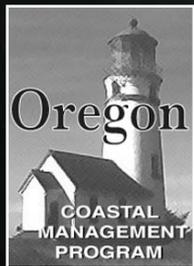


Oregon Status Report: Marine Reserves Wave Energy



Bob Bailey
Oregon Coastal Management Program

Overview of:

- Marine Reserves Designations
- Ocean Energy Planning
- Marine Mapping

Marine Reserves Key Actions

Governor Executive Order March 2008

- ODFW lead, with OPAC Advice
- STAC Size and Spacing workshop spring 2008
- Ad Hoc Marine Mapping Working Group
- ODFW, Oregon Sea Grant Open Houses
- Public nominations July 1 - Sept 30, 2008
- Agency / science review by October 31
- OPAC recommended 6 sites by December 1
- '09 Legislature: budget for implementation (?)

Marine Reserves website:

<http://www.oregonmarinereserves.net/>



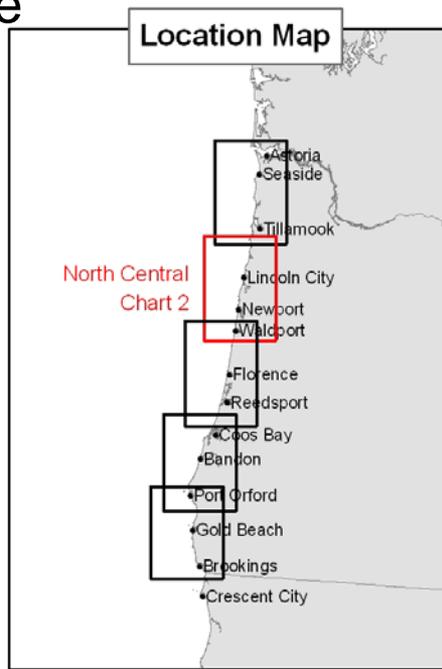
Thematic Chart Series

Biological Resources

Human Use and Management

Seafloor and Shoreline

- 1:100,000 scale (36x54in).



The screenshot shows the Oregon Marine Reserves website. At the top is a navigation bar with links: Home, Oregon's Process, Got Involved, Site Proposals, News, Links, and FAQ. Below the navigation bar is the site's logo and title: "Oregon Marine Reserves Public Gateway to Information". A sub-header reads "Thematic Information Charts". The main content area contains a grid of 15 thumbnail maps, organized into three columns: "Biological Resources", "Human Uses", and "Seafloor Type". Each column contains five maps, and each map has a "Download PDF" link below it. At the bottom of the page, there is a "Map Disclaimer" link.

Biological Resources

Pinniped Haulout sites, ODFW 2007

- All 4 species present
- Specific Location Haulout Site (<100 animals)
- Specific Location Haulout Site (>100 animals)
- General Haulout Site (>100 animals)
- General Haulout Site (< 100 animals)

Stellar Sea Lion Rookeries (# Animals)

- <100
- 100-500
- >500

* Oregon Seabird Colony Locations (USFWS, 2008)

- Final Critical Habitat for Marbled Murrelets (USFW, 1996)
- Final Critical Habitat for Western Snowy Plover (USFW)
- Bull Kelp, Nereocystis luetkeana (ODFW)
- National Wildlife Refuges (USFWS)
- Intertidal or Subtidal Research Reserve (ODFW)
- Marine Gardens (ODFW)
- Habitat Refuge (ODFW)
- Rocky Reef Groundfish Essential Fish Habitat (OSU)
- Groundfish Essential Fish Habitat Conservation Areas

Oregon State Parks (OPRD, 2008)

