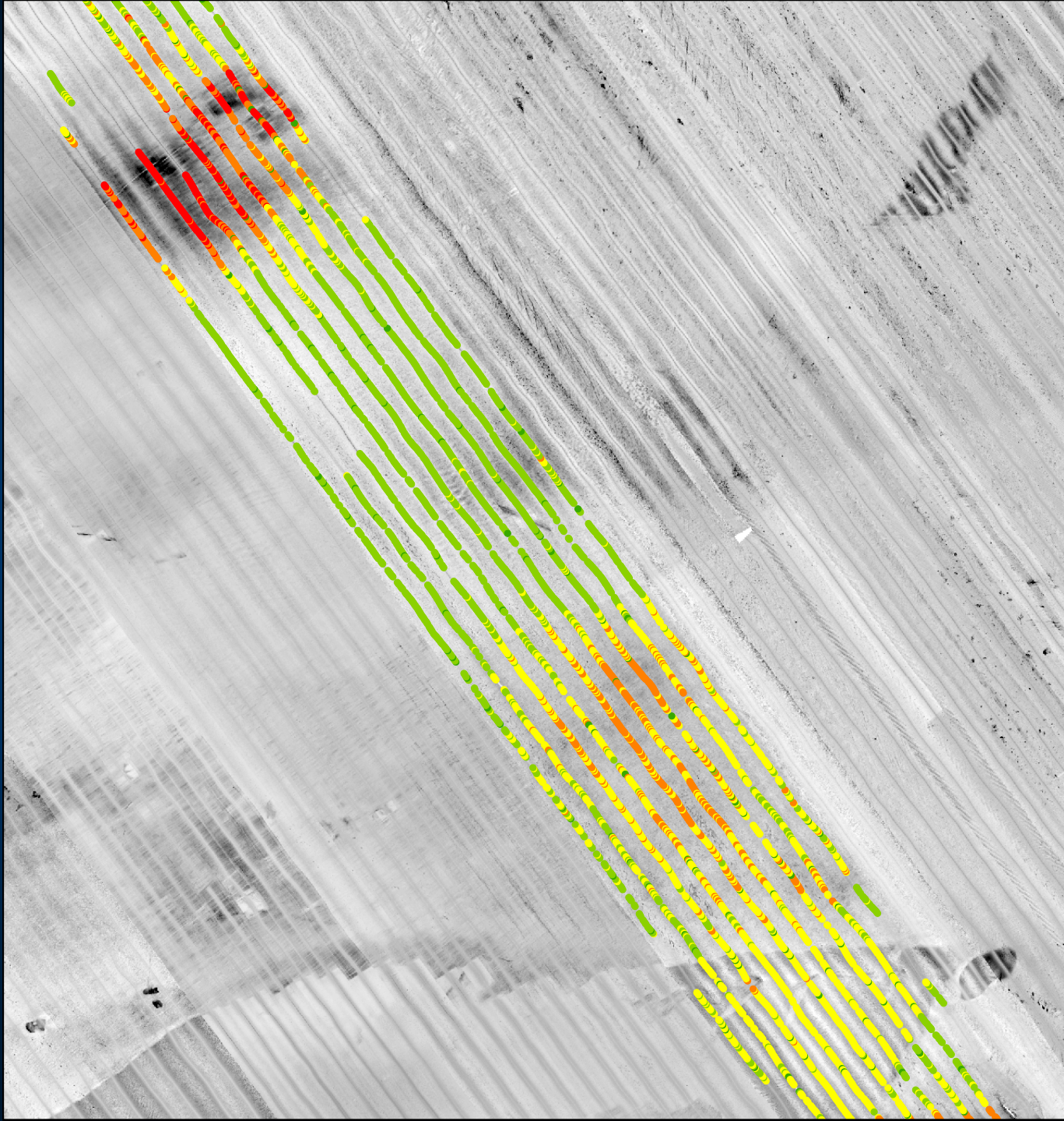


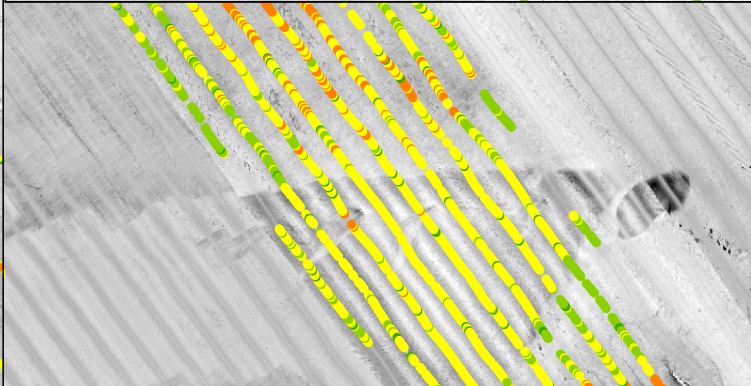
