Welcome to the BOEM-Oregon Science Exchange

January 20, 2016 10:00 am
Audio: call toll free 877-612-1641 , passcode: 572 910 9
We will begin shortly!

If you are having technical difficulties, please call John Sanchez at 805-384-6315 or send us a chat message.

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Pacific Region Benthic Specialist

Lisa Gilbane

Survey of Benthic Communities near Potential Renewable Energy Sites Offshore the Pacific Northwest

Cooperative Agreement through the Pacific Northwest Cooperative Ecosystem Studies Unit

Lisa Gilbane

Oregon State University

Sarah Henkel
Hatfield Marine Science Center
and
Chris Goldfinger
College of Oceanic and Atmospheric Science
Active Tectonic Group, Seafloor Mapping Lab

January, 2016 ● Camarillo, California

BOEM–Oregon Planning & Collaboration

- **We collaborated early** *in the planning process for ocean energy*
  - Joint identification of need for seafloor information
  - Led to a 2010 collaborative effort to conduct a **regional benthic assessment**
- **We continue to collaborate** *as needed throughout the process*
  - Joint discussion of need to examine research efforts
  - Led to a 2012 collaborative effort to convene an **Oregon science conference**

Oregon Science Conference

- **Open session** (100+ attendees)
- **Experts workshop** (40+ scientists and managers)
- **Identified and prioritized research needs**
  - Baseline information and siting studies
  - Impact studies
  - Long-term monitoring studies
- **Proceedings published**

http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5255.pdf

http://hmsc.oregonstate.edu/rec/sites/default/files/boem-oregonmreconfprocfinal041413.pdf

Benthic Assessment

- *Title:* **Benthic Communities near Potential Renewable Energy Sites Offshore the Pacific Northwest**
- 2010-2014
- *Principal investigators:*
  - Lisa Gilbane
  - Sarah Henkel
  - Chris Goldfinger
- *Scientific review group:*
  - U.S. Environmental Protection Agency
  - U.S. Geological Survey
  - National Oceanic and Atmospheric Administration (NWFSC)

Benthic Assessment

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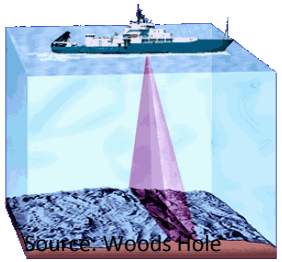
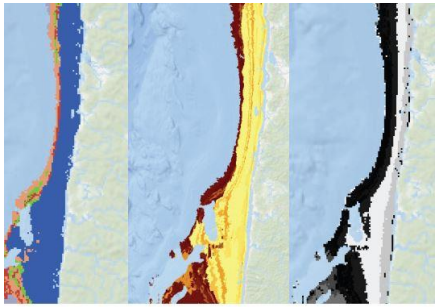
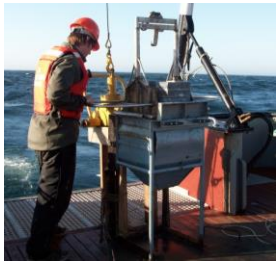
OSU
Oregon State University

