

# **Information to Support the Five-Year Review of Essential Fish Habitat for Pacific Coast Groundfish**

**Pacific Fisheries Management Council  
Pacific Coast Groundfish**

**Essential Fish Habitat Review Committee**

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B. Pettinger, J. Schumacker, G. Shester, J. Stadler, W. Wakefield,  
M. Yoklavich, and alternates)**

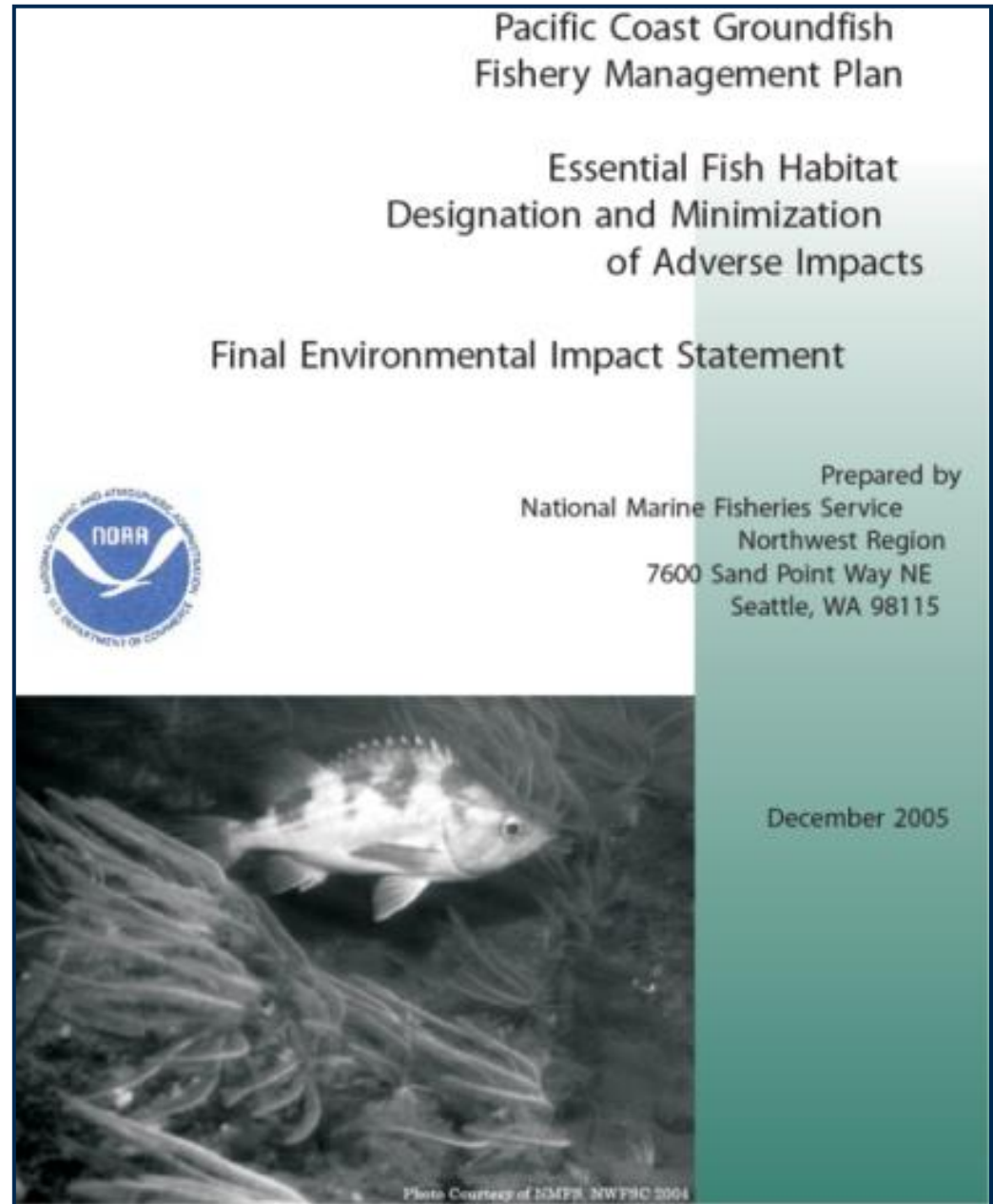
**With support from:**

- **Chris Romsos - OSU College of Earth, Ocean & Atmospheric Science**
- **Joseph Bizzarro - UW School of Aquatic and Fishery Sciences**