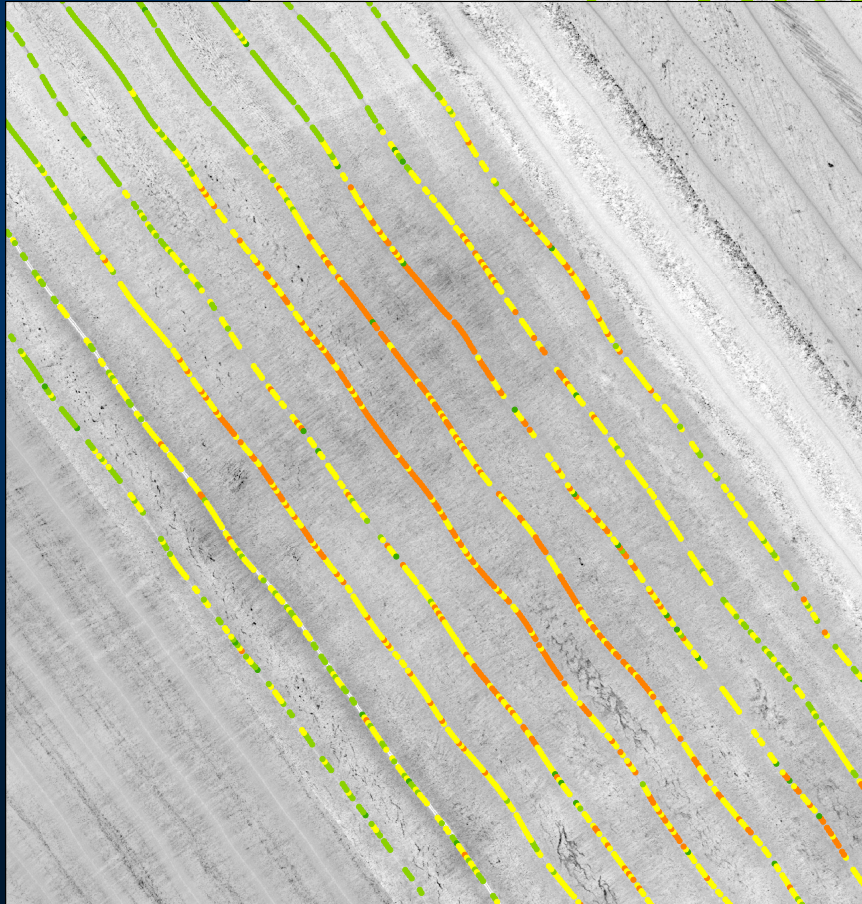
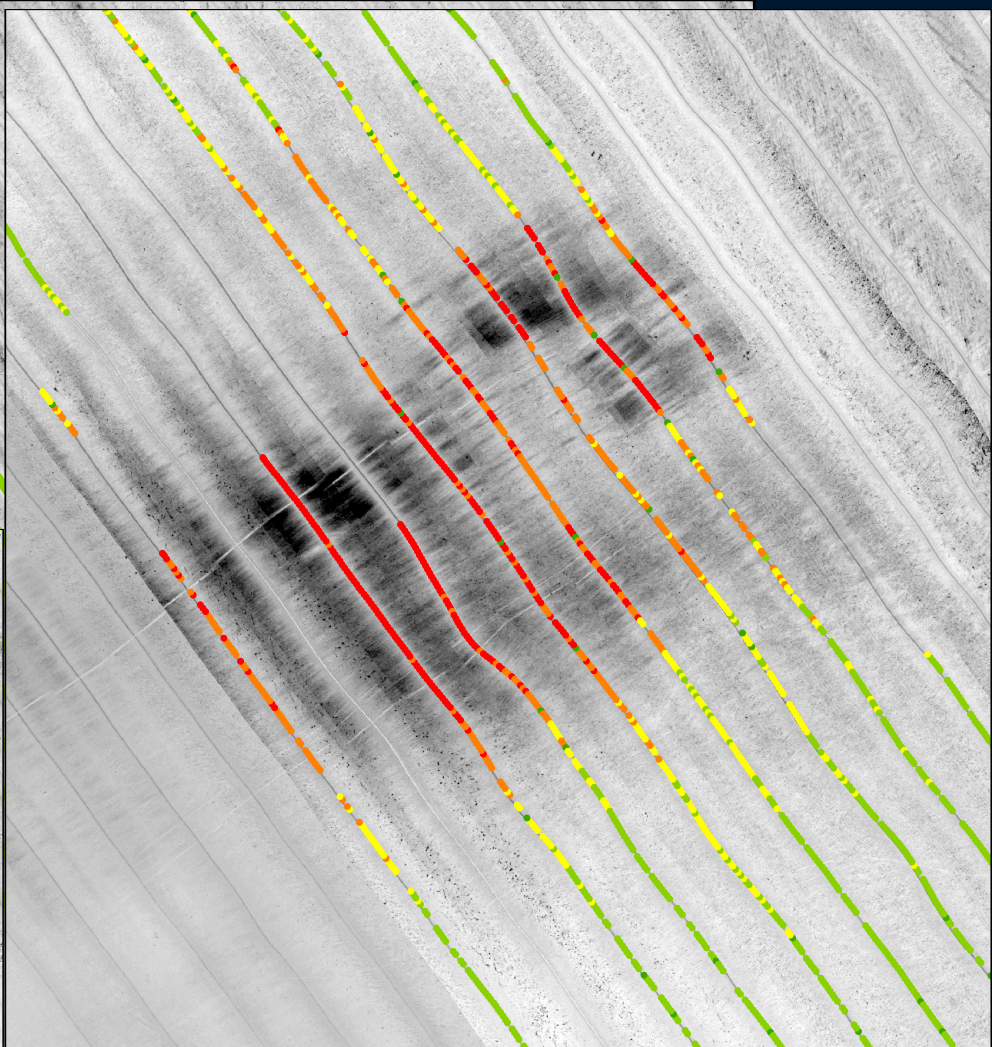
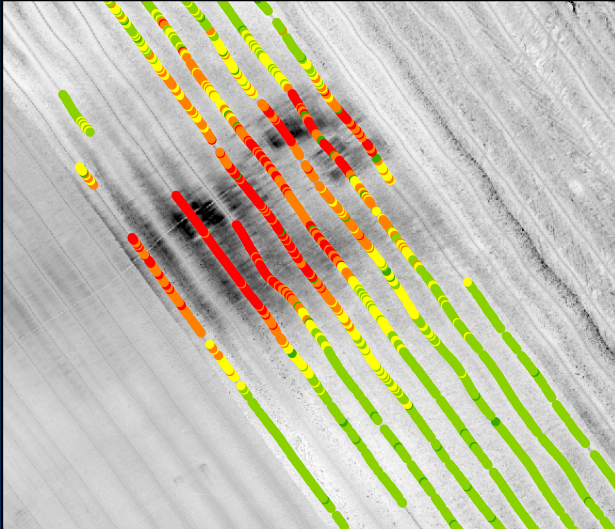