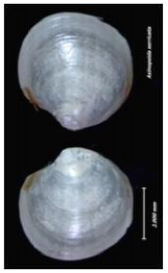
Project Components & Sites

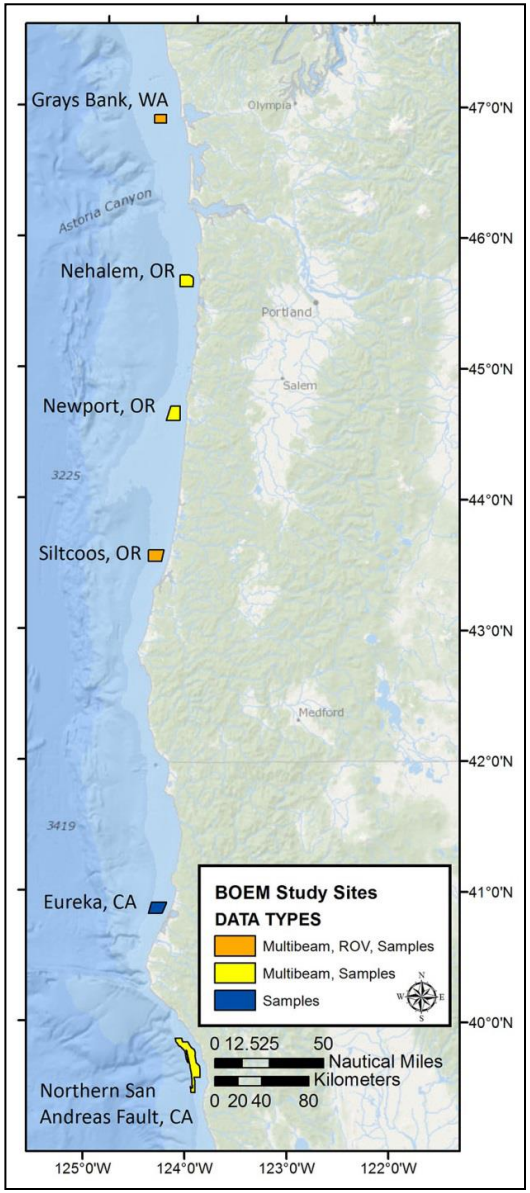


Source: Woods Hole Oceanographic Institute







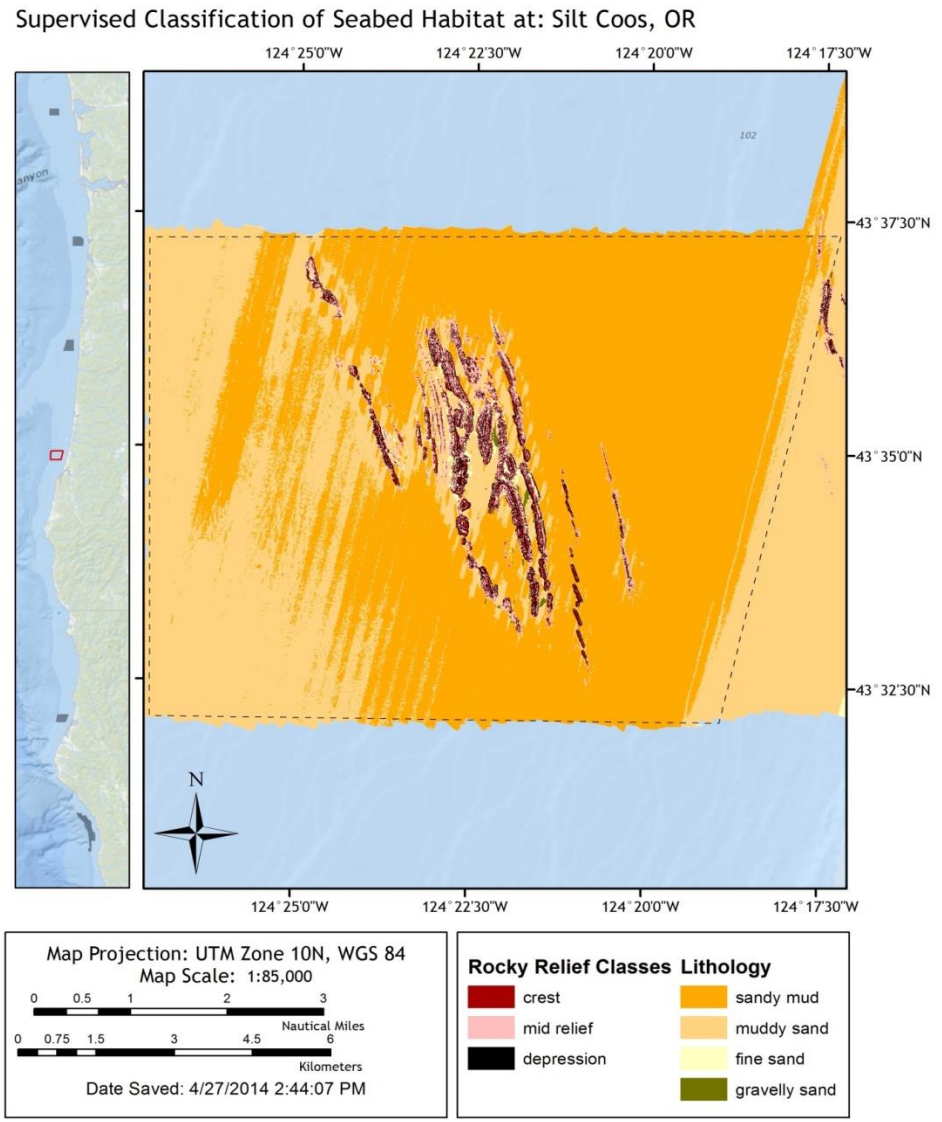


Benthic Assessment – Geophysical

Mapping New Areas of the Seafloor

Data Collected

- Sea floor imaging: multibeam bathymetry and backscatter imagery, Reson Sea-Bat 8101 multibeam sonar (280 kHz)
- Sediment grain size (206 samples)
- Integrated ROV and AUV video when available
- Spatial analyst tools, Maximum Likelihood Classification tool



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Benthic Assessment – Geophysical

