ESTIMATING DISTRIBUTION OF SEDIMENTARY BENTHIC HABITATS AND SPECIES ON THE EASTERN PACIFIC SHELF

AND

EFFECTS OF DEVICE DEPLOYMENT

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BOEM
Bureau of Ocean Energy Management

2010 - 2014

Regional Survey

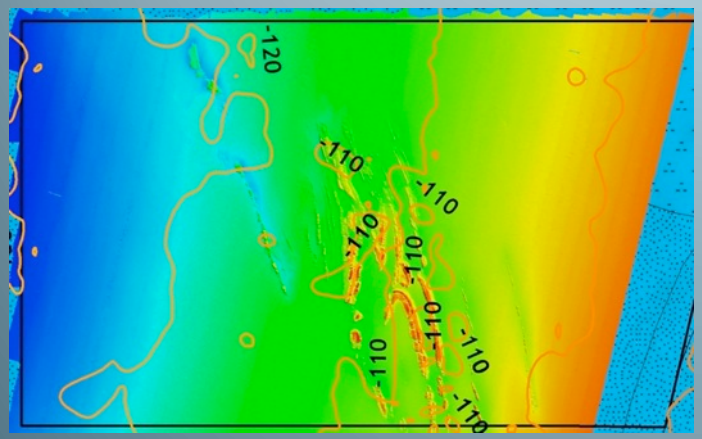
- High resolution mapping (5.5 sites)
- Sediment ground-truthing (6 sites)
- Invertebrate surveys
  - Infauna (box core): 8 sites, 153 grabs
  - Epifauna (ROV): 3 sites, 36 stations
- Objectives:
  - Map habitat, not just geology
  - Develop predictive capabilities of where to find high priority habitat or species

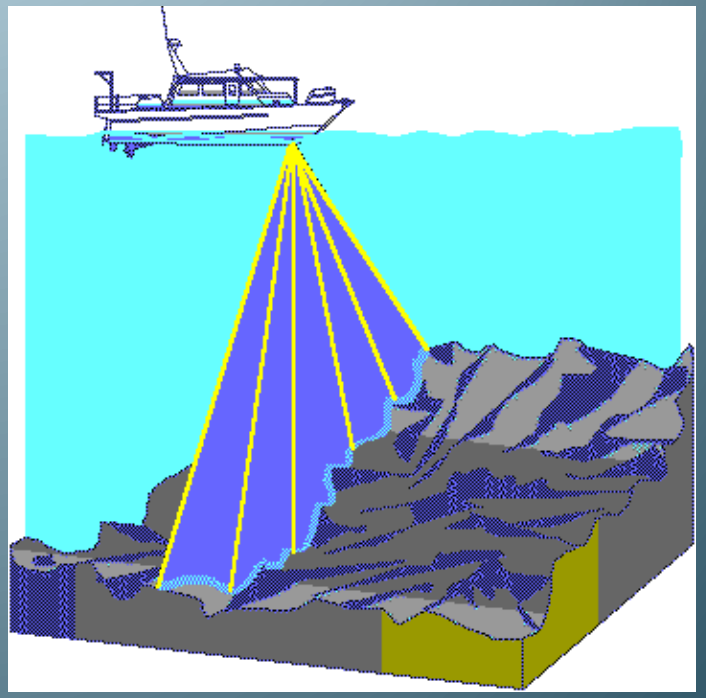
Part 1: Distribution of Habitats and Species

High Resolution Mapping

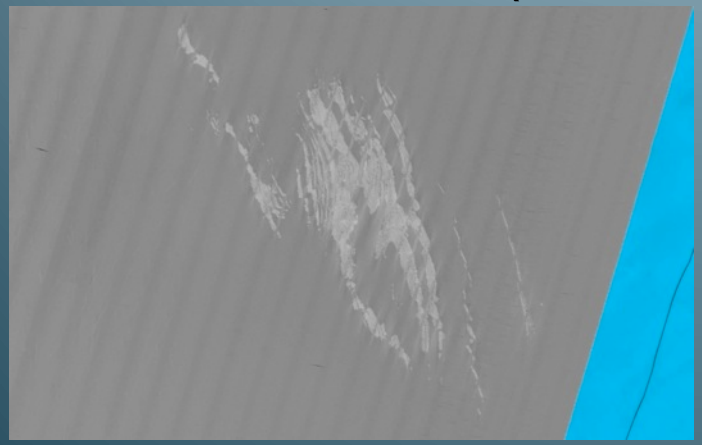
Conducted by C. Goldfinger lab (OSU-CEOAS)

Multi-beam sonar mapping (bathymetry)