- **Curt Whitmire - NOAA NMFS NW Fisheries Science Center**
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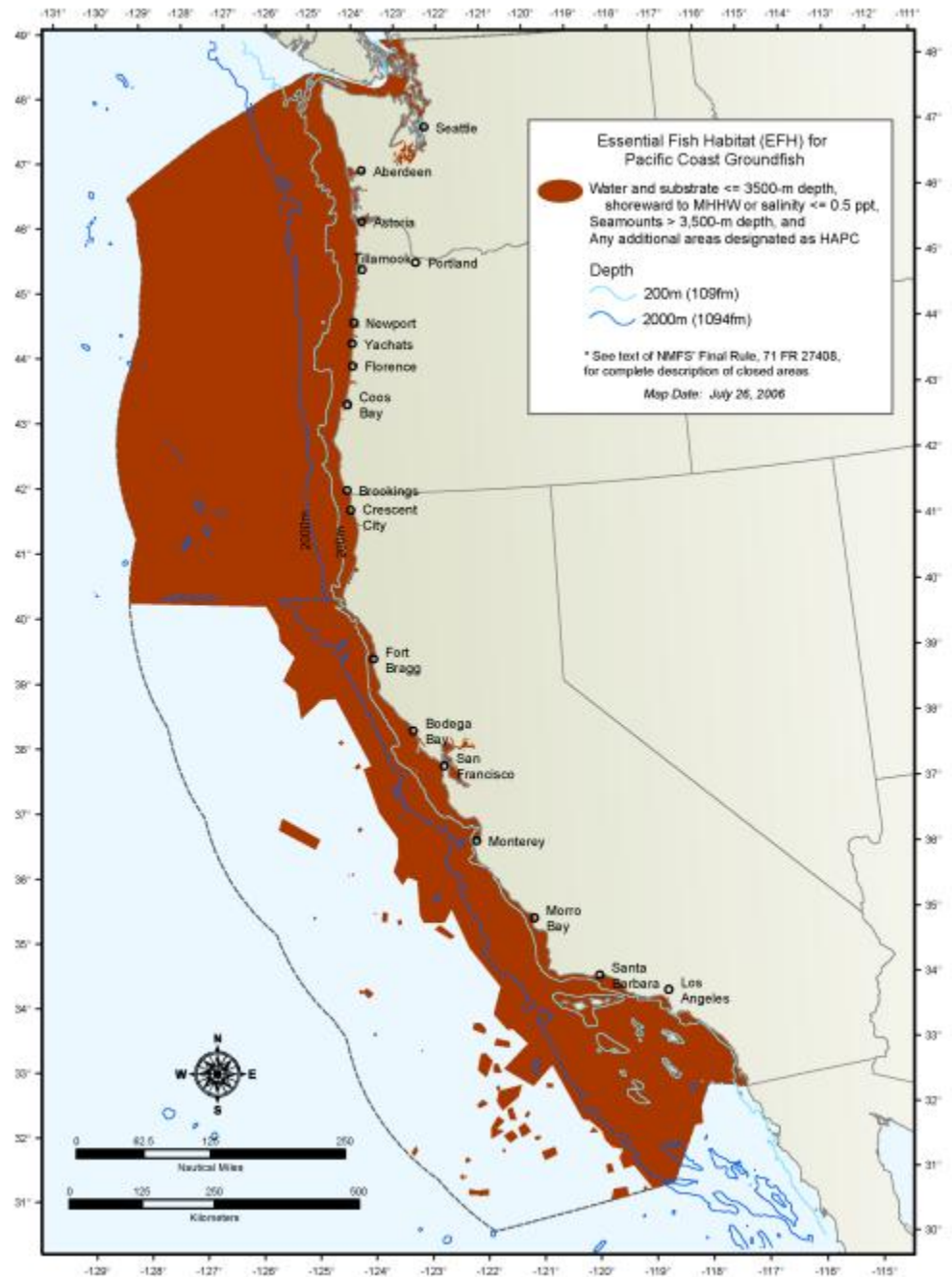
# Background for Essential Fish Habitat (EFH)

- EFH regulatory guidance requires a periodic review and update of EFH at least every five years
- This review must be based on the best scientific information available
- EFH is: “*Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.*”

Pacific Coast  
Groundfish EFH  
was most recently  
reviewed in 2005,  
and EFH  
designations were  
approved by NMFS  
in 2006  
(Amendment 19)