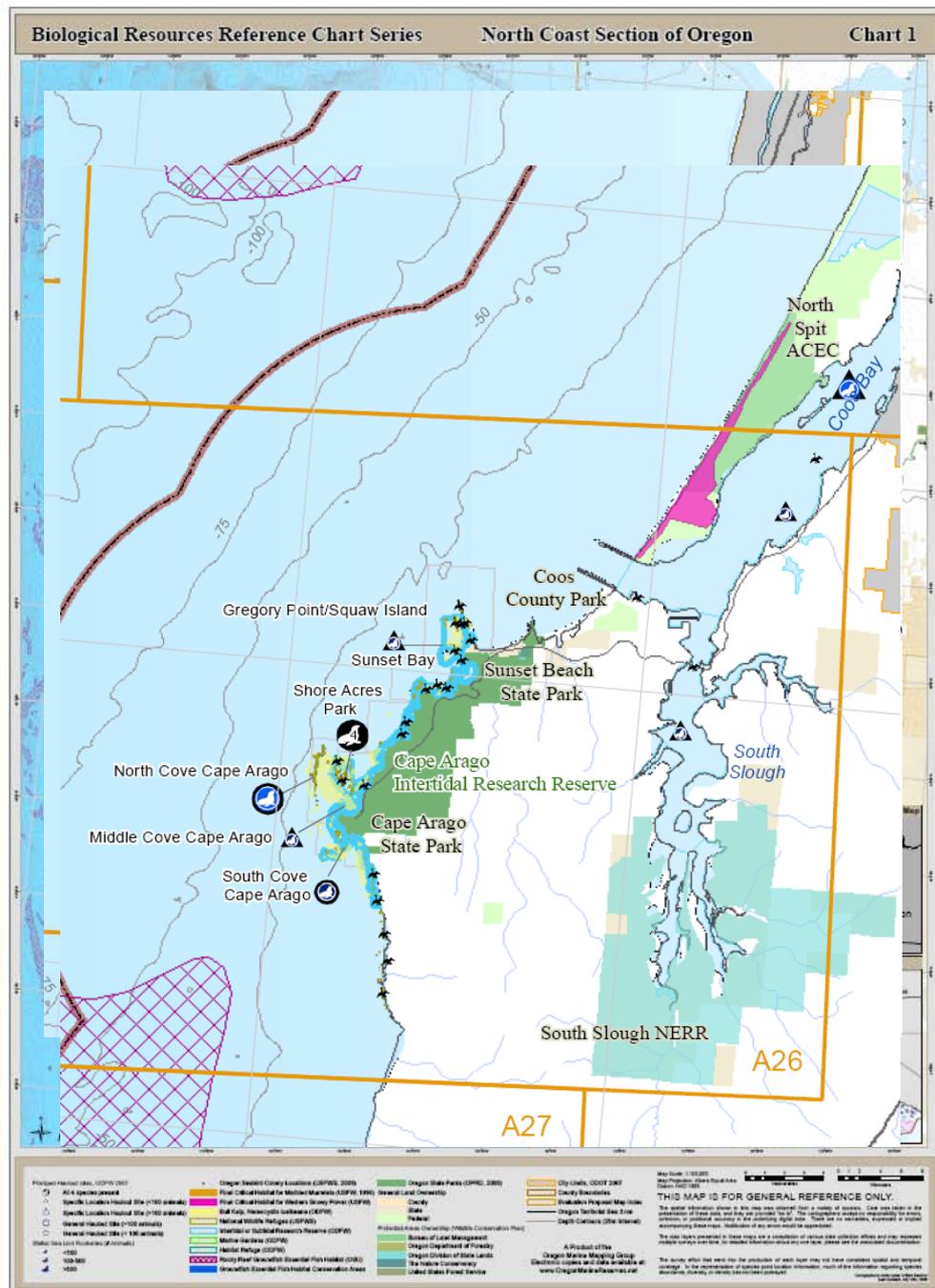
General Land Ownership

- County
- State
- Federal

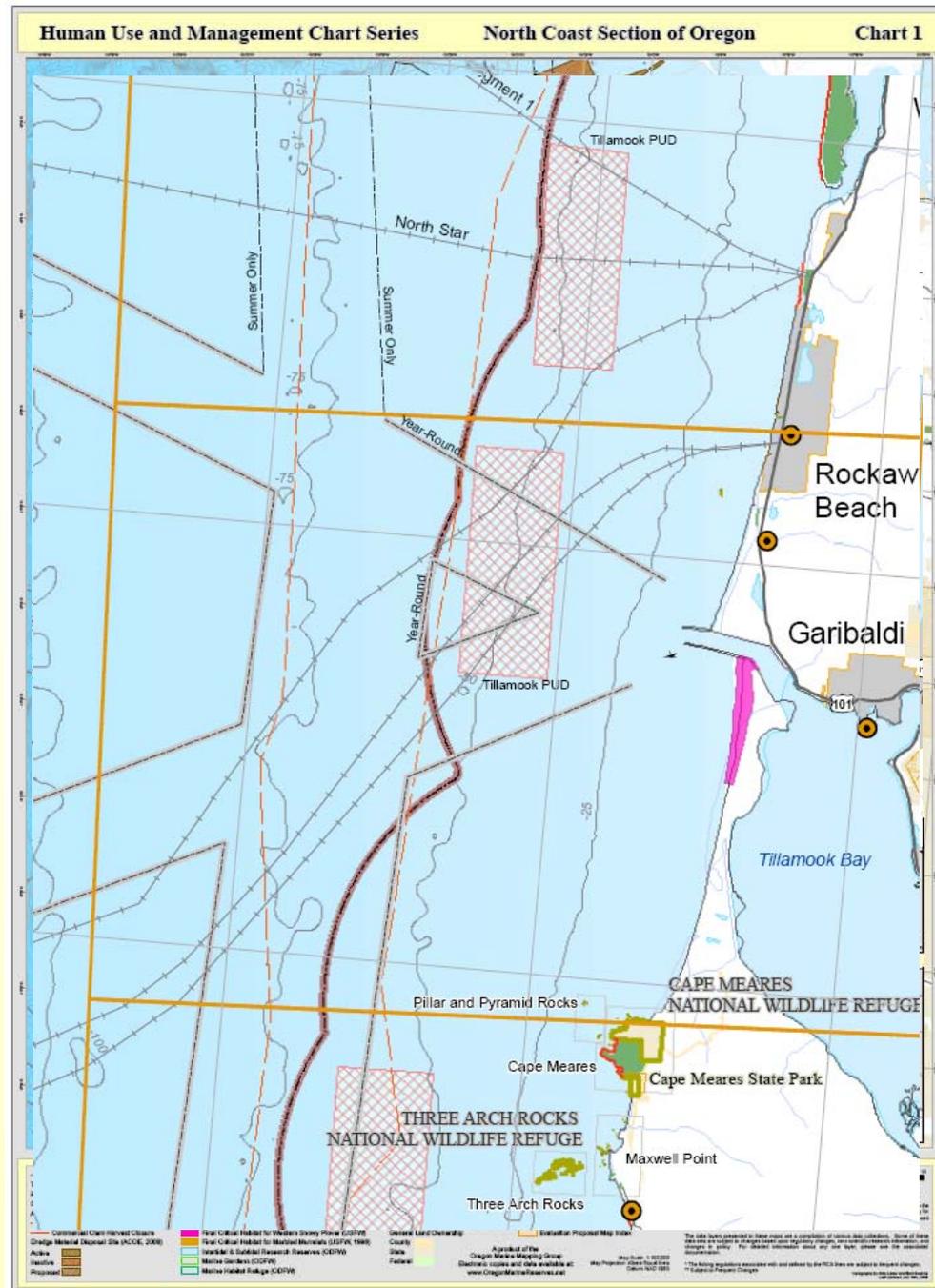
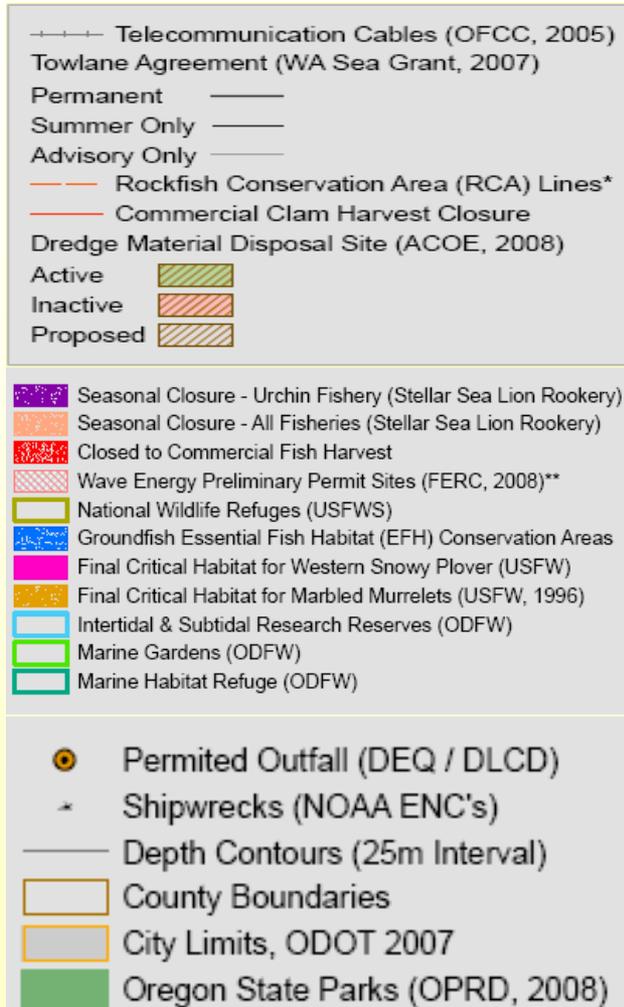
Protected Areas Ownership (Wildlife Conservation Plan)