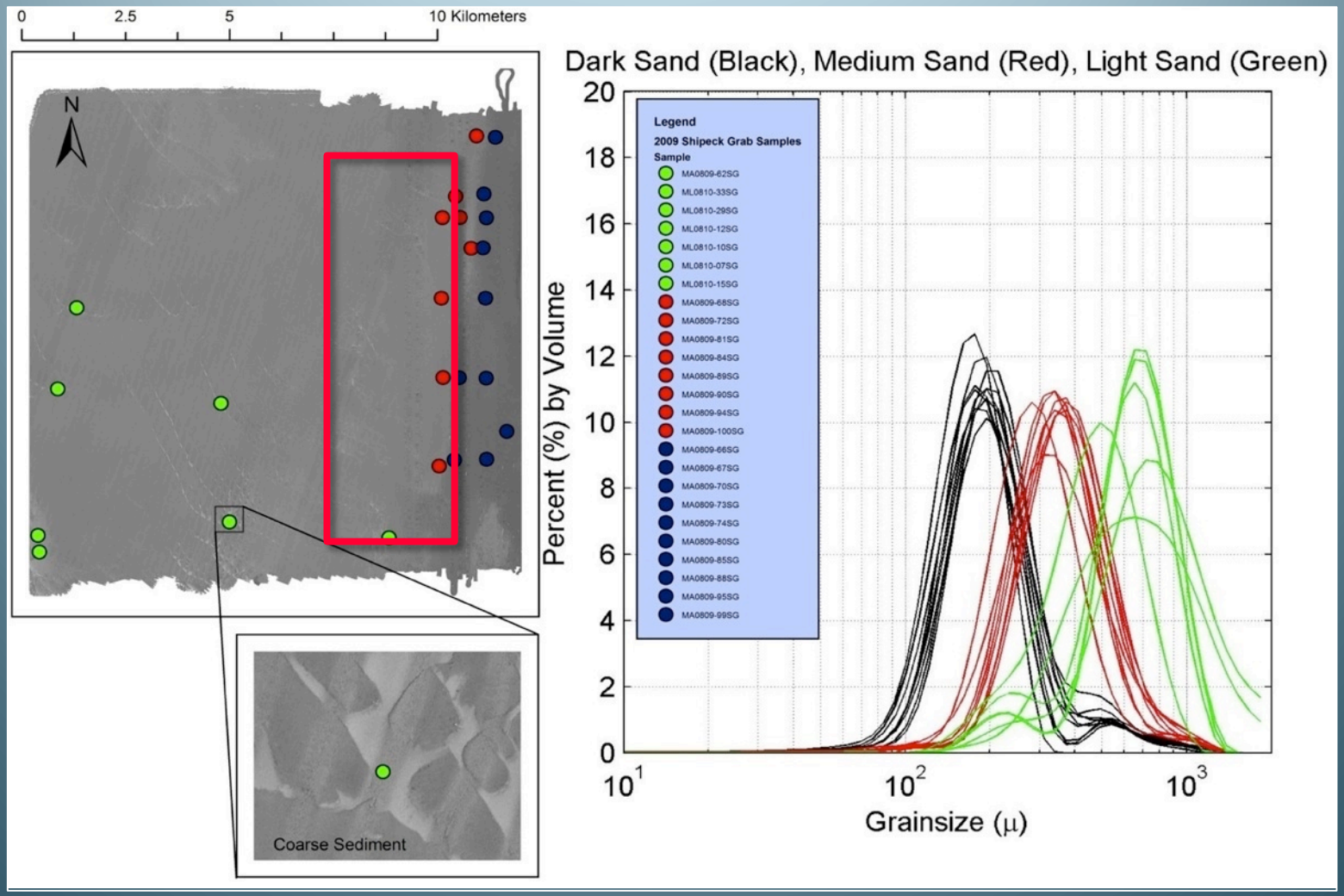


Acoustic backscatter (substrate type)



Groundtruth with Grab Samples

Conducted by C. Goldfinger lab (OSU-CEOAS)