# EFH for 82 Species of Pacific Coast Groundfish 2006



- Seagrass
- Canopy Kelp
- Rocky Reefs
- Estuaries
- Areas of Interest

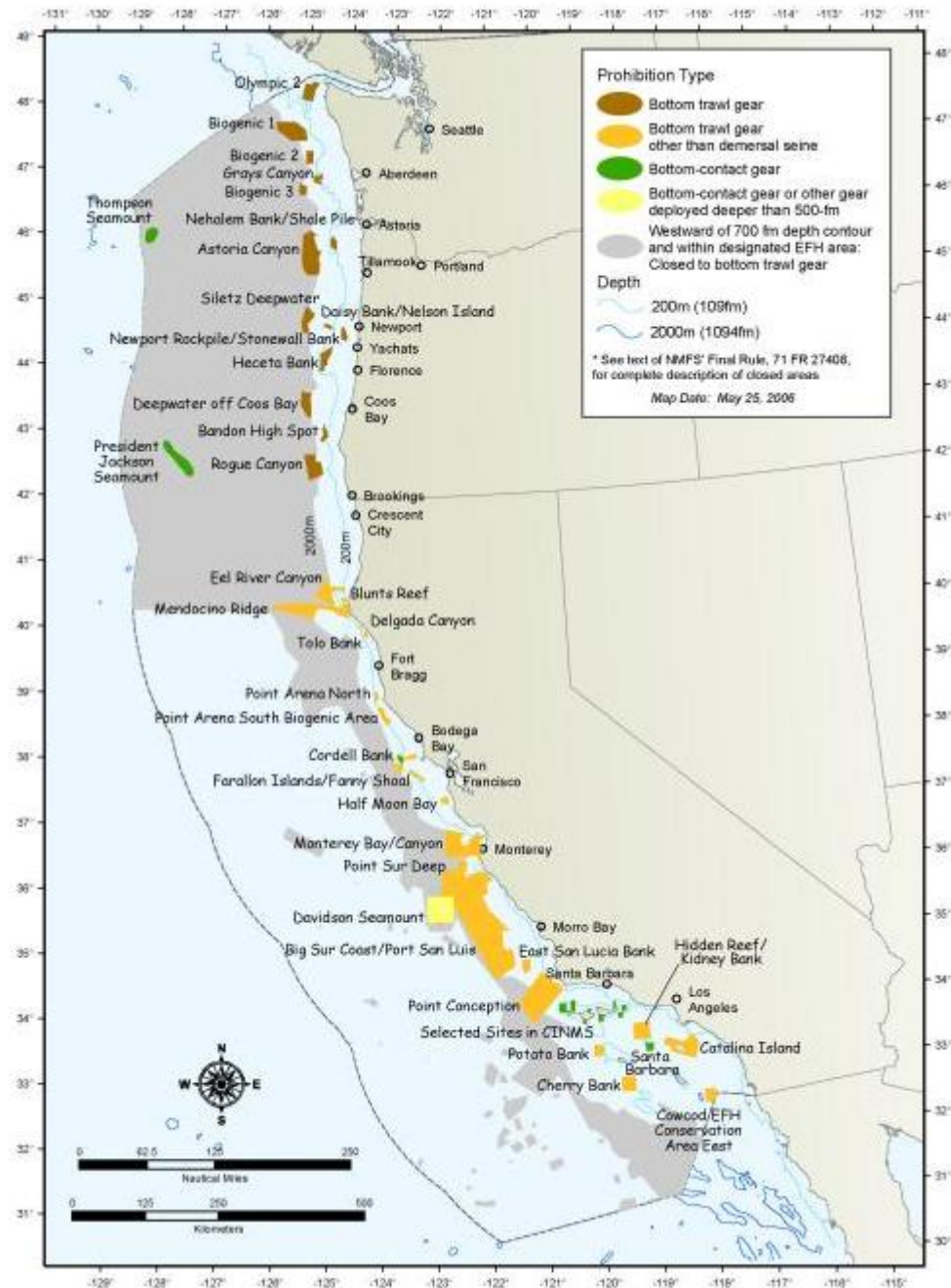
- Seagrass
- Canopy Kelp
- Rocky Reefs
- Estuaries
- Areas of Interest





# EFH Closures to Protect Pacific Coast Groundfish Habitat 2006

- Bottom trawl gear
- BTG other than demersal seine
- Bottom contact gear
- BCG or other gear deployed deeper than 500 fm
- Westward of 700 fm depth contour and within EFH area; Closed to BTG



# **A recommended schedule based on a three-phase approach**

- **Phase I** – Information and data gathering, culminating in a report to the PFMC in September 2012; Council considers report
- **Phase II**
  - Sept 2012-April 2013: NMFS synthesizes and interprets data and information in the Phase 1 report
  - April 2013: NMFS presents synthesis to Council
  - *Release of Request for Proposals (RFP) to modify EFH*
  - EFHRC reviews proposals and submits Phase II Report to Council; Council determines whether or not to revise EFH
- **Phase III** – If Council decides to amend EFH, that begins Phase III; May require an FMP amendment

## **Pacific Coast Groundfish 5-Year Review of Essential Fish Habitat**

Report to the Pacific Fishery Management Council  
Phase 1: New Information

Groundfish Essential Fish Habitat  
Review Committee