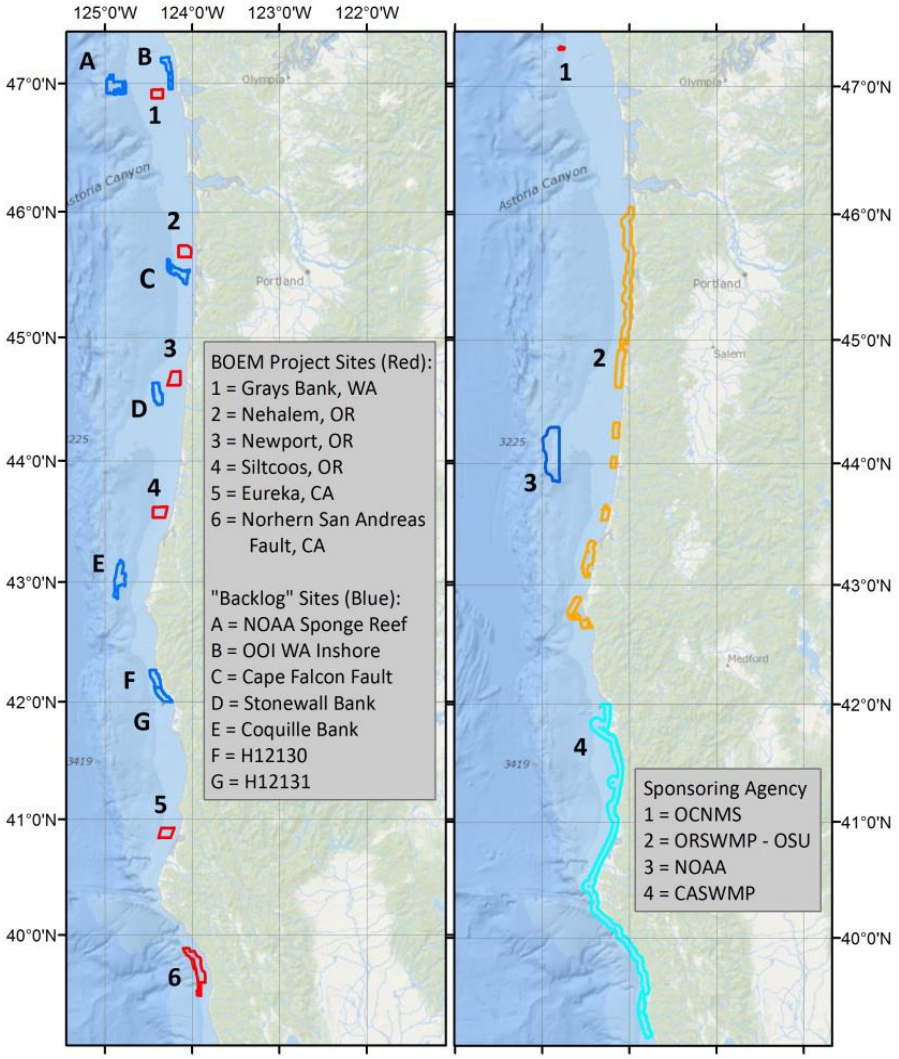
Mapping New Areas of the Seafloor

Sharing Vessels

- Oregon state agencies
- NSF Ocean Observing Initiative
- NOAA Ocean Explorer
- U.S. Geological Survey

Results of Collaborations

- 848 km^2 new multibeam bathymetry and backscatter imagery mapped
- Partnerships yielded additional areas equaling 1302 km^2
- Comparable effort to the Oregon State Waters Mapping Program (1639.90 km^2)



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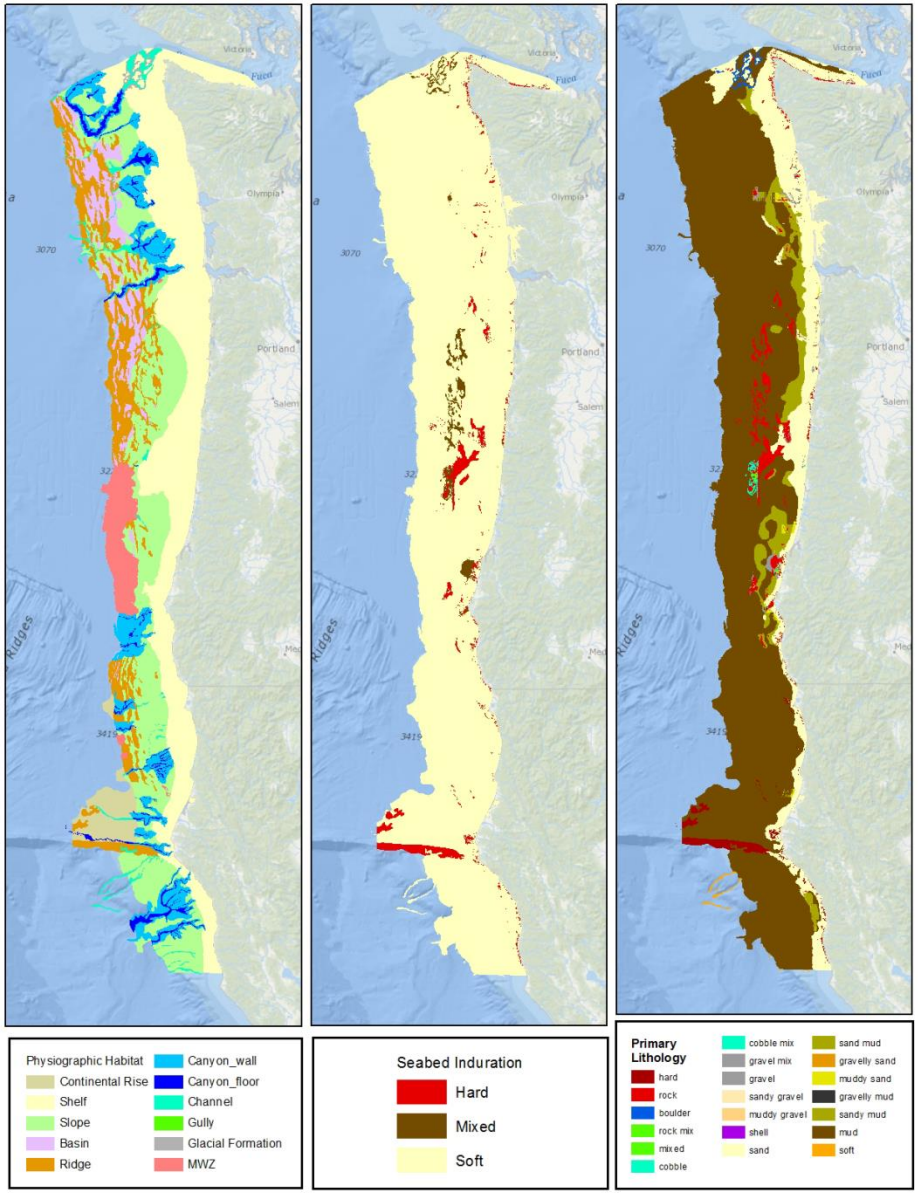
Benthic Assessment – Geophysical

Regional Mapping

Version 4.0 Surficial Geologic Habitat maps for WA, OR, and northern California

Each map panel is derived from the same underlying polygon feature class, but is symbolized according to a different map attribute with Physiographic Habitat (left), Seabed Induration (center), and Primary Lithology (right).