Part 1: Distribution of Habitats and Species

Infauna and Sediment Sampling

Water quality samples

0.1 m^2 Grey-O'Hare box core

Analyze sediment for grain size, fines, TOC, TN

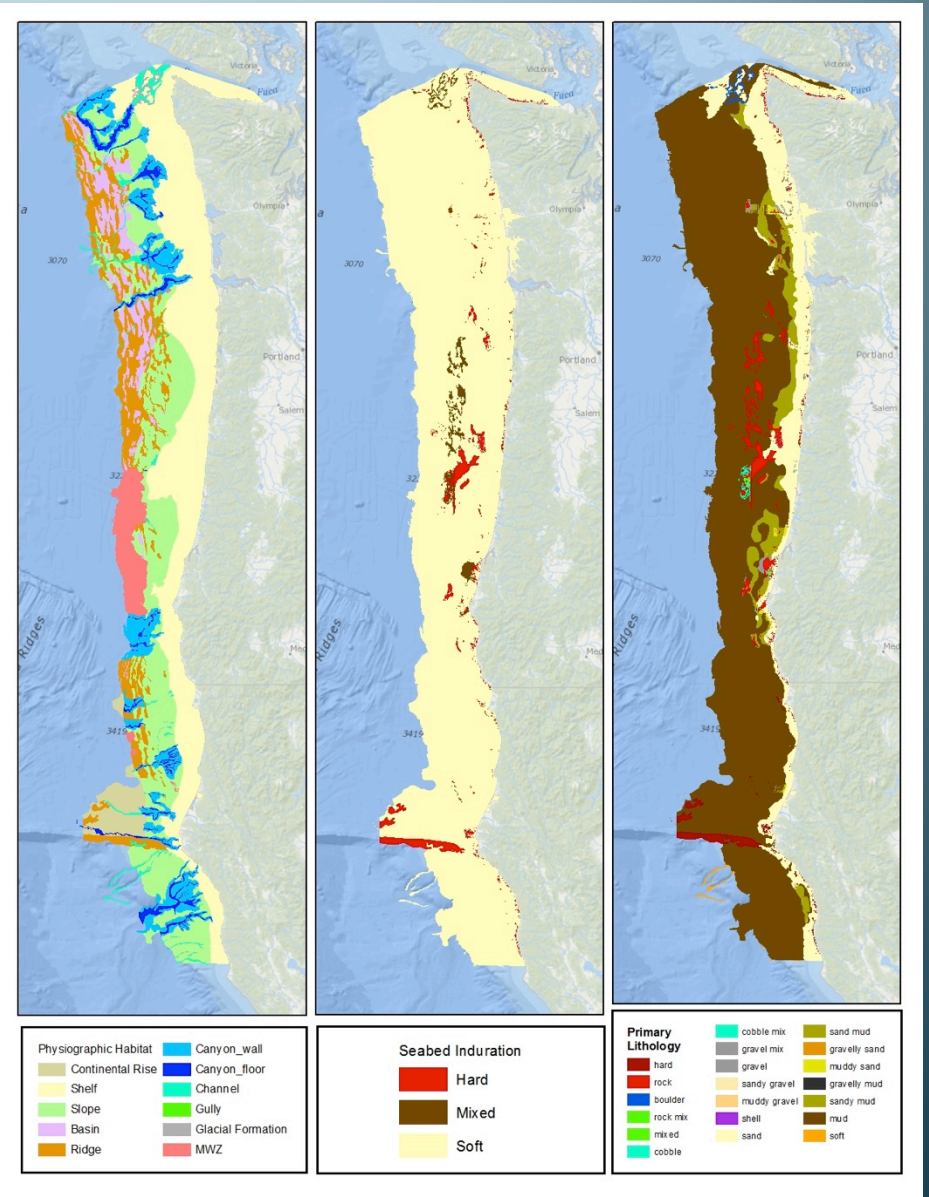
Sieve through 1.0 mm mesh

Identify infauna in the lab

"Habitat" Maps based on Lithology

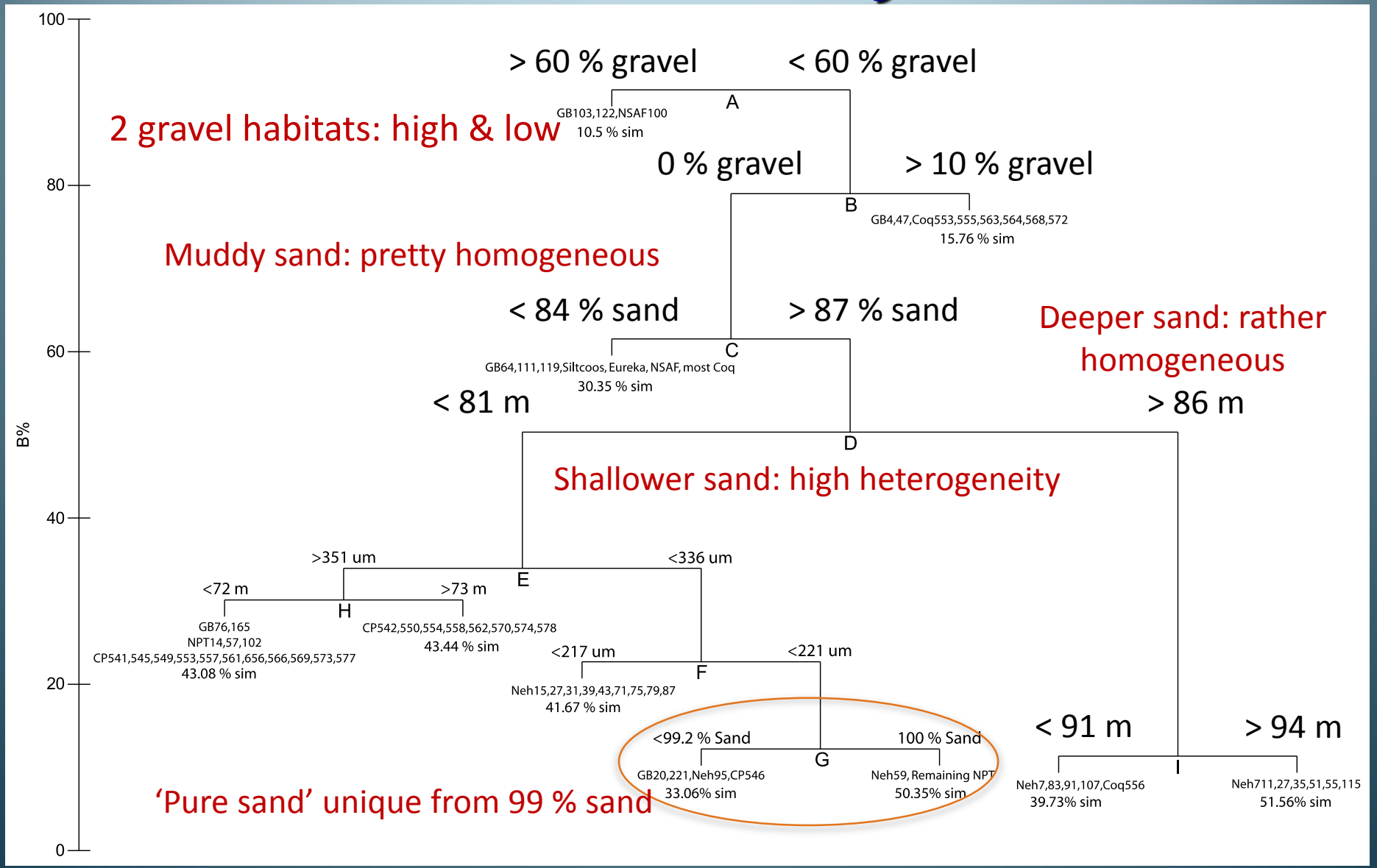
Created by C. Goldfinger lab (OSU-CEOAS)

- Mean Grain Size Map:
  - 3,360 samples selected from usSEABED, OSU, and BOEM databases; Inverse Distance Weighted Method: Error 8.15%
- % Sand Map:
  - 3,455 samples from usSEABED, OSU, BOEM, and EPA; Inverse Distance Weighted Method: RMS Error = 14.03%