USING SONAR FOR SYSTEM- WIDE BENTHIC MAPPING

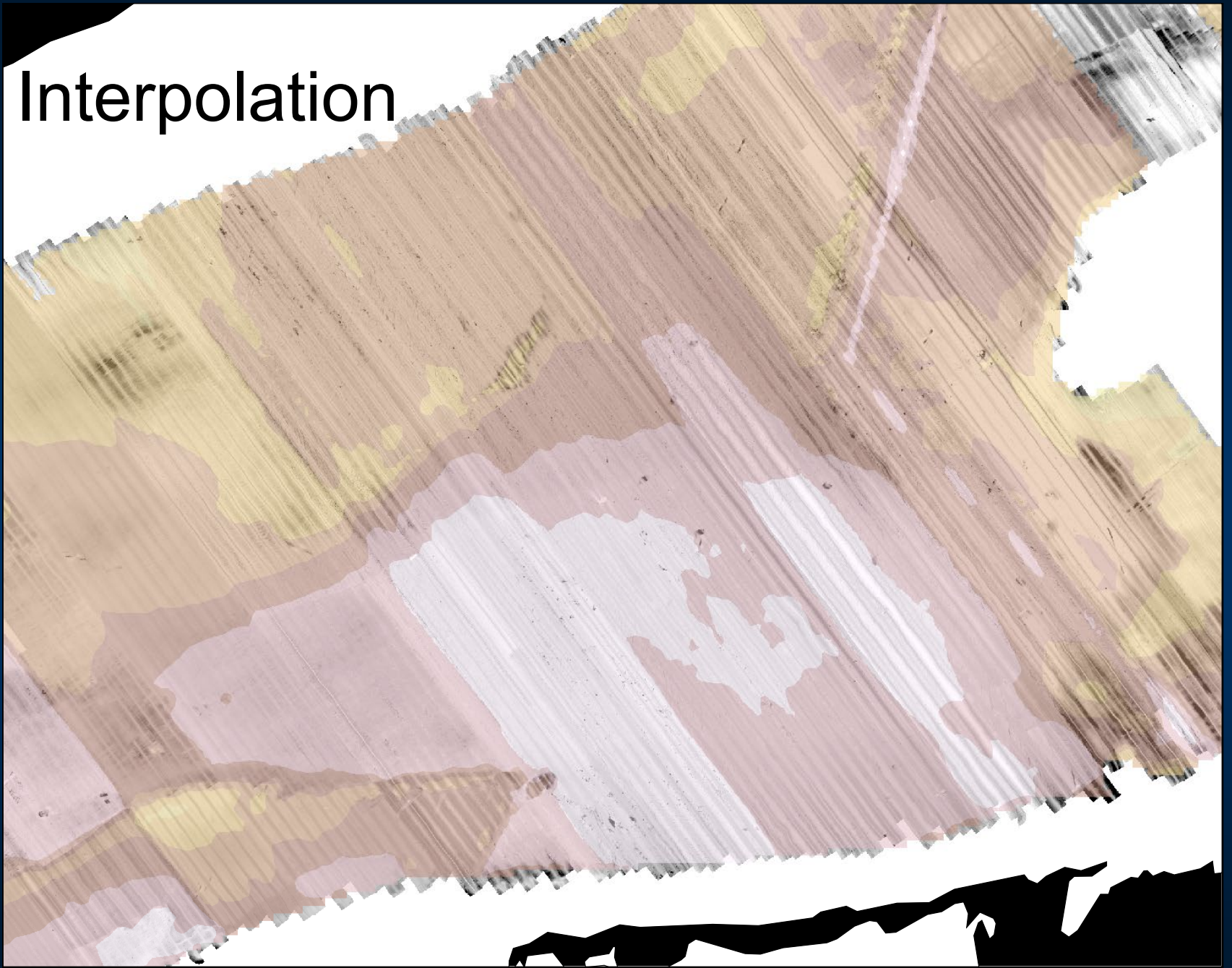