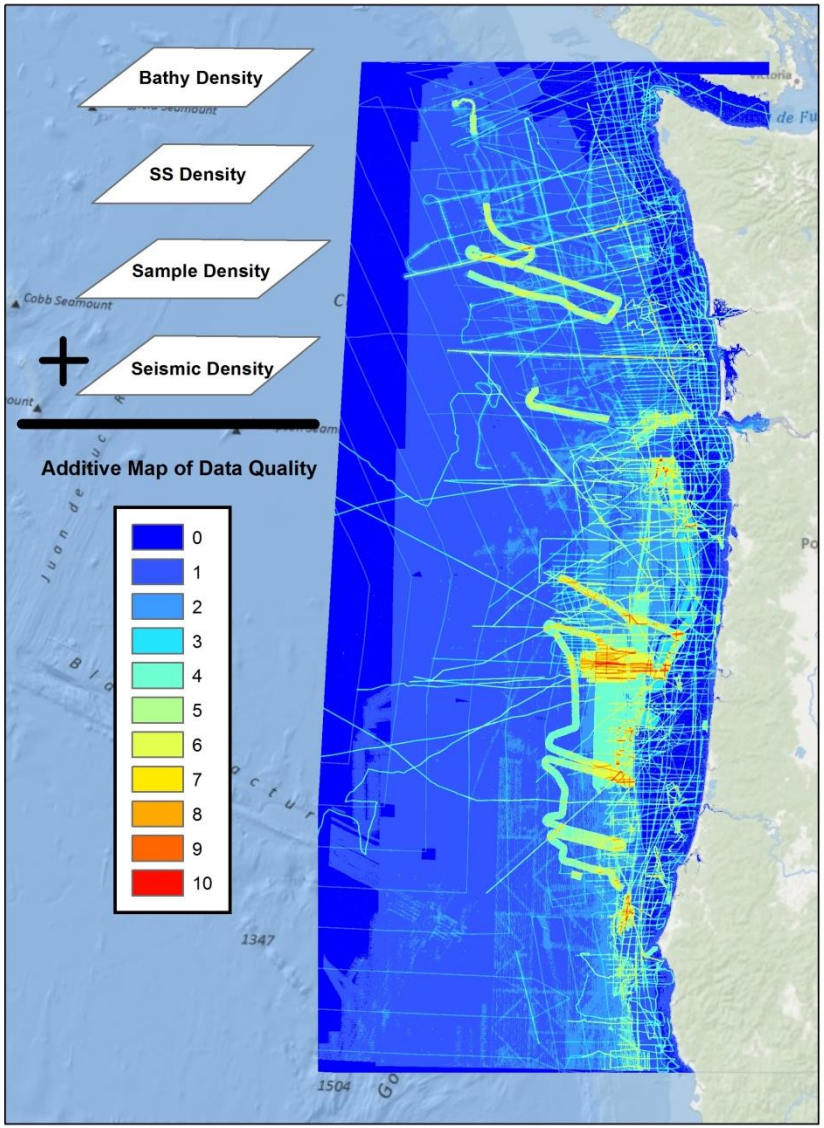


5-Year Review of Essential Fish Habitat, Pacific Fishery Management Council

Benthic Assessment – Geophysical

Regional Mapping

Data Quality Layer: A quick visual way to understand the amount and quality of data underlying your area of interest.