Part 1: Distribution of Habitats and Species

Let Organisms Delineate Habitats: LINKTREE Analysis

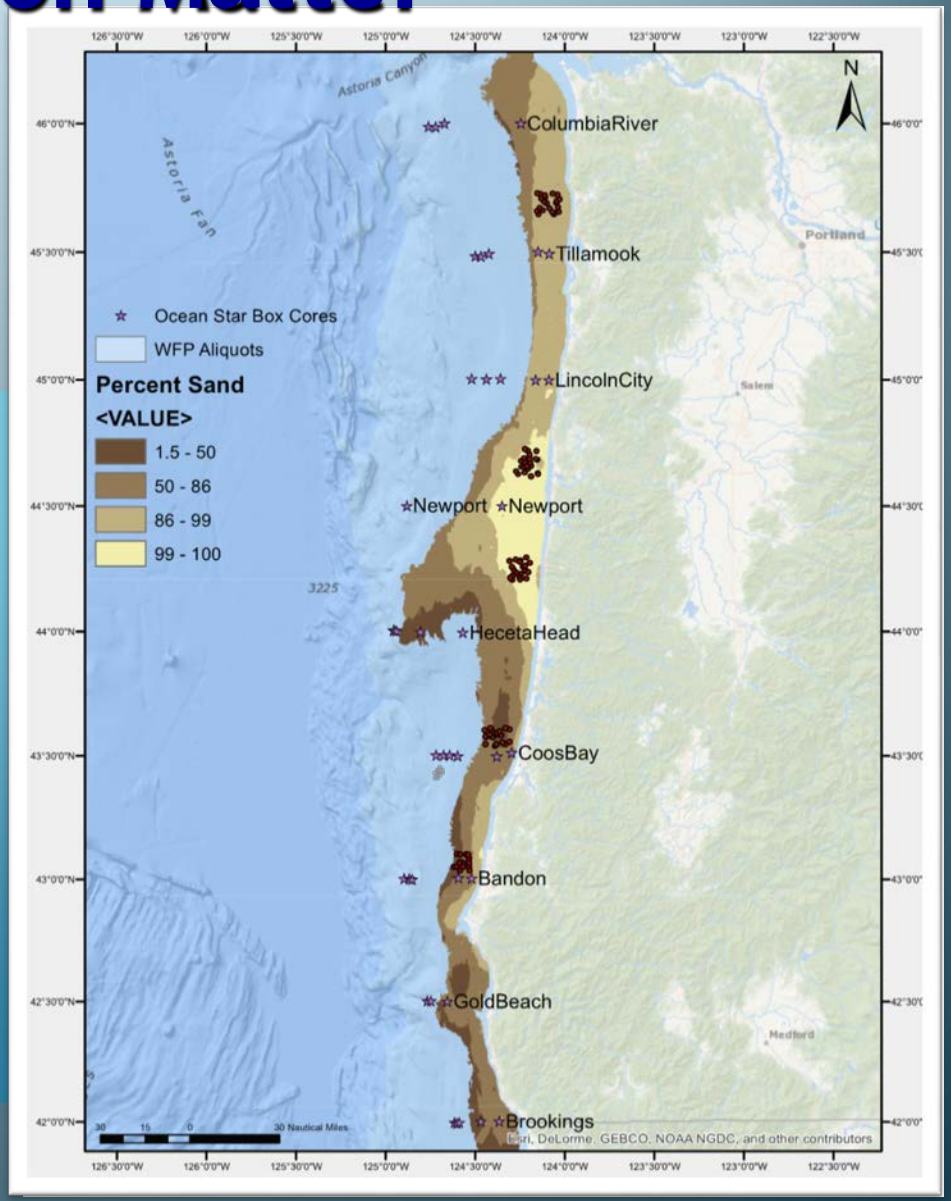


Subtle Differences in Sediment Composition Matter

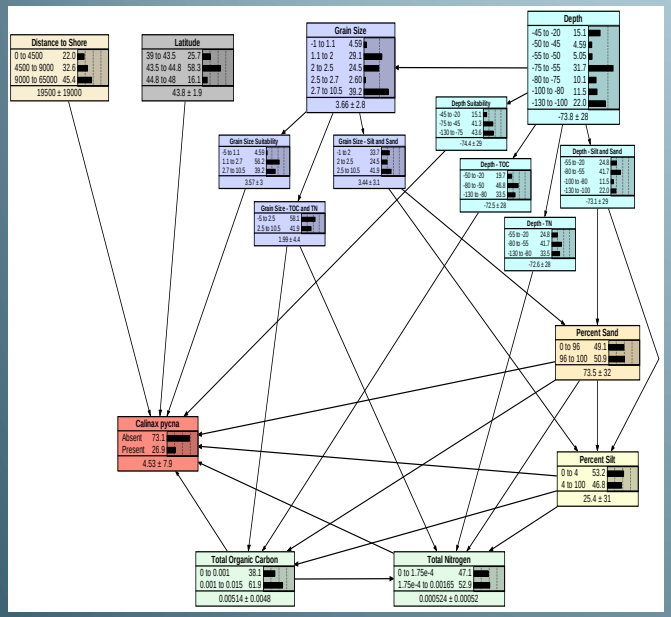
- Species assemblages within the study zone primarily shaped by % sand. Secondary differentiation based on depth and grain size.

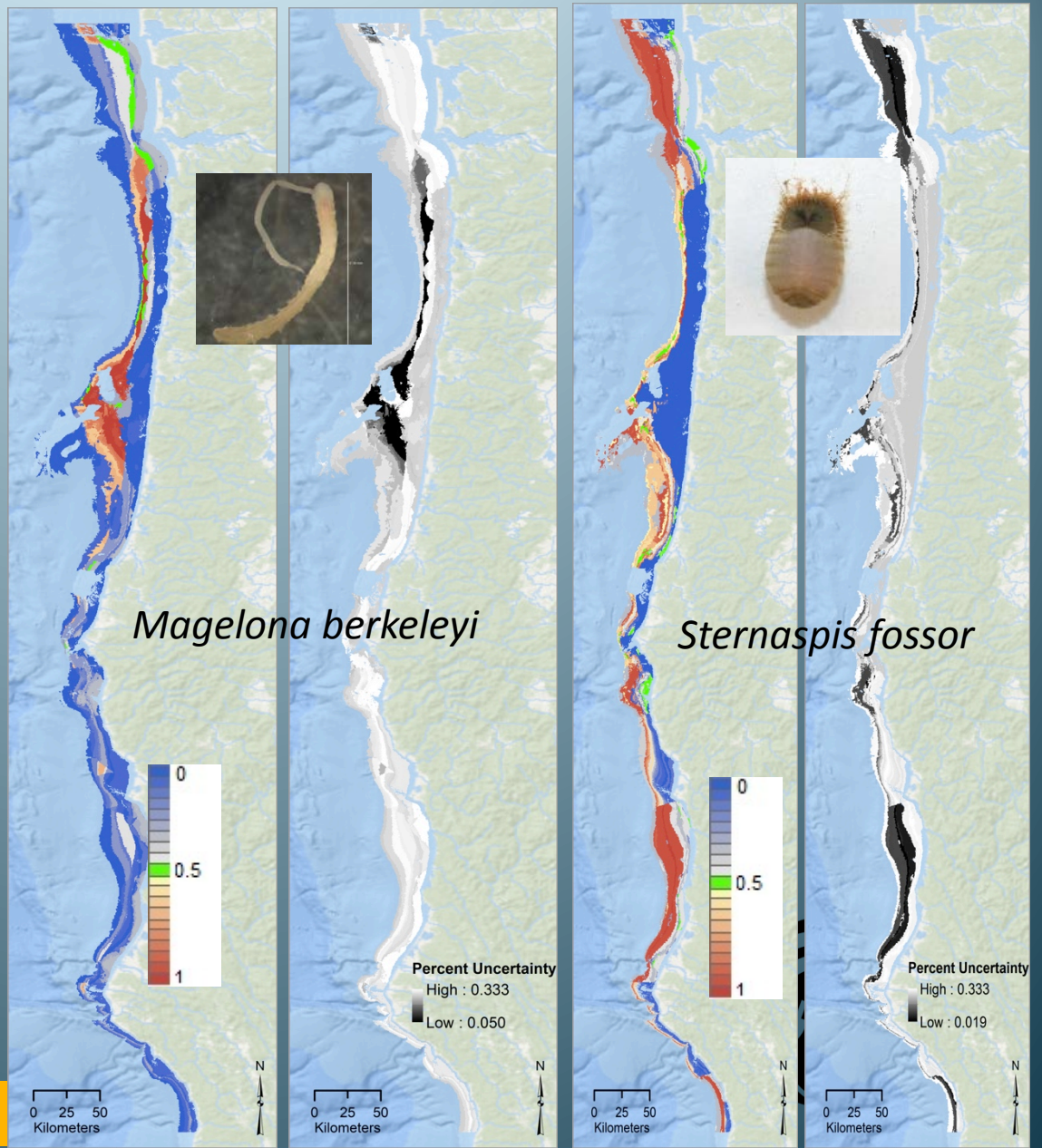
Habitat map = adjust bins to reflect species preferences rather than equal splitting:

- 99 – 100 % sand
- 87 – 99 % sand
- < 84 % sand
- 60 – 100 % gravel
- 10 – 60 % gravel