- Bureau of Land Management
- Oregon Department of Forestry
- Oregon Division of State Lands
- The Nature Conservancy
- United States Forest Service

- City Limits, ODOT 2007
- County Boundaries
- Evaluation Proposal Map Index
- Oregon Territorial Sea 3 nm
- Depth Contours (25m Interval)



Human Dimension



Seafloor & Shoreline

Shoreline Geomorphology and Exposure (NOAA ESI)

- Undefined
- Marshes
- Exposed Rocky Shores and vertical seawalls
- Wave-cut platforms and exposed pier structures
- Fine-grained sand beaches
- Medium-to coarse-grained sand beaches
- Mixed sand and gravel beaches
- Gravel beaches and exposed riprap
- Sheltered rocky shores and coastal structures
- Sheltered tidal flats

Oregon Seafloor Sediment (OSU, 2004)

Sediment Type (Dominant/Subdominant)

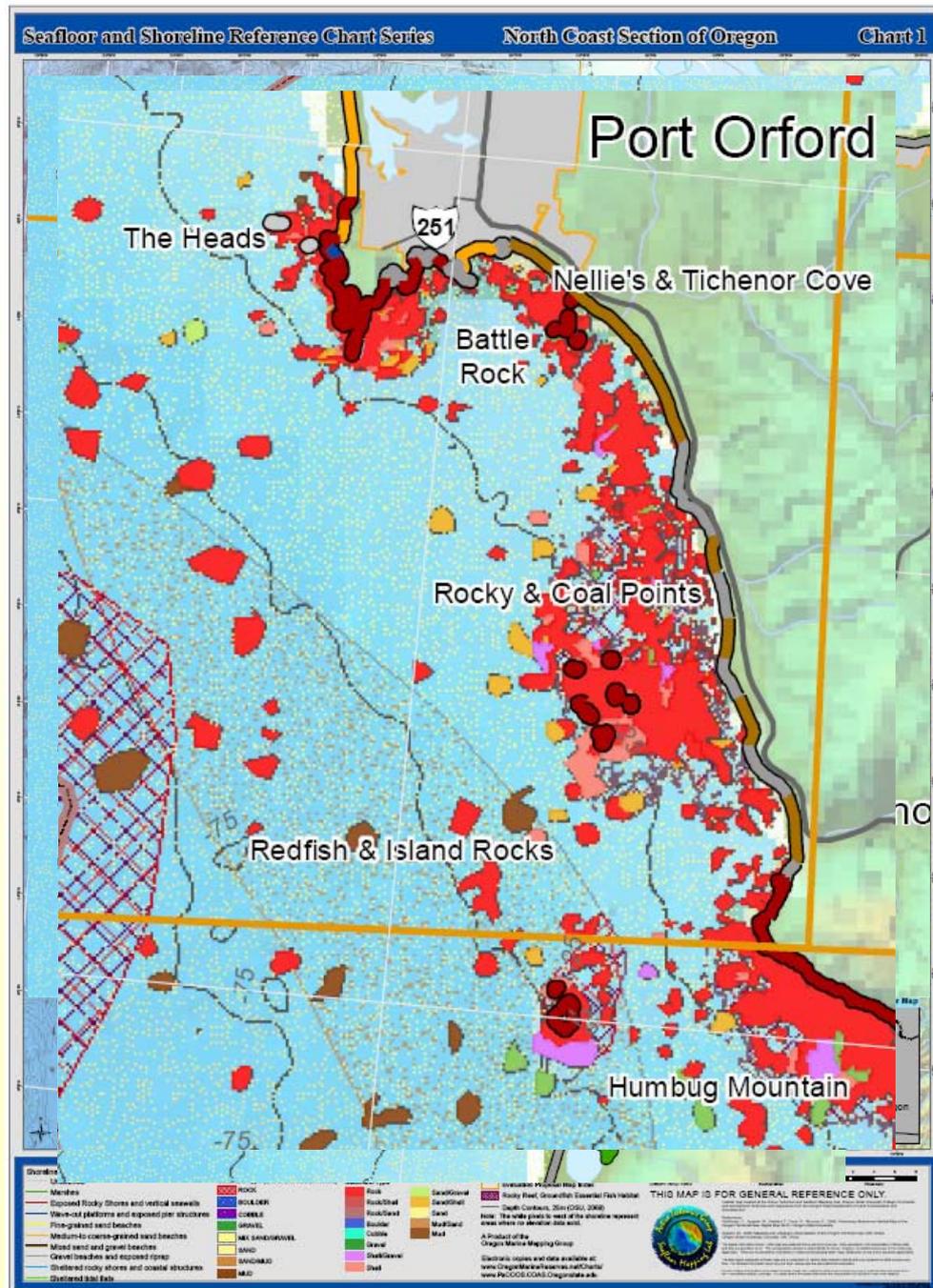
- ROCK
- BOULDER
- COBBLE
- GRAVEL
- MIX SAND/GRAVEL
- SAND
- SAND/MUD
- MUD

Territorial Sea Sediment Map (OSU, 2008)

Sediment Type

- | | |
|--------------|-------------|
| Rock | Sand/Gravel |
| Rock/Shell | Sand/Shell |
| Rock/Sand | Sand |
| Boulder | Mud/Sand |
| Cobble | Mud |
| Gravel | |
| Shell/Gravel | |
| Shell | |

- Oregon Territorial Sea 3 nm
- Evaluation Proposal Map Index
- Rocky Reef, Groundfish Essential Fish Habitat
- Depth Contours, 25m (OSU, 2008)



Nomination Map Resources

Oregon Marine Reserves - Proposal Map Series - Windows Internet Explorer

http://www.oregonmarinereserves.net/index.php?option=com_content&task=view&id=103&Itemid=72