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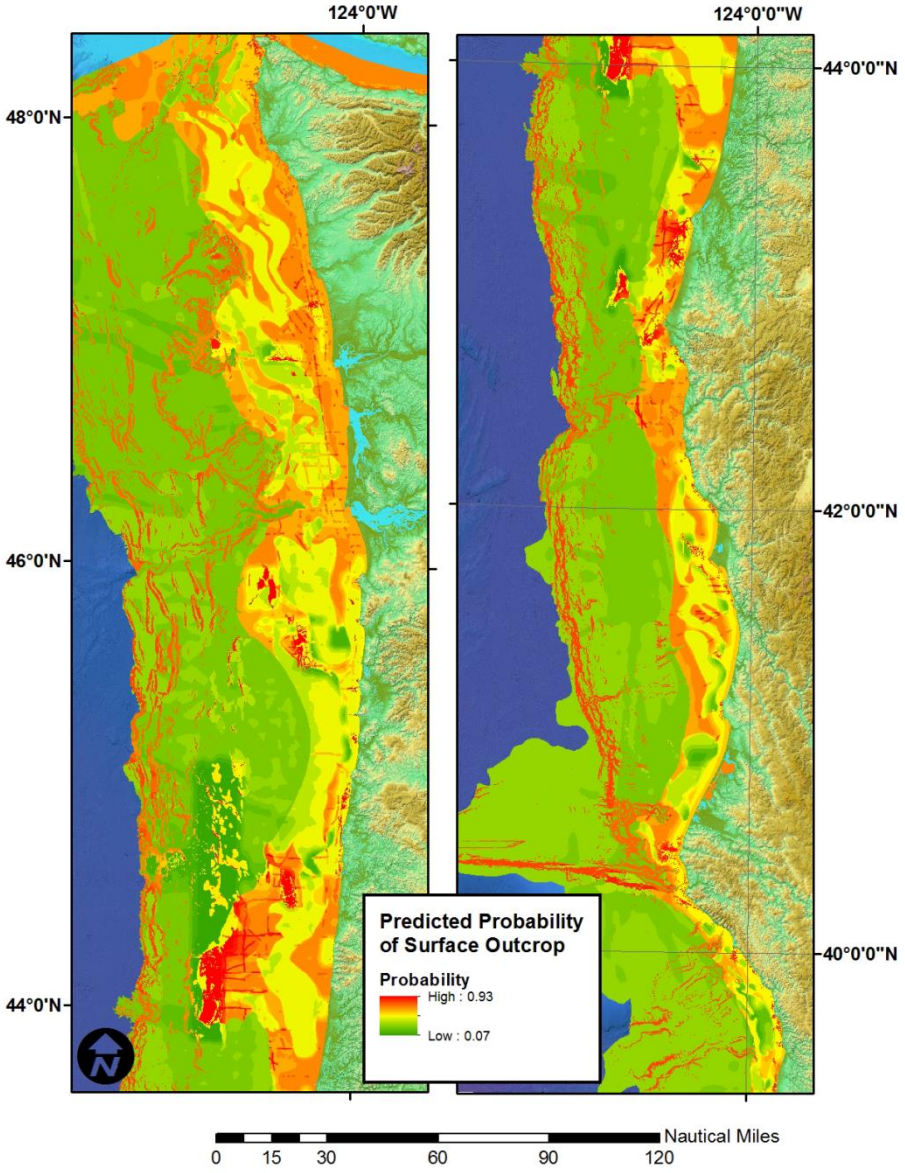
Benthic Assessment – Geophysical Results

Regional Mapping

Probability of Rocky Outcrops: Integrated existing seismic profiles to estimate the probability of consolidated sediments at or near the surface of the seafloor.

Yellow color means there was not enough data.

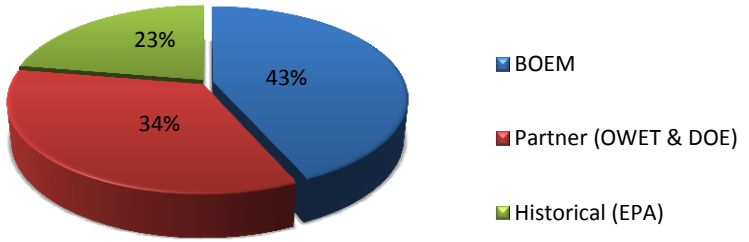


Benthic Assessment – Infauna

353 infaunal samples

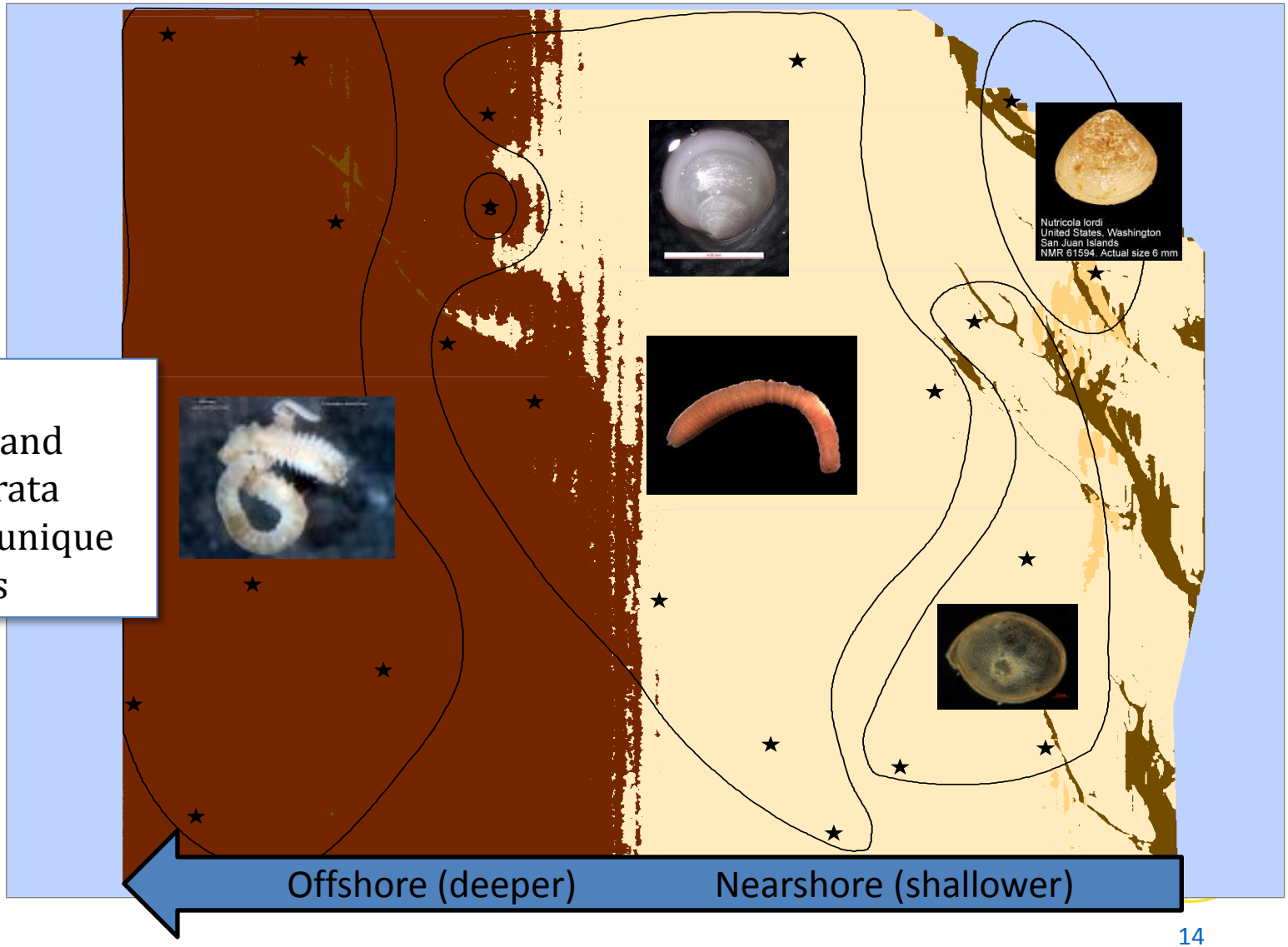
- Summer 2010 = 118 stations across 6 sites
- Summer 2012 = 35 stations across 2 additional sites
- Supplementary partner samples = 121 stations across 4 additional sites (2011 & 2013)

