Mapping and Exploring the “Hidden Oregon”

Dr. Dawn Wright, OSU

and the

Oregon Territorial Sea Task Force

State Land Board/COMPASS Luncheon, Salem, 05/24/07
Isn’t it already mapped?

Could you find your way to every town on this map?
Territorial Sea, not the EEZ
Only 5% Thus Far!
Graphic courtesy of Christina Massel, Steve Miller, Scripps
Details, Details…

100 m

10 m

California Dept. of Fish & Game, Moss Landing Marine Labs
An Example of Required Detail: Siletz
An Example of Required Detail:
Seal Rock

The Seal Rock Multibeam Bathymetry Survey

For the
Oregon Department of Fish and Wildlife
By
Seamark Consulting Inc.
P.O. Box 1935
Ashland, Oregon 97520

Multibeam Survey
R/V RANGER
Survey Vessel:
Tuckalaster
Chief Survey Officer:
Jensvan Turner

Vemco VR2 hydrophone locations for the Black Rockfish Telemetry Project overlay the 1m bathymetric grid.

Depth (meters)
High -38.00000
Low -41.75001
Vemco VR2 Locations

Oregon Department of Fish & Wildlife, Marine Resources Program
Seafloor Mapping: What and How?

Single Beam

Multibeam

Images courtesy of NOAA and UNH
Topo/Bathy is the Fundamental Base "Layer"
An Example of Required Detail: Siletz

Oregon Department of Fish & Wildlife, Marine Resources Program
Photos/Videos of the Mapped Bottom

Images courtesy of Deidre Sullivan, MATE Center, Monterey, CA
Generation of a Tsunami

Wave of a Tsunami

(a) GENERATION OF A TSUNAMI

Paul Pinet textbook, Invitation to Oceanography
“Feeling the Bottom”

(b) SHALLOW-WATER WAVES IN PROFILE

Intermediate wave | Shallow-water wave | Surf zone | Swash zone

Wavelength $L_1 \rightarrow L_2 \rightarrow L_3 \rightarrow L_4$

Height $H_1 \rightarrow H_2 \rightarrow H_3 \rightarrow H_4 \rightarrow H_5$

vertical exaggeration $= 20 \times$

$L_1 > L_2 > L_3 > L_4$
$H_1 < H_2 < H_3 < H_4 < H_5$

wave speed decreases
wave length decreases
wave height increases
## Applications

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Scientific Consensus Statement for Mapping the Oregon Territorial Seafloor

For Oregon, as for most coastal states, the sea represents both a valuable resource and a potential threat. The sea provides many Oregonians with a livelihood, food, and recreation, and it attracts visitors to our coastal communities. The sea also represents a significant risk in the form of an inevitable earthquake-generated tsunami, akin to the recent one in Indonesia.

Understanding the nature of Oregon’s Territorial Sea is critical to sustaining sport and commercial fisheries, coastal tourism, and a broad range of other ocean-derived ecosystem services valued by Oregonians, in addition to addressing the threat posed by a major tsunami.

Presently, we have detailed bottom mapping of only about 5% of the area of the Oregon Territorial Sea, which extends 3 nautical miles from the coast and comprises approximately 950 square nautical miles. Effective decision-making concerning the management and conservation of ocean resources and the modeling of shoreline inundation and erosion from storm waves or a tsunami all depend upon better knowledge of the nearshore waters.

This consensus statement expresses the belief that completing seafloor mapping of Oregon’s coastal nearshore ocean is of the highest priority. We, the undersigned academic and government agency scientists, urge State and Federal officials to support and expeditiously ocean floor mapping of Oregon’s territorial sea within the next two years. Oregon Statewide Planning Goal 19 (12/1/2000) calls for stewardship and conservation of ocean resources in Oregon’s Territorial Sea. This consensus statement is consistent with and inspired by Goal 19.

Seafloor mapping of the Oregon continental margin is presently underway through a variety of efforts. However, the nearshore area is commonly left out due to the difficulty of mapping in shallow water and insufficient resource allocation. As a group of leading scientists engaged in all aspects of study of our coastal ocean, we urge an initiative to map the seafloor of our coastal territorial sea. The costs are not excessive (under $3 million), and the benefits are immeasurable. Presently, there is no State or Federal agency charged with this responsibility. Over the last several years, new sonar technologies, and the associated data management infrastructure, have moved what was once prohibitively expensive within our reach. Nevertheless, current efforts to accomplish this important work are insufficient. Without a coordinated effort, it will take 50 years or more at the present rate of progress. This pace is much too slow to meet the needs of coastal sector studies, tsunami planning and resource management decision-making.

Specifically, we recommend mapping of the seafloor of the Oregon Territorial Sea for the following reasons:

• Oregon, along with Northern California, Washington, and Vancouver Island, faces a 20% probability of experiencing a magnitude-9 subduction earthquake and tsunami in the next 50 years, much like the 2004 disaster in Indonesia. We are just now beginning to understand what this disaster will mean for the Oregon coast. For the many towns along the coast, we presently cannot say how far the waters will rise, because the modeling of tsunami water depends on detailed knowledge of coastal water depths that presently does not exist. Managing the hazards posed by this inevitable geological event requires this knowledge.

• We now understand that many Oregon nearshore fisheries and other marine life are dependent upon spatially explicit, yet limited, habitat features. Describing and classifying nearshore habitats are essential components of effectively assessing and managing Oregon’s marine resources, including nearshore fish populations for both the Federal Essential Fish Habitat and State nearshore management processes.
The Consensus Statement is …

- An expression of need…
  to fill a critical gap in data

- Apolitical …
  coalition of academic and agency *scientists*

- An information tool to consider and use when making decisions for and with the governor

- Part of governor’s public position on ocean stewardship

- A suggested process …
  (communal funding, communal availability)
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