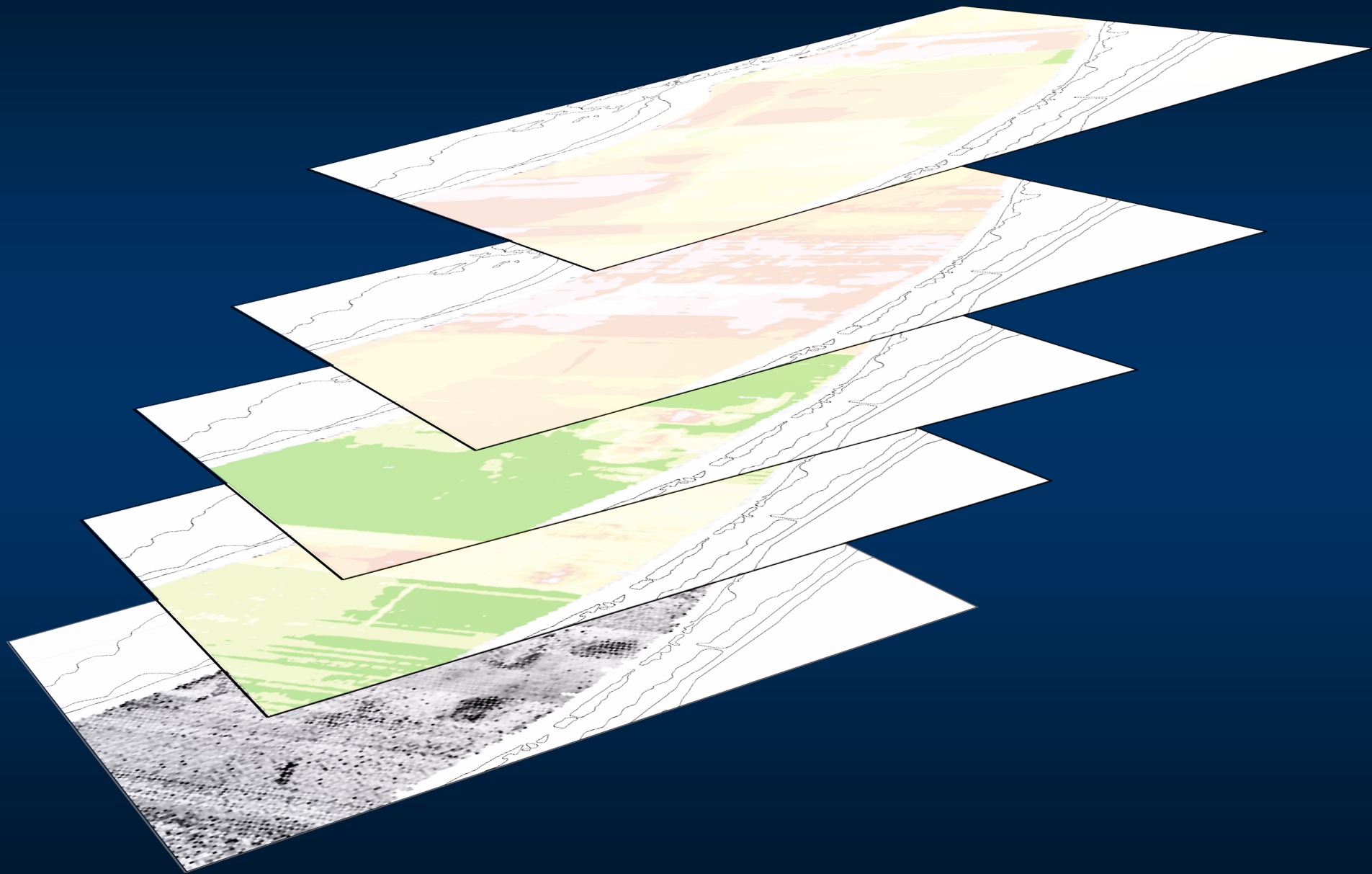




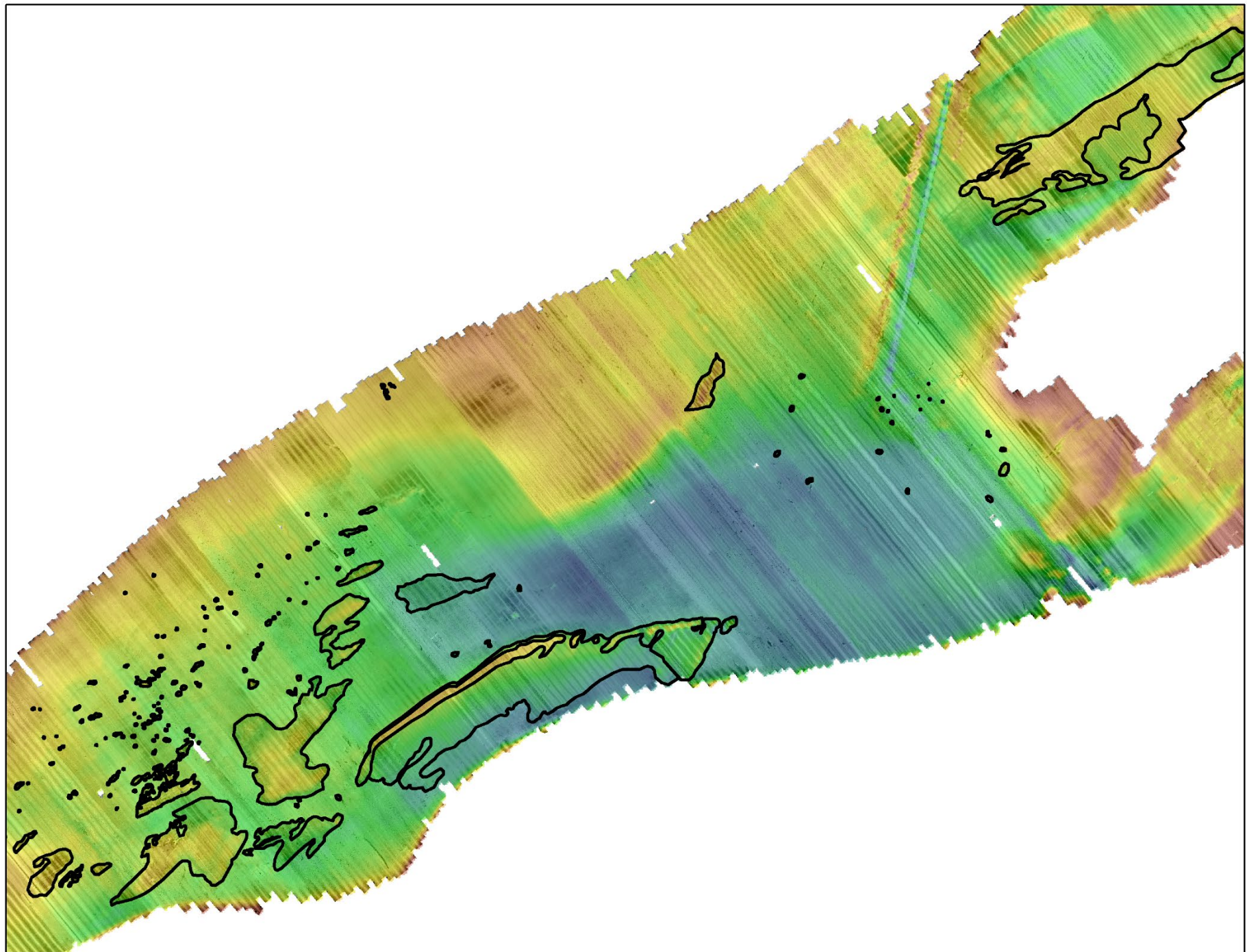