  274 new samples
- EPA EMAP = 79 additional stations (2003)



Benthic Assessment – Infauna

Nehalem:
Clear depth and sediment strata reflected in unique assemblages



Infaunal Summary

- No evidence for seasonal variability. In central Oregon state waters, infaunal invertebrate assemblages have not varied across seasons but have shown interannual variability.
- Depths of 10 meters can indicate different assemblages.
- Gravel-based assemblages are very distinct from the rest of the groupings.
- Silty (> 16% mud) habitats support similar assemblages regardless of latitude or depth.
- Sand habitats are more complex. Stations with > 87% sand were further split on the basis of depth, median grain size, and finally a differentiation between 99.2 and 100% sand.
- If the depth and grain size of a site are measured, one may be able to make good predictions of the species assemblage likely to be found there. Environmental variables that correlated best with macrofaunal invertebrate assemblages included depth, % sand, % gravel and median grain size with a correlation of 0.709.

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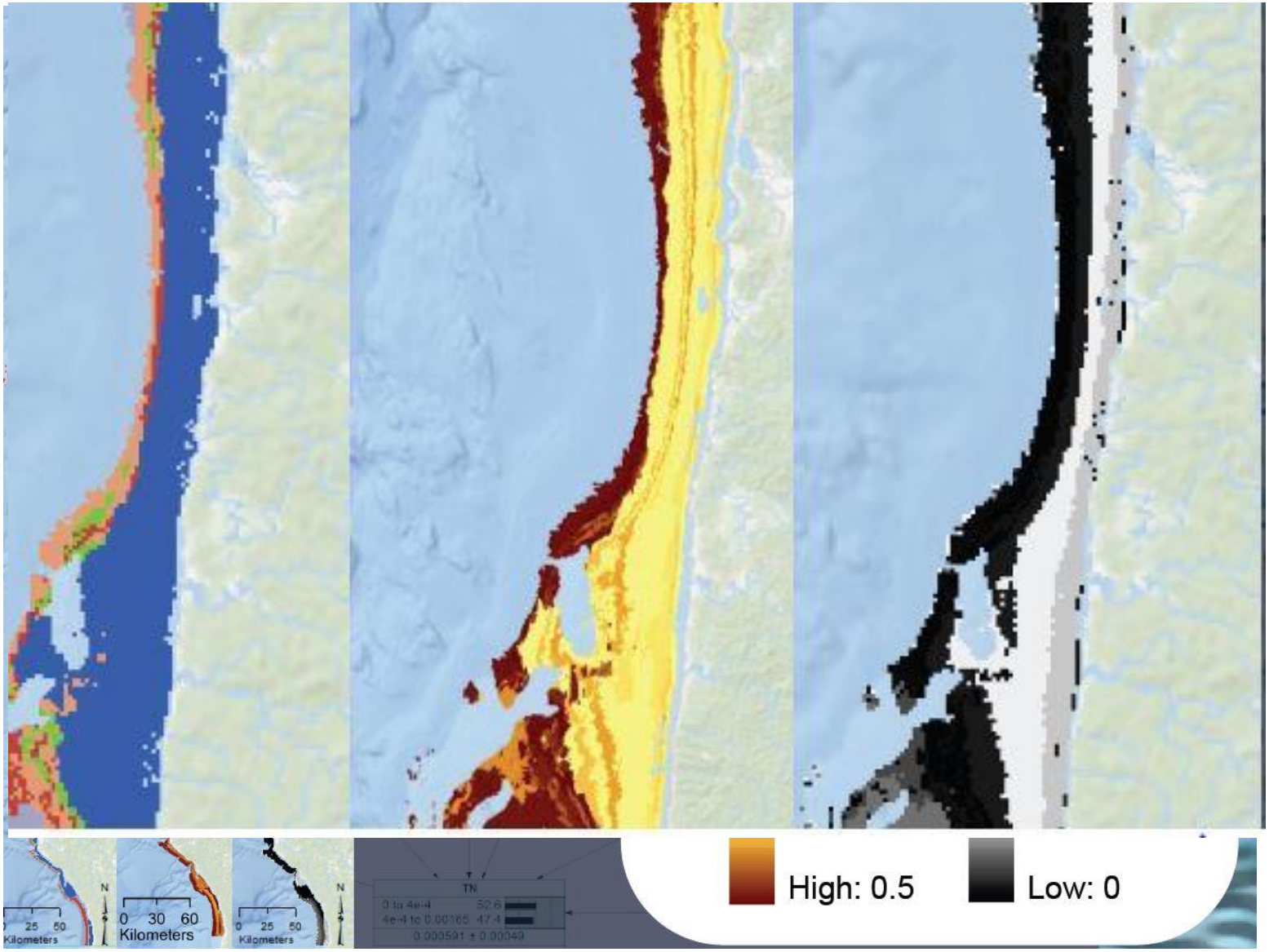
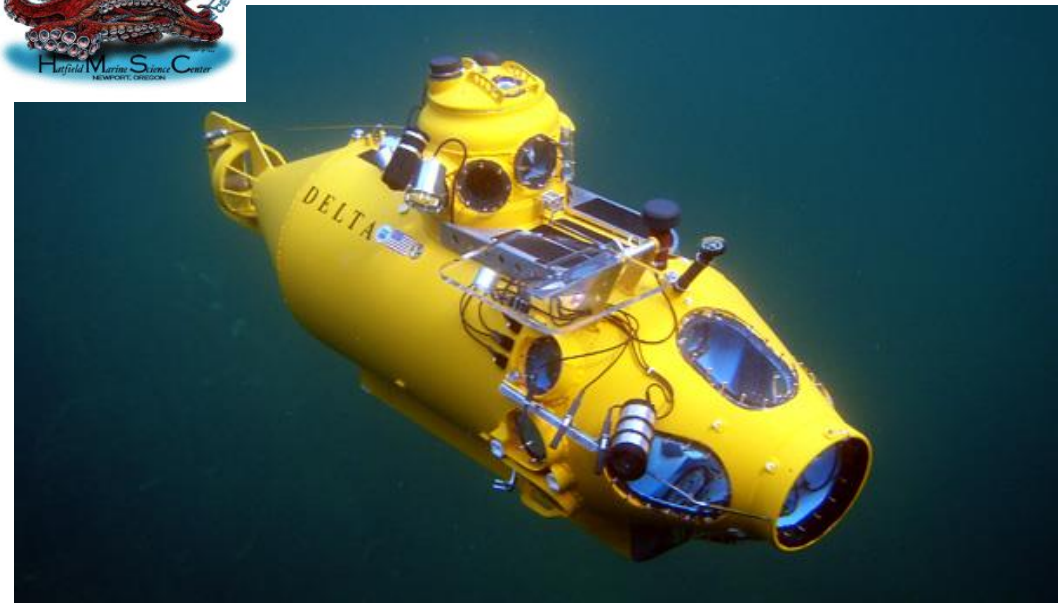
Benthic Assessment – Infauna



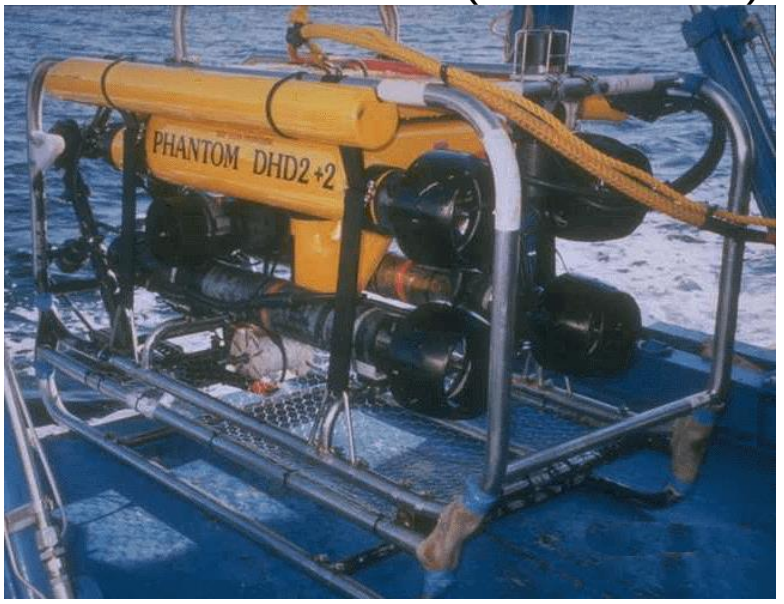
Benthic Assessment – Epifauna

Gray's Bank (WA), Bandon-Arago & Siltcoos (OR)

Delta submersible in mid-1990s



Phantom DHD2+2 (2011 & 2012)