Oregon Marine Reserves - Proposal Map Series

Home Oregon's Process Get Involved Site Proposals News Links FAQ

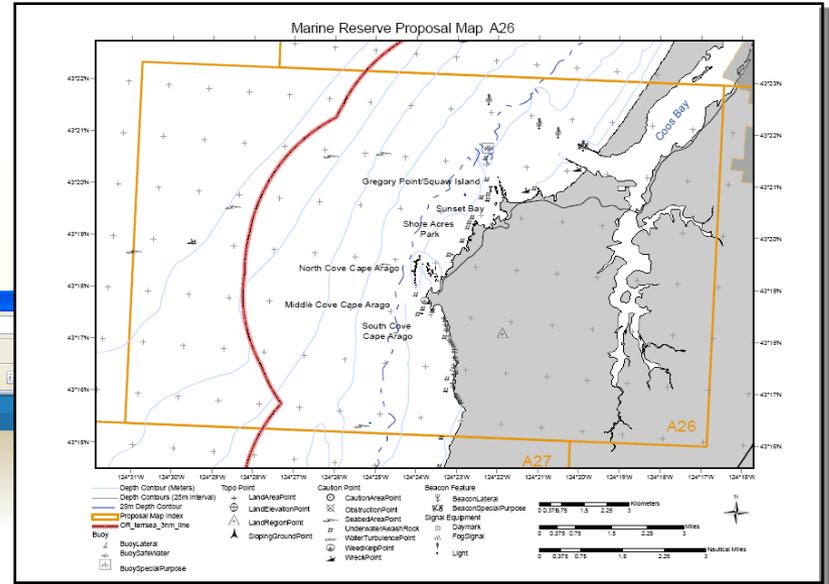
Oregon Marine Reserves Public Gateway to Information

Home Site Proposals Proposal Map Series

Proposal Map Series

This series of base maps, which cover Oregon's Territorial Sea and adjacent upland areas, are designed to assist you in proposing sites to be considered for evaluation as potential marine reserves. These maps must be used, along with other information, to propose sites for evaluation as marine reserves. The map sections are at a large enough scale so that you can draw in the boundaries for a proposed site on the printed map. To download a map for your area of interest, click on one of the Download links below. A maximum of nine sites can be designated as marine reserves from among those that are proposed for evaluation.

Proposal Map Index	Download PDF Maps Below	Links to Web GIS
A01	• Download Map A1	• View Area A1 in PaCOOS
A02	• Download Map A2	• View Area A2 in PaCOOS
A03	• Download Map A3	• View Area A3 in PaCOOS
A04	• Download Map A4	• View Area A4 in PaCOOS
A05	• Download Map A5	• View Area A5 in PaCOOS
A06	• Download Map A6	• View Area A6 in PaCOOS
A07	• Download Map A7	• View Area A7 in PaCOOS
A08	• Download Map A8	• View Area A8 in PaCOOS
A09	• Download Map A9	• View Area A9 in PaCOOS
A10	• Download Map A10	• View Area A10 in PaCOOS
A11	• Download Map A11	• View Area A11 in PaCOOS
A12	• Download Map A12	• View Area A12 in PaCOOS
A13	• Download Map A13	• View Area A13 in PaCOOS
A14	• Download Map A14	• View Area A14 in PaCOOS
A15	• Download Map A15	• View Area A15 in PaCOOS
	• Download Map A16	• View Area A16 in PaCOOS



West Coast Marine Habitat Server - Windows Internet Explorer

PaCOOS: West Coast Habitat Portal

for the integrated assessment of living marine resources on the west coast

AMRMS NOAA Oregon State OSU

Layer Query

Table of Contents

- Political Data
- State Index Layers
- Beach
- Real and Bathymetric Data
- Red Tide (green close to the coast)
- Cological Data
- Oceanographic Data
- Viewable Terrestrial Sea Data
- Geological
- Cological
- Biological
- Resource Databases (for query only)
- Seating
- Seafloor Elevation
- Shoal SST
- Worlds C.M.I. 4 2007.01
- ITS Net In Use 2002.02

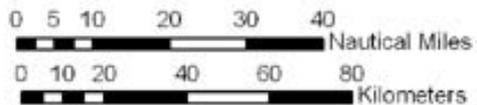
Query Layers

- Allow Multiple?
- Surface Geologic Habitat

Table of Contents Usage

- Left click ToC layer for meta data
- Right click ToC layer for legend
- Select visible layers
- Select feature layer for queries

Oregon Marine Reserve Proposals



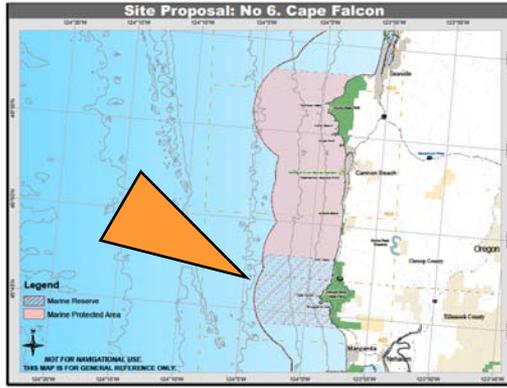
Marine Reserve Marine Protected Area

In the case of overlapping proposals, Marine Reserve nominations are shown when there is co-occurrence with a nominated Marine Protected Area.

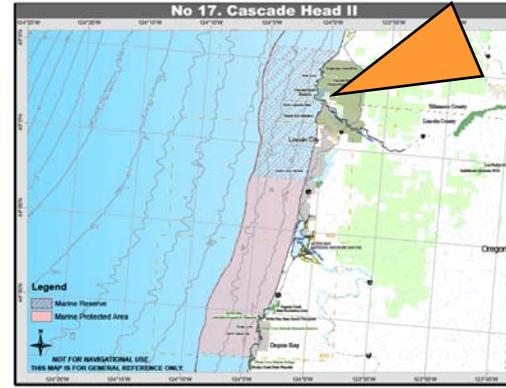
Cartography by Andy Lanier
 Oregon Coastal Management Program
 Dept. of Land Conservation and Development