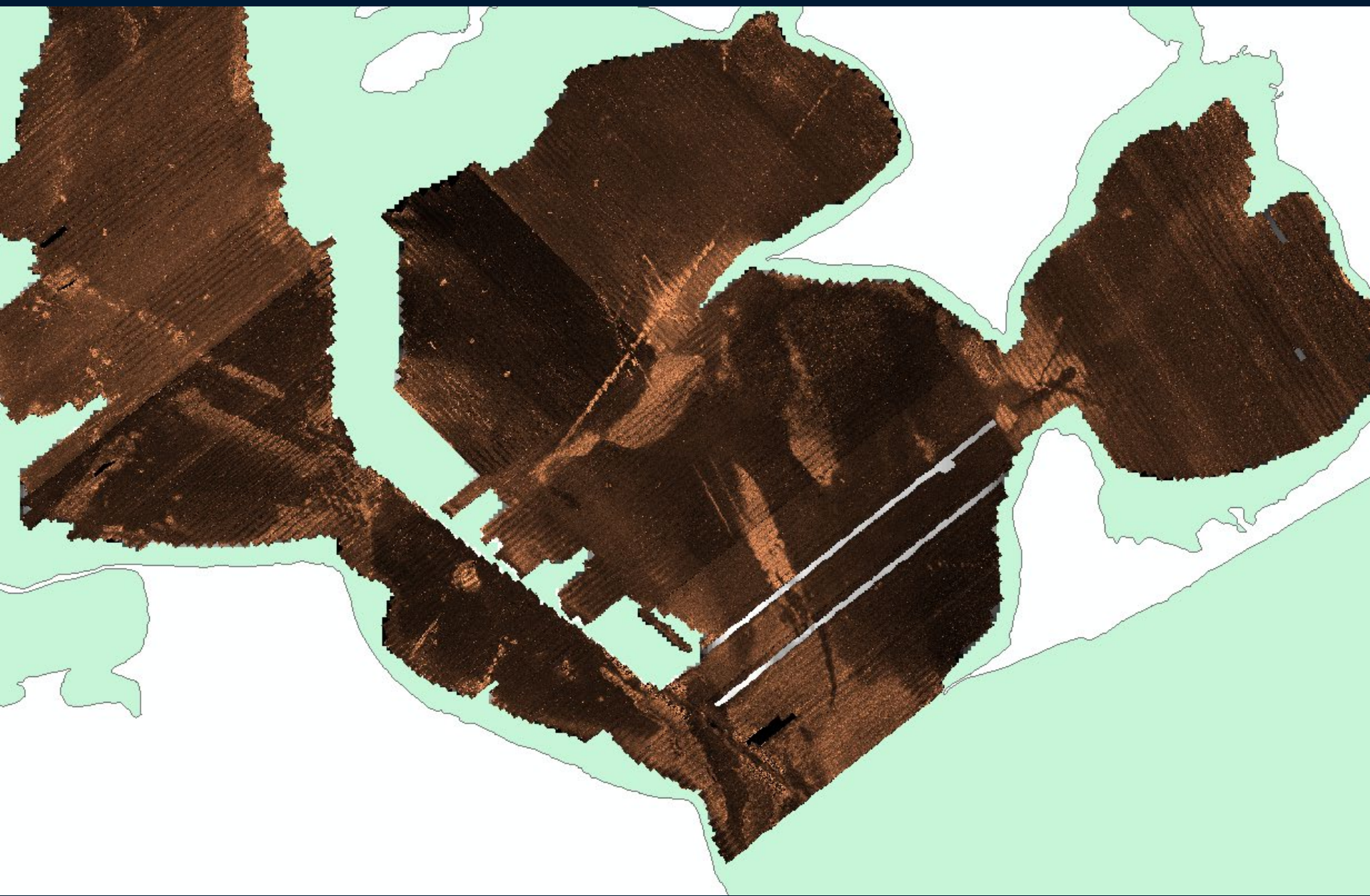
Interpolation