Benthic Assessment – Epifauna

ROV surveys (ż = 78 m)

- 4-5 substratum types:
  1. Pure soft sediment
  2. Mixed soft/hard
  3. Consolidated rock (flat or angled)
  4. Complex rock

Delta surveys (ż = 149 m)

- 4-5 substratum types:
  1. Pure soft sediment
  2. Mixed soft/hard
  3. Flat rock
  4. Ridge (angled) rock

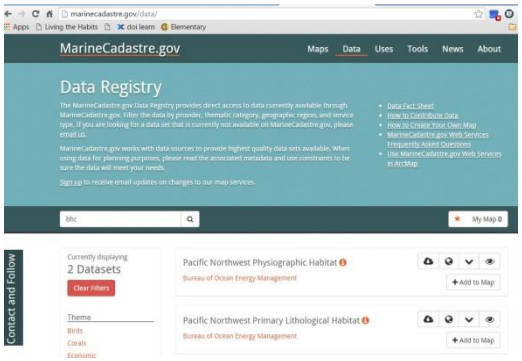
- Epifaunal Invertebrate assembledges do not form consistent groups within rock habitats among surveys or sites.
- Invertebrates define habitat as rock, soft sediment, and mixed.

Benthic Assessment Summary

- Collaborations benefited everyone.
- Provided a baseline of seafloor sediment and invertebrate species data in Oregon.
- Produced many tools for the initial exploration of spatial planning and renewable energy locations on the continental margin off of Oregon.
- A broader definition of habitat mapping should should consider sediment distinctions that delineate distinct invertebrate assemblages.

Benthic Assessment – Products and More Information

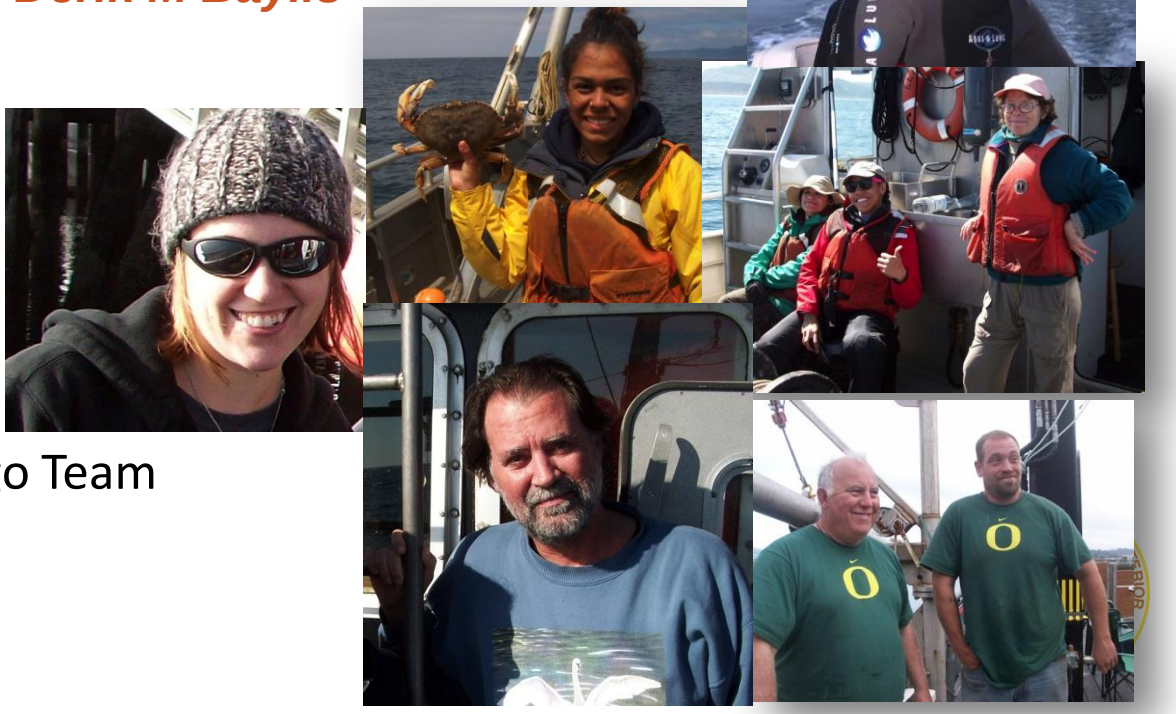
- Technical Summary: http://www.boem.gov/2014-662/
- Data download (search benthic, bhc): http://bhc.coas.oregonstate.edu/geoportal/ & http://marinecadastre.gov/data/
- Two Volume BOEM Final Report
- Theses: Tim Lee, Stephanie Labou, Danny Lockett, and Andrea Havron



Benthic Assessment – More Wonderful Partners

- Chris Romsos
- Kristin Politano
- Lenaïg Hemery
- Brian Tissot
- Tim Lee
- Elizabeth Lopez
- Nate Lewis
- Stephanie Labou
- Danny Locket
- Bob Hairston-Porter
- Andrea Havron
- Morgan Erhardt
- The University of Chicago Team
- Smithsonian Institute

Miss Linda
R/V Elakha
R/V Pacific Storm
R/V Derik M Baylis



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For an overview of selected BOEM research informing renewable energy offshore Oregon, go to:

www.boem.gov/Oregon