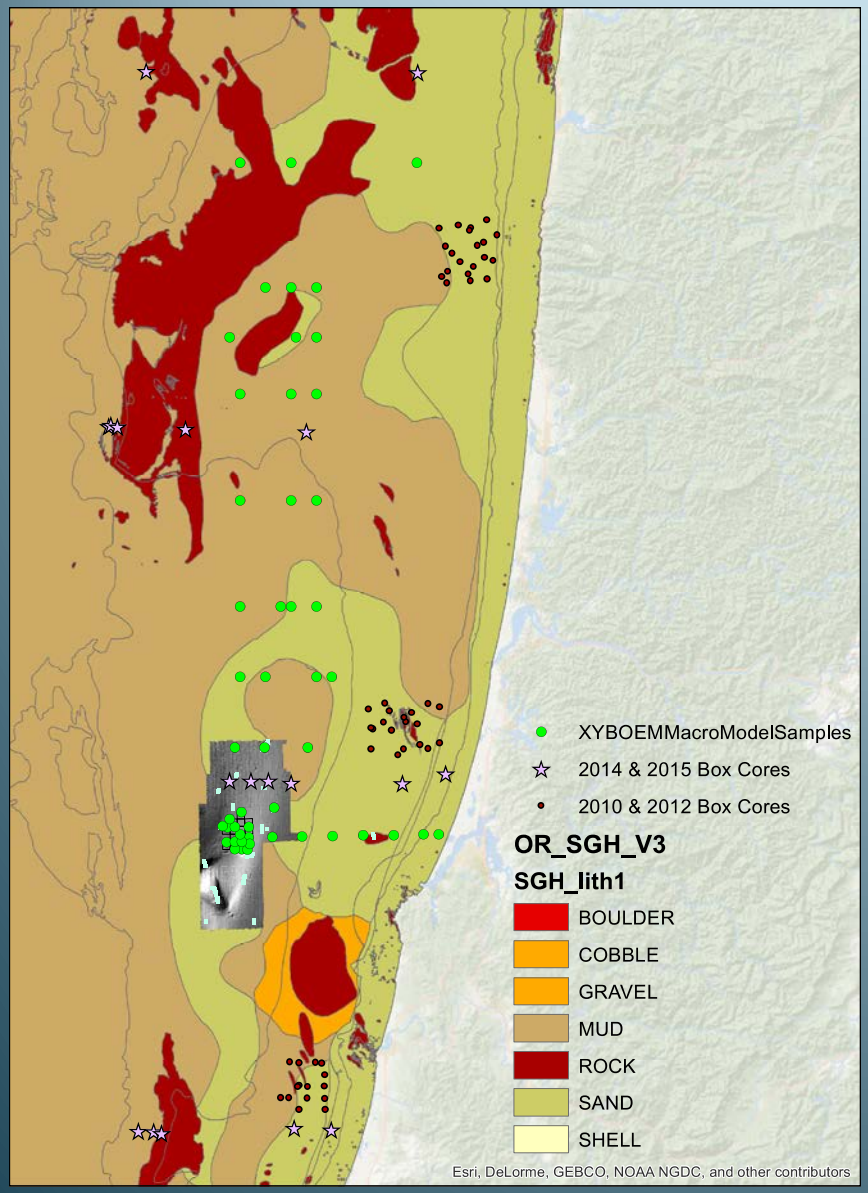
Map Habitat Suitability (and uncertainty)