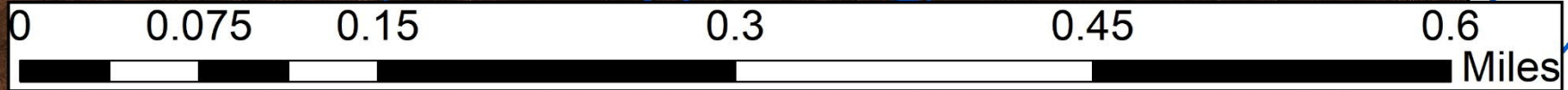
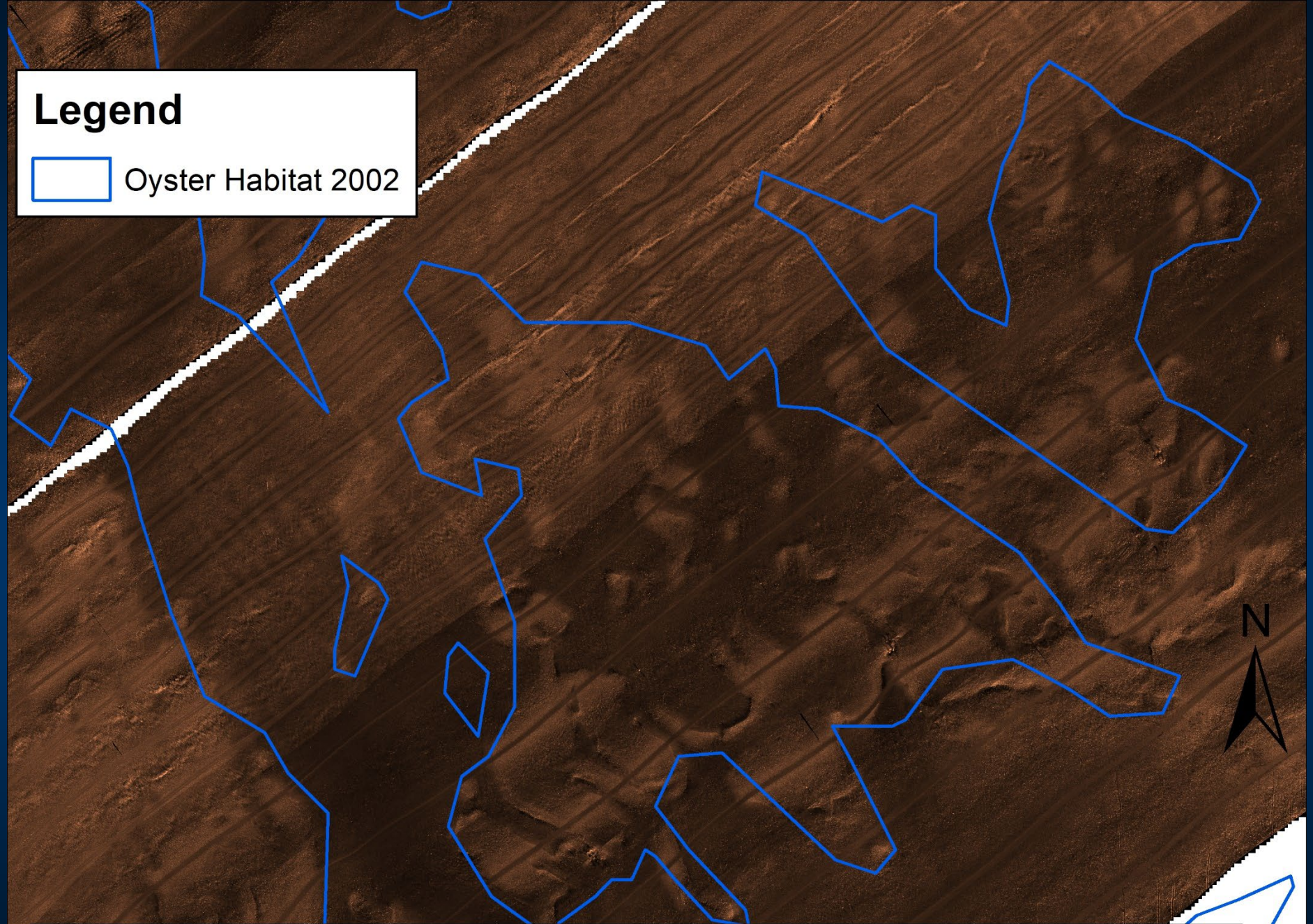