Recommended Marine Reserve Sites

Cannon Beach
Cape Falcon



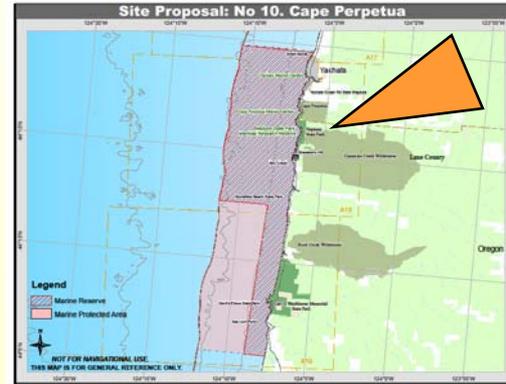
Lincoln City
Cascade Head



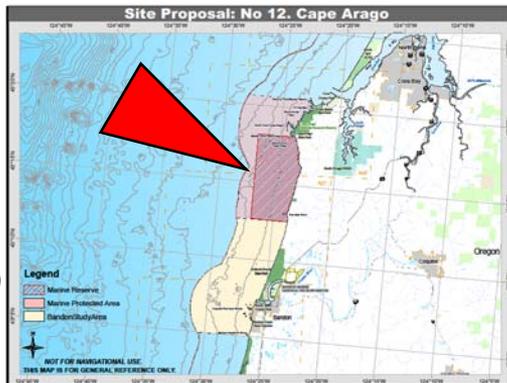
Depoe Bay
Otter Crest



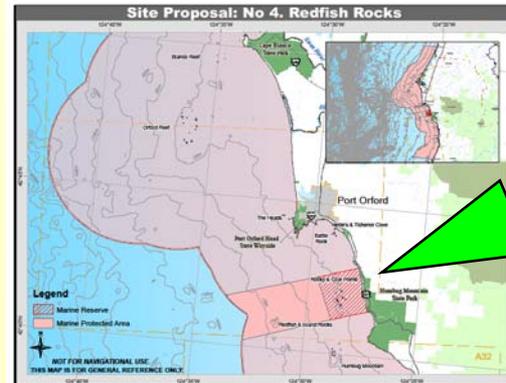
Yachats
Cape Perpetua



Coos Bay
Cape Arago



Port Orford
Redfish Rocks



~~Wave Energy~~ Ocean Renewable Energy



Ocean Energy Status

Great idea!

Lots of concerns!!

Very complicated

Please...

HELP US SAVE OUR FISHING COMMUNITY!



Oregon Fisherman have contributed billions of dollars to Oregon's economy.

Oregon Dungeness Crab Commission
P.O. Box 1160
964 Central Ave.
Coos Bay, OR 97420
Phone: 541-267-5810
Fax: 541-267-5772
Email: hugh@oregondungeness.org

Oregon Fishermen need your help!

WAVE ENERGY
Is it **FAIR?**



The Oregon Dungeness Crab Commission asks you to
BE INFORMED

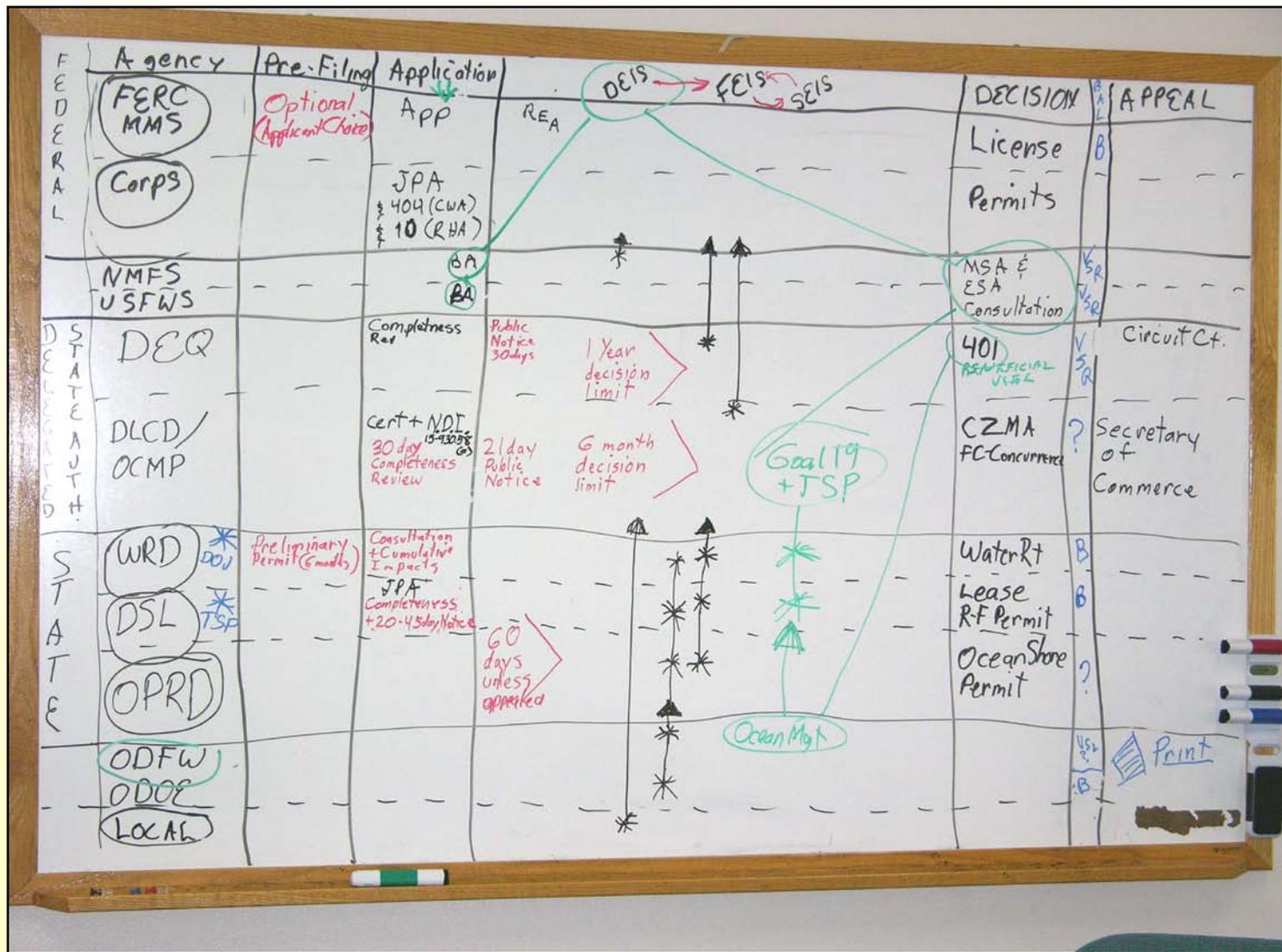
Ocean Energy

Key Uncertainties

- **Where? User conflicts**
- **Effects? Environmental/economic**
- **State v. Federal requirements**
- **FERC v. MMS jurisdiction/process**
- **Agency capacity and expertise**
- **State approval process**