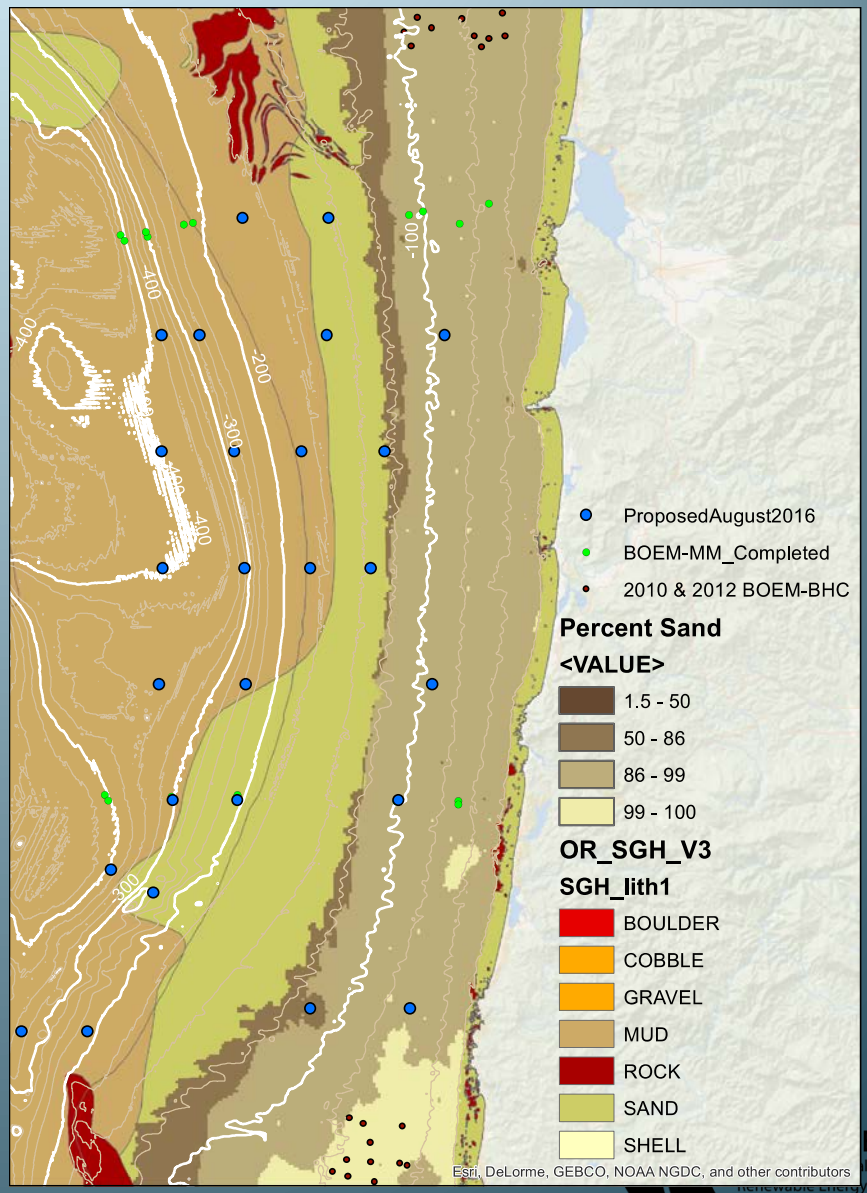




Part 1: Distribution of Habitats and Species

Up Next: Cross-shelf and Slope sampling



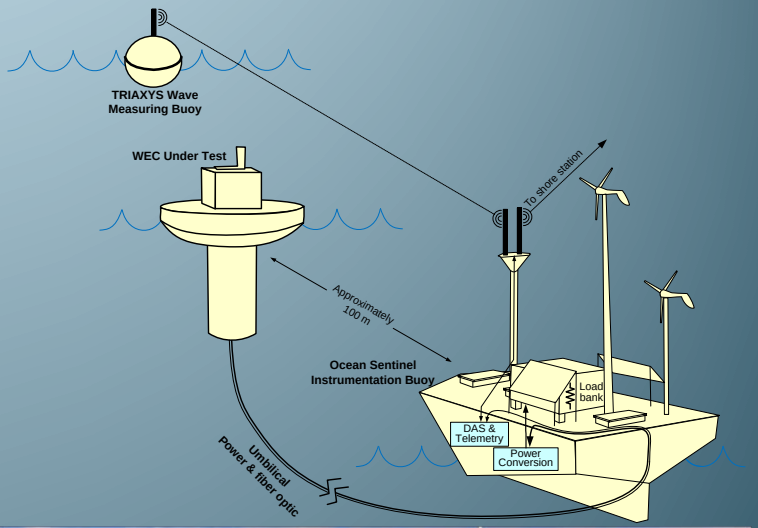


Part 1: Distribution of Habitats and Species

Assessing Deployment Effects at PMEC-NETS

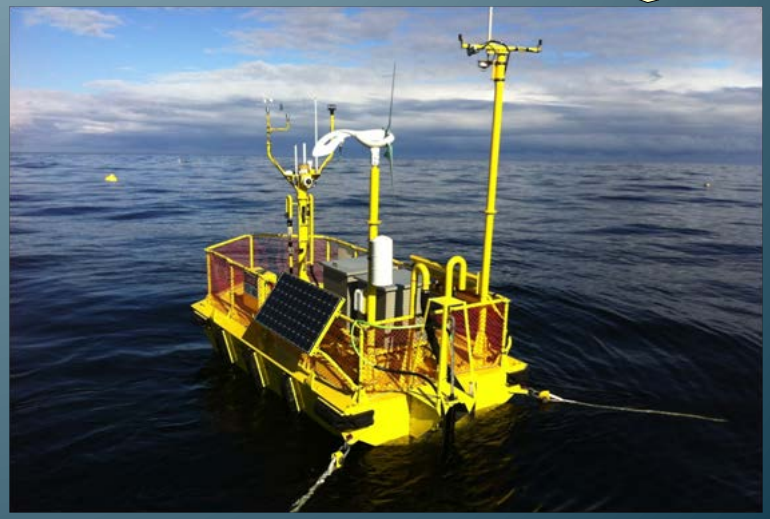
PMEC-NETS

- 1 nm^2 site in state waters off Newport, OR
- Non grid connected: can test 1/3 to ½ scale devices
- 99.75% sand



Ocean Sentinel

- Provides stand-alone electrical loading and power conversion for test WEC
- Measures and records WEC power output and data from nearby wave-measuring instrument
- Transmits collected data to shore via wireless telemetry system
- Three-point mooring of 4'x4'x4' concrete anchors



2012 ROV Survey of Wet-NZ test

Starting in 2013, anchor grabs

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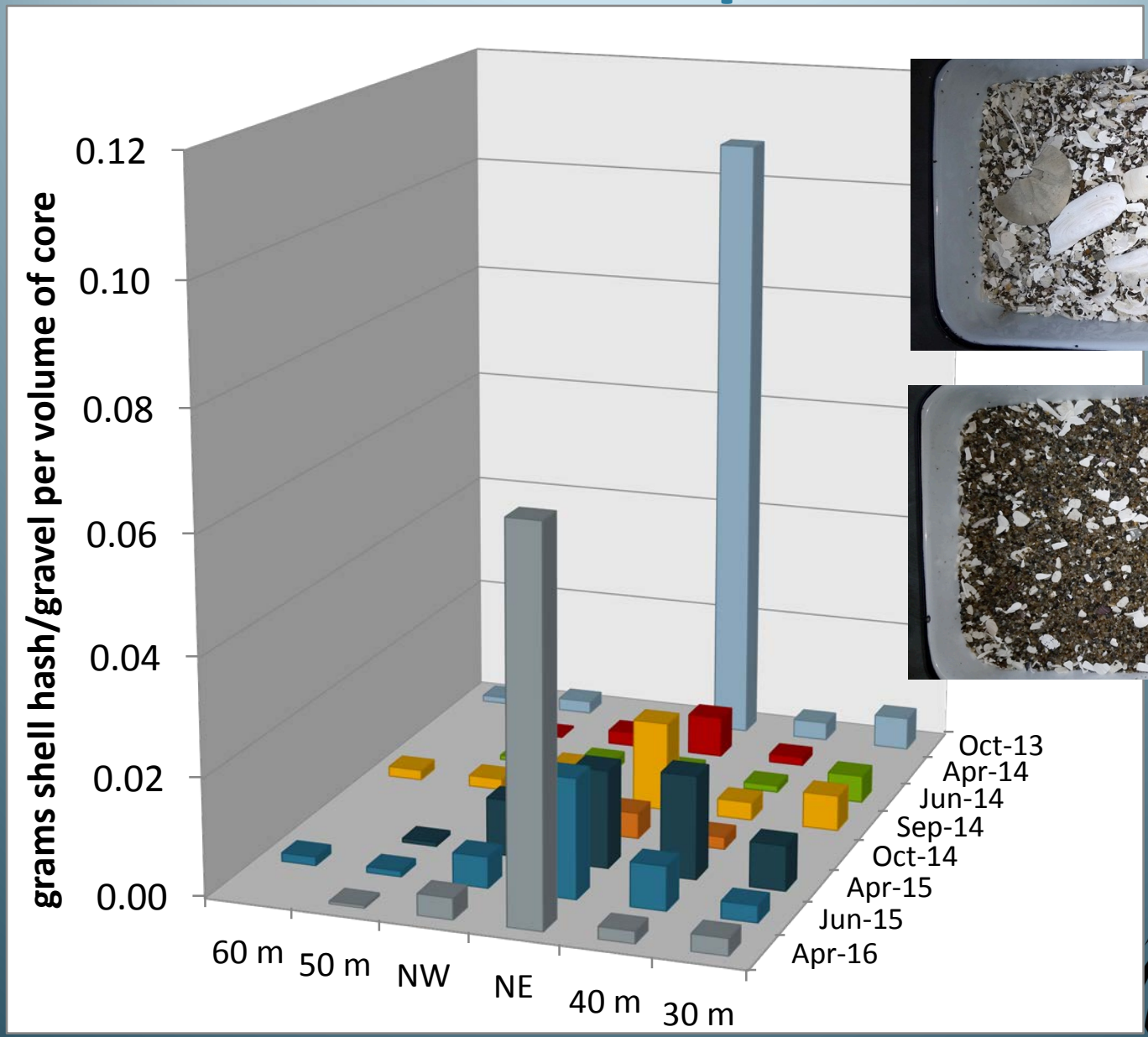
Residual Proportion