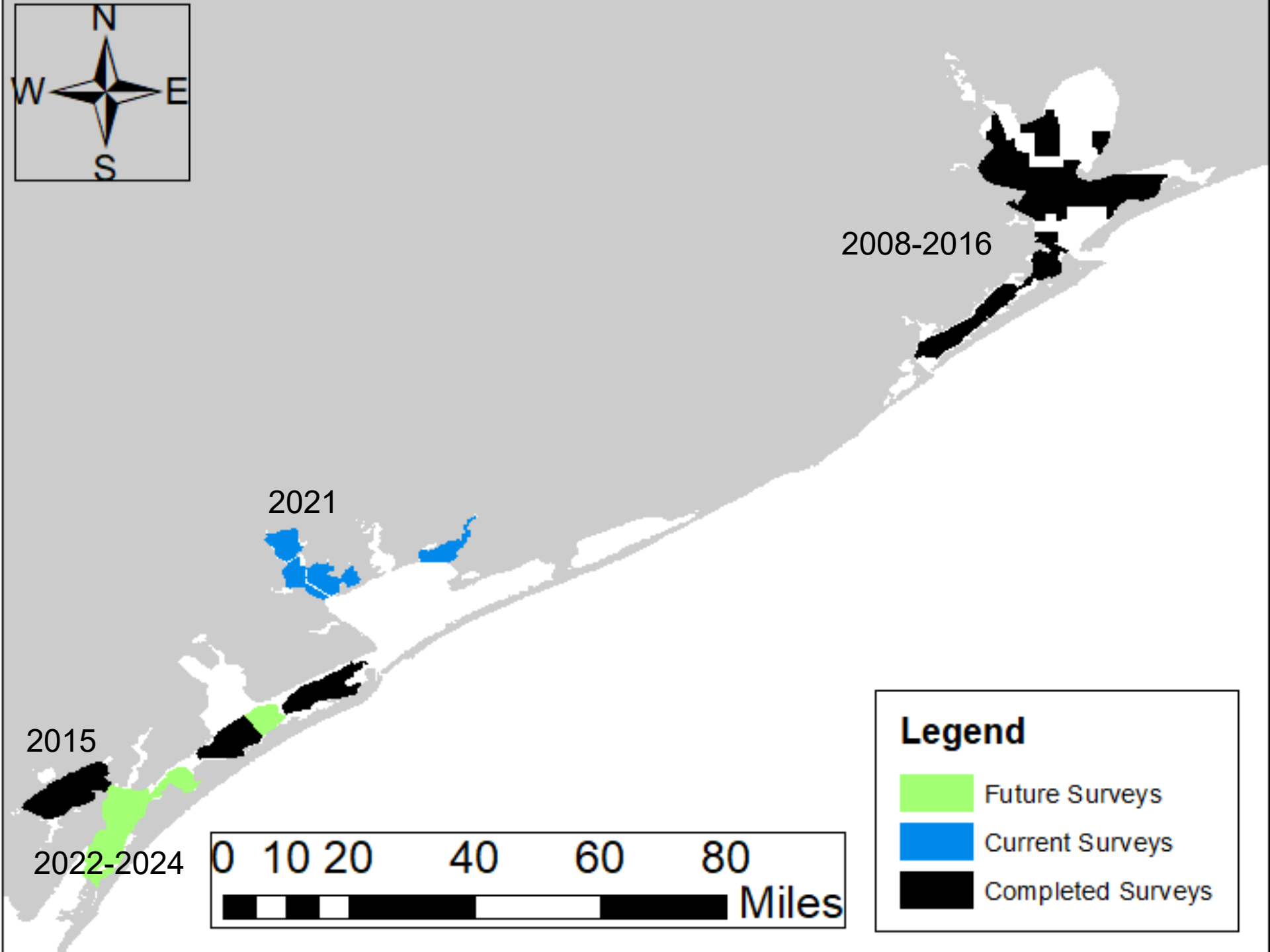




Legend

 Oyster Habitat 2002



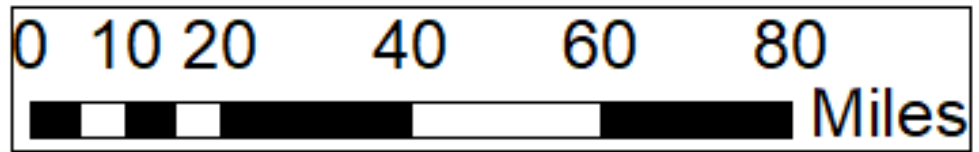


2008-2016

2021

2015

2022-2024

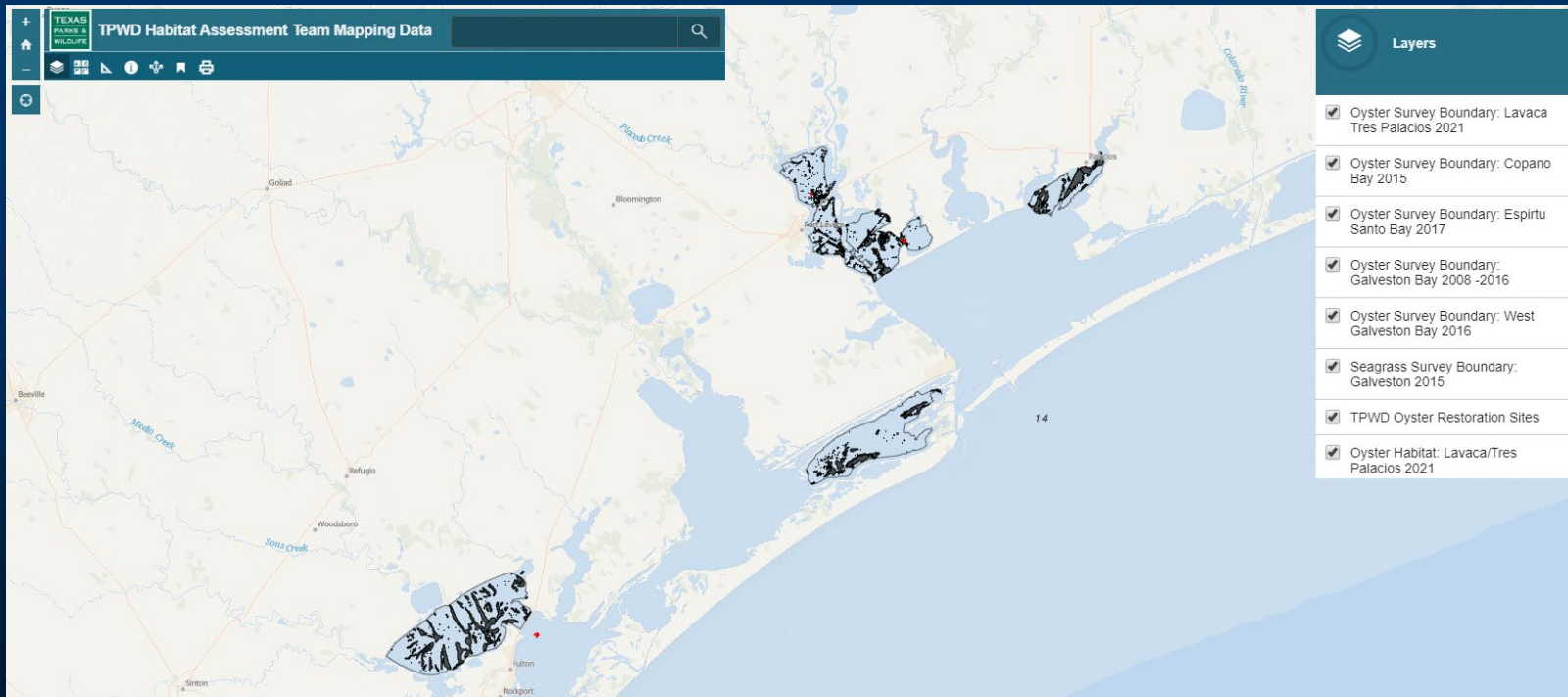


Legend

- Future Surveys
- Current Surveys
- Completed Surveys

Data Access

- <https://tpwd.texas.gov/landwater/water/habitats/coastal-fisheries-habitat-assessment-team/>
- All habitat products are hosted on ArcGIS online as services





QUESTIONS?

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