Ocean Energy

Procedural Uncertainties

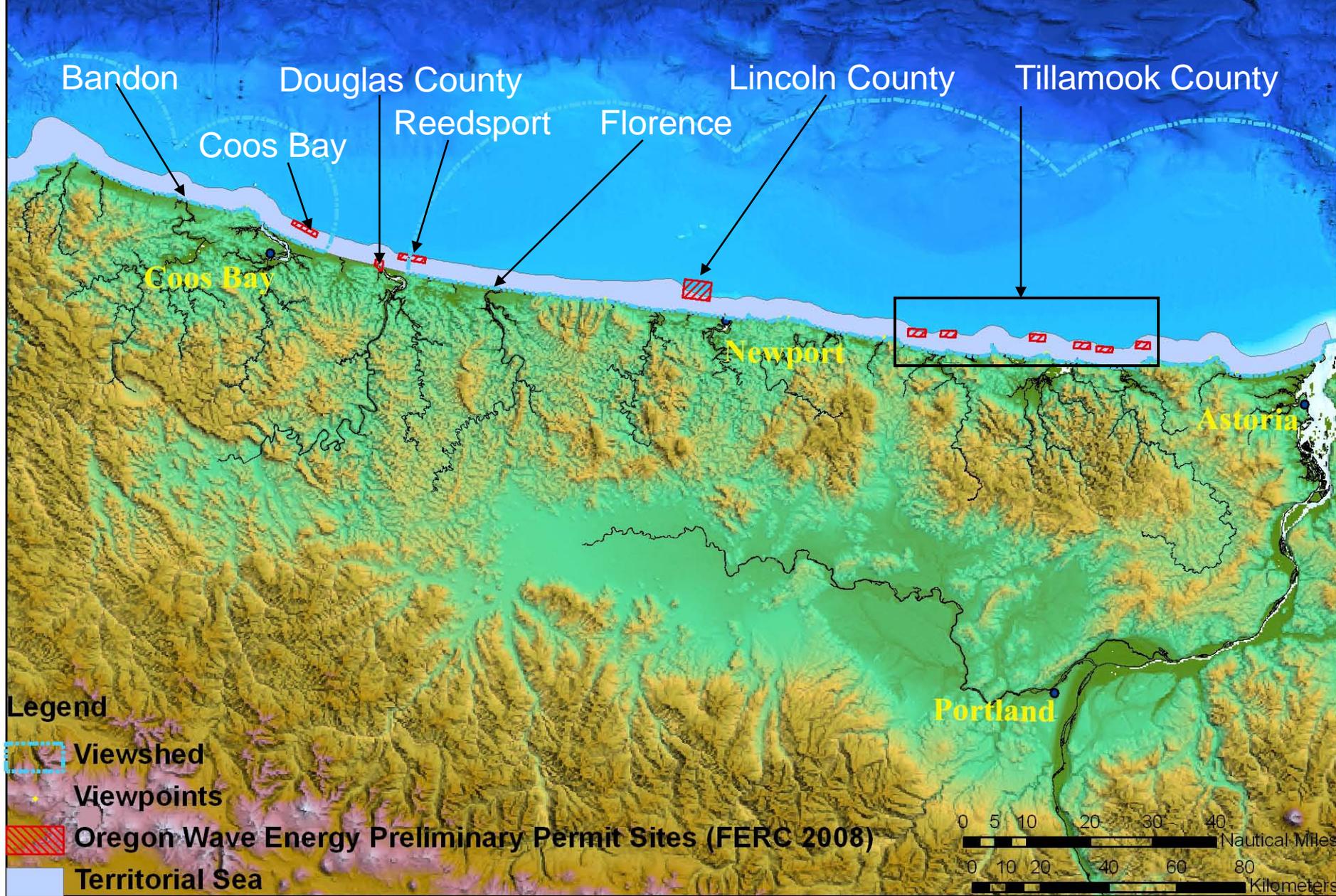


Ocean Energy

Key Challenges

- **Many moving parts**
- **Creating new governance framework**
- **Evolving technology & interest**
- **Financial constraints on everyone**
- **Obtaining appropriate information**
- **Agency capacity and expertise**
- **High expectations**

Oregon Wave Energy Permit Sites



Permit Status

Tillamook County (active): Preliminary Permit awarded;

Lincoln County: *Preliminary Permit offshore Lincoln not awarded.*

Florence: *Energitech surrendered Preliminary Permit.*

➔ **Reedsport (active):** Ocean Power Technologies finalizing Settlement Agreement will submit Final License Application for a 2.1 MW, 10-buoy project to FERC October 2008 through Traditional Licensing Process (TLP). One buoy to be deployed in 2009; 9 more in 2010. Build-out to 50 MW - major license amendment.

Douglas County (active): Preliminary Permit awarded to County for a 1-3 MW oscillating water column technology attached to South Jetty of the Umpqua River.

➔ **Coos Bay (active):** Preliminary Permit awarded to Ocean Power Technologies. OPT negotiating with fishers, likely to go through a Settlement process (like Reedsport Project). Will be fully commercial project with buoy deployment beginning 2012.

Bandon: *Finavera surrendered Preliminary Permit*

Ocean Energy

Avenues for Progress

- **FERC Settlement Process**
- **FERC – State MOA**
- **Gov. E.O: State Wave Energy Plan**

- Northwest National Marine Renewable Energy Center
- Oregon Ocean Wave Energy Trust

Ocean Energy

Avenues for Progress

FERC Settlement Process

- Reedsport project (OPT)
- 24 month “learning experience”
- Stakeholder participation
- Detailed review of many issues
- Ready for signing to support licensing

Ocean Energy FERC Settlement Process

Table 8. Summary impact matrix for wave energy development on the Oregon continental shelf.