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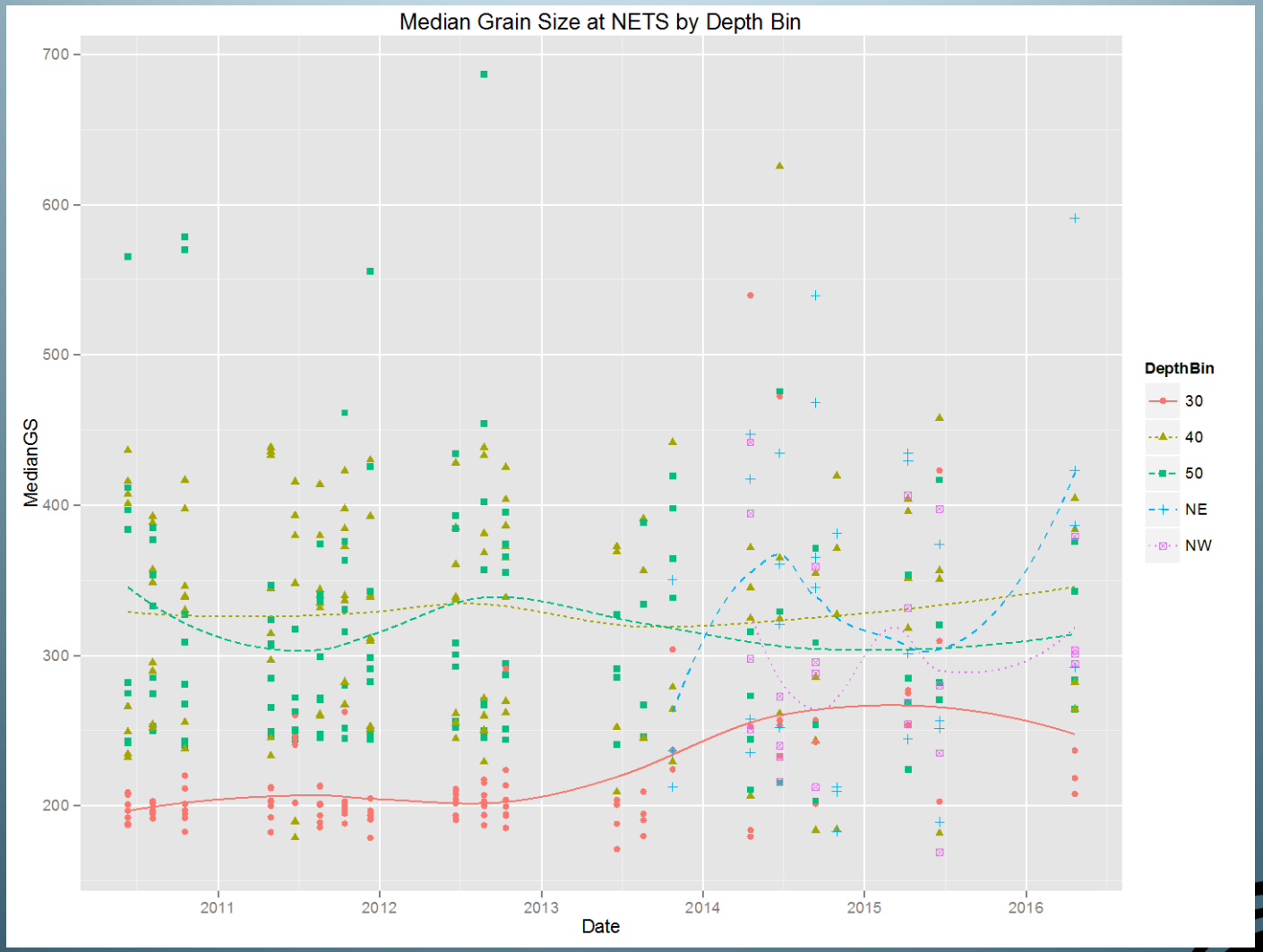
No Effects on Median Grain Size