Activity (agent or stressor)	Receptors												
	Ocean Waves	Ocean Currents	Sediments	Plankton	Fouling Community	Migratory Fish	Forage Fish and Invertebrates	Demersal Fish	Epibenthic Macroinvertebrate	Benthic Infauna	Seabirds	Pinnipeds	Cetaceans
EFFECTS OF DEVELOPMENT													
PHASES of DEVELOPMENT													
Emplacement													
Mooring System													
Electrical Transmission Infrastructure													
Operation													
Mooring System													
Buoy or Other Generation Device													
Electrical Transmission Infrastructure													
Chemical Coatings													
Decommissioning													
Buoy or Device Removal													
Transmission Infrastructure Removal													
Anchor Removal or Decommissioning													

Receptor-specific effects table for fish and fisheries. KEY: L=low impact, M=medium impact, H=high impact, U=unknown, ?=some uncertainty associated with the estimate, + positive effect

Activity (agent or stressor)	Receptors												
	Market Squid ^a	Dungeness Crab	Pink Shrimp ^b	Sharks	Salmon and Steelhead ^c	Albacore Tuna ^{b,d}	Smelts, herring, sardines, anchovies	Rockfish, Lingcod ^e	Other Demersal Roundfishes	Flatfish	Skates and Rays	Green Sturgeon	Pacific Sandlance ^f
Emplacement													
Mooring System	L	L	L	L	L	L	L	L	L	L	L	L	L
Electrical Transmission Infrastructure	L	L	L	L	L	L	L	L	L	L	L	L	L
Operation													
Mooring System & benthic habitat (shell mounts)	H ⁺	H ⁺	M ⁺	M ⁺	M ⁺	M ⁺	L	H ⁺	H ⁺	M ⁺	L	H ⁺	L
Buoy or Other Generation Device	L	L	L	M ⁺	M ⁺	M ⁺	L	H ⁺	H ⁺	L	L	L	L
Electrical Transmission Infrastructure(EMF)	L	M ⁺	L	H ⁺	H ⁺	L	L	M ⁺	M ⁺	L	H ⁺	H ⁺	L
Chemical Coatings	L	H ⁺	L	L	H ⁺	L	L	M	M	M	L	L	L
Wave and Current Attenuation	U	U	U	U	U	U	U	U	U	U	U	U	U
Acoustics	L	L	L	L	H ⁺	L	M	M ⁺	M ⁺	L	L	L	L
Decommissioning													
Buoy or Device Removal	L	L	L	L	L	L	L	L	L	L	L	L	L
Transmission Infrastructure Removal	M	M	M	L	M	L	L	M	M	M	M	M	M
Anchor Removal or Decommissioning	M	M	M	L	M	L	L	M	M	M	M	M	M
Routine Maintenance													
Vessel Traffic, Maintenance Activities	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]	L [?]

^a *Dorytenthis opalescens* (formerly *Loligo opalescens*)

^b Low vulnerability given our understanding of the current wave energy structures and technology

^c Sea-run rainbow trout, *Oncorhynchus mykiss*

^d *Thunnus alalunga*

^e *Ophiodon elongatus*

^f *Ammodytes hexapterus*

^g positive effect for adults, negative for juveniles

^h positive or negative effect, varies with species

Ocean Energy FERC-Oregon MOU

Provides for:

Short-Term Experimental & Pilot Projects

- **Coordinated Review and Schedule**
- **Stakeholder Involvement-Adaptive Management**

State Comprehensive Plan

- **Incorporated into Oregon Coastal Mgt. Program**

Damage to Fish and Wildlife

Ocean Energy

Governor's Executive Order 3/2008

Directs DLCD: to prepare a “wave energy plan” by 12/1/2009;

- amend Territorial Sea Plan;
- Submit to NOAA as CZP amendment.

Ocean Energy

Wave Energy Planning

- Stakeholder planning process;
 - OPAC working group (policy framework)
 - Broad “rule-making” work group
- Build on existing state authorities;
- Add new policies and process;
- Add new spatial component.

Ocean Energy

Wave Energy Planning

Fisheries Mapping and Valuation

Fisherman interviews through local fisherman groups

Confidentiality is a big concern

Basis for determining “Important Fishery Areas” to be protected under Goal 19 and Territorial Sea Plan