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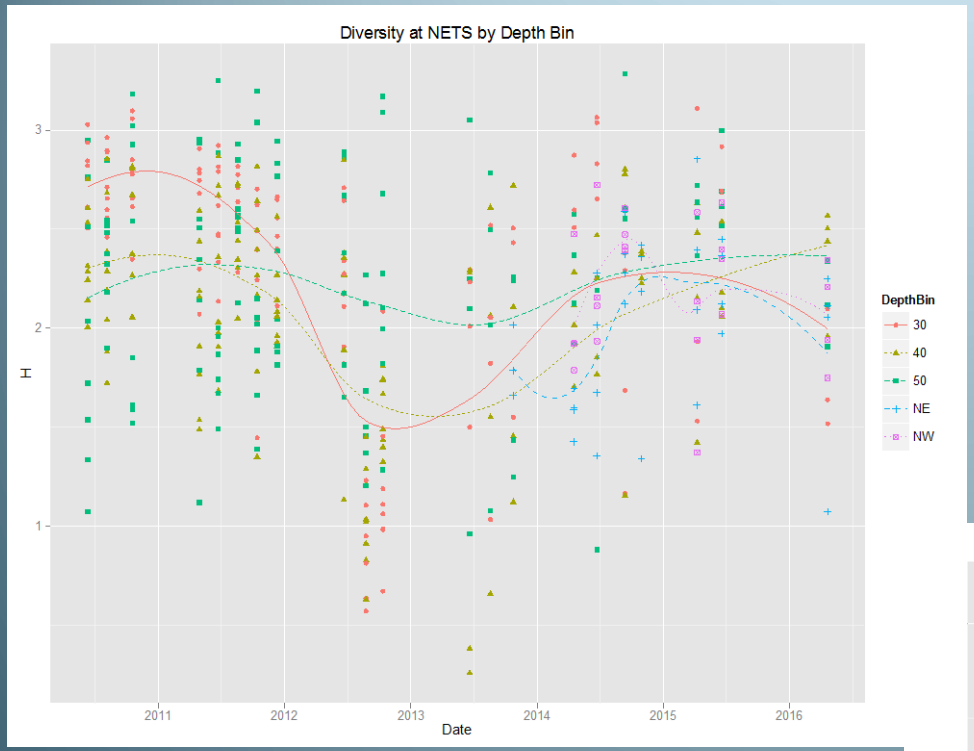
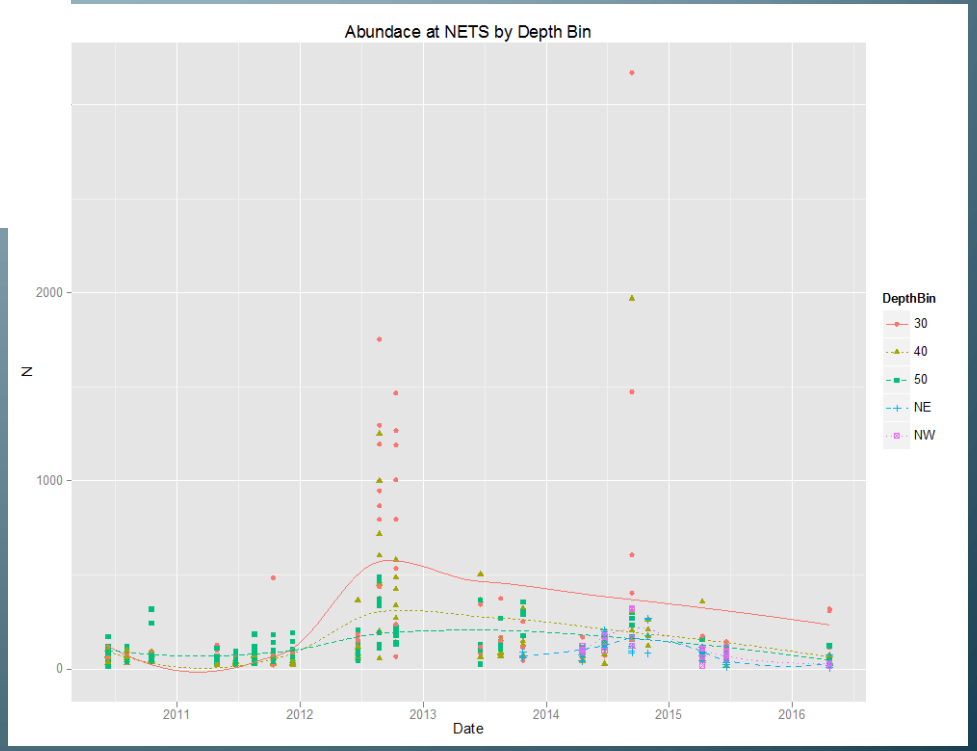
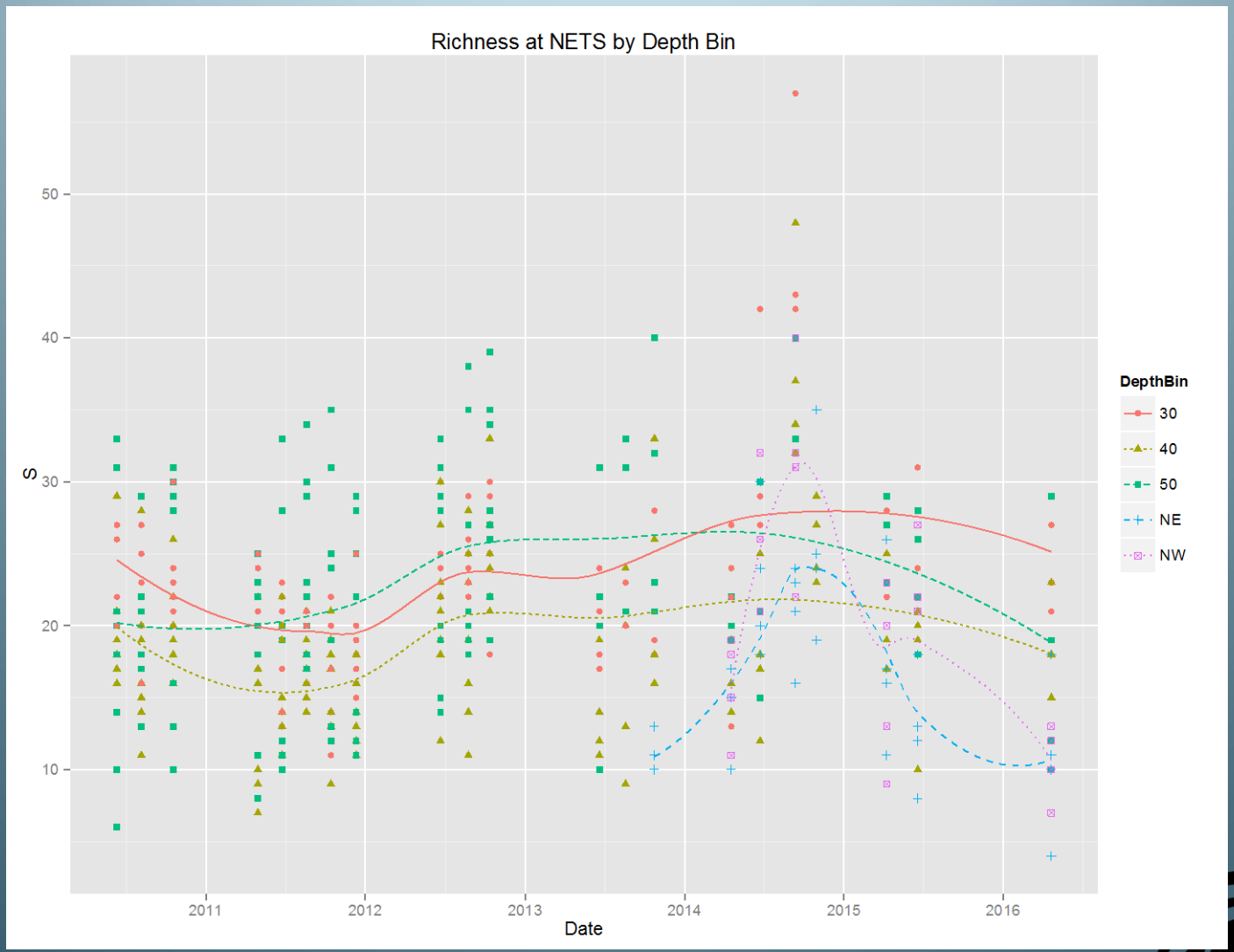
No Effects on Diversity or Abundance





Part 2: Detecting Device Effects

Potential Effects on Richness



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Summary

- Macrofaunal assemblages primarily shaped by % sand and depth, finer differentiation based on grain size: habitat maps should show sediment breaks that reflect species preferences.
- Greater proportion of shell hash and gravel collected around anchors at PMEC-NETS – potential indicator of scour or other processes.
- Little evidence for anchor effects on sediment median grain size or macrofaunal organismal indices in medium to coarse sand habitat. Would not necessarily expect same response in area with more fine sediment.
- Seafloor conditions not recovered 5 months after anchor removal.

Acknowledgements

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