Ocean Energy

Avenues for Progress

Northwest National Marine
Renewable Energy Center

Oregon Wave Energy Trust

Marine Mapping & GIS

Territorial Sea Mapping Group

Began in Fall 2007

Very active Spring-Summer-Fall 2008

Goal: information to the public to support
Marine Reserves Process

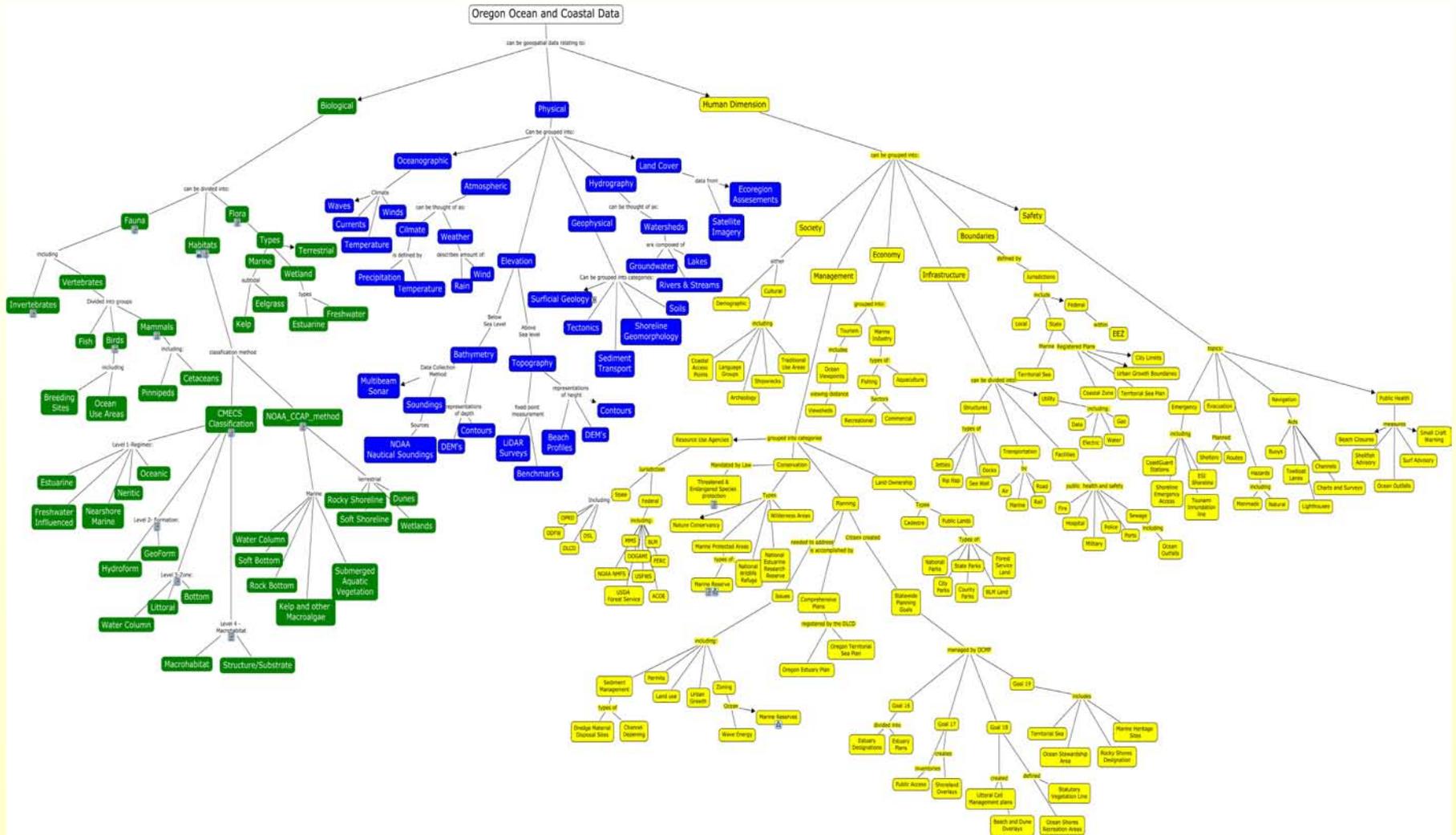
State/Federal/NGO/Academic team

DLCD NOAA Coastal Fellow leadership

Multiple data sets in three thematic areas

Marine Mapping

Data Structure for Oregon Marine GIS



Marine Mapping

To Support Ocean Energy Planning

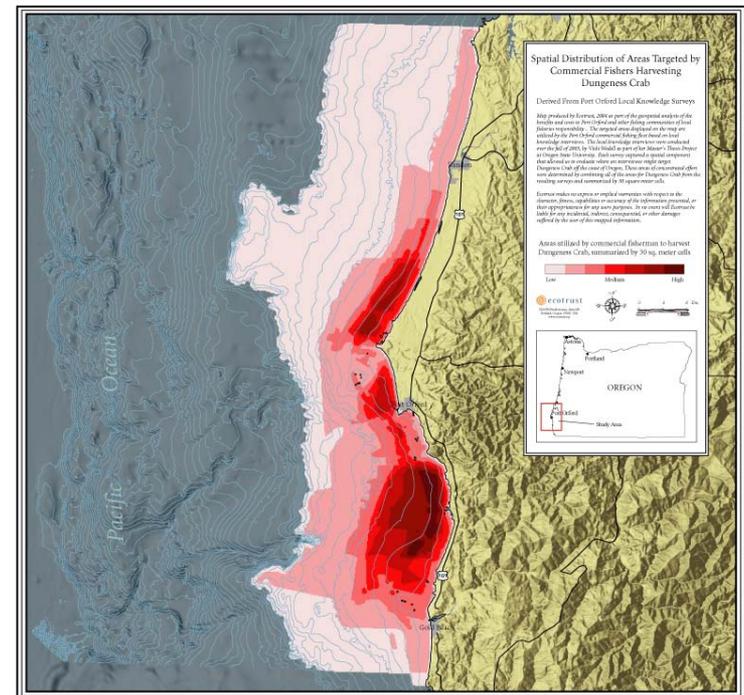
Fisheries Mapping

Summer, Fall 2009

Fisherman Organizations in
five ports

Federal, State, NGO Funds

Valuation assessments



Marine Mapping

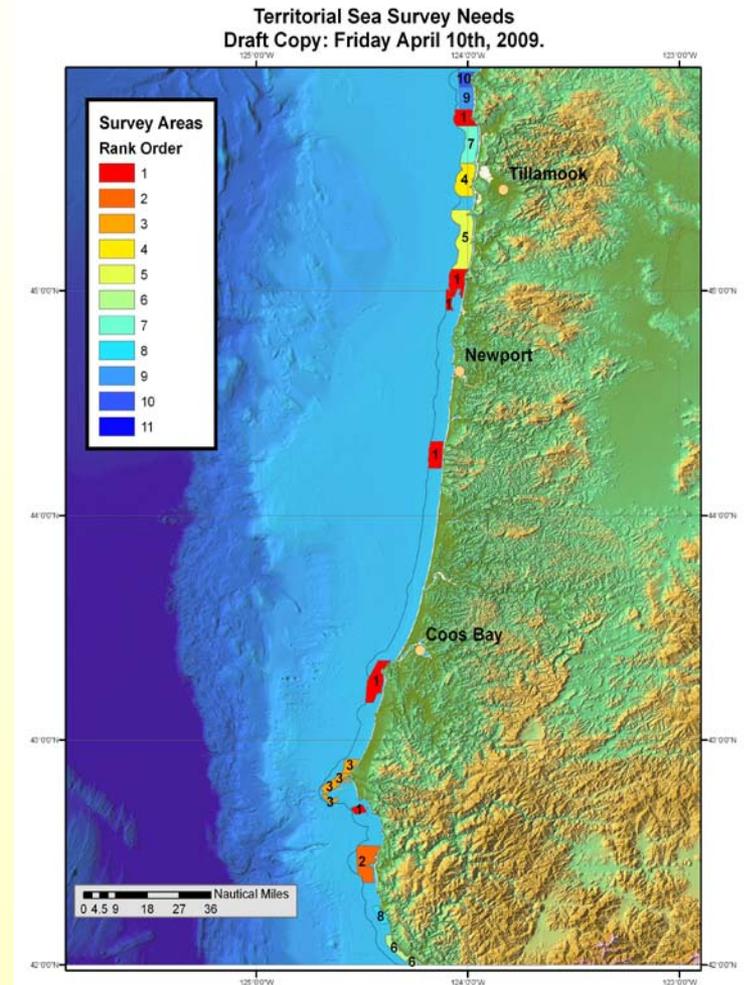
To Support Multiple Planning Uses

Seafloor Mapping in Territorial Sea

Summer 2009

NOAA Charting (~25%)

State Funding (~25%)





To Be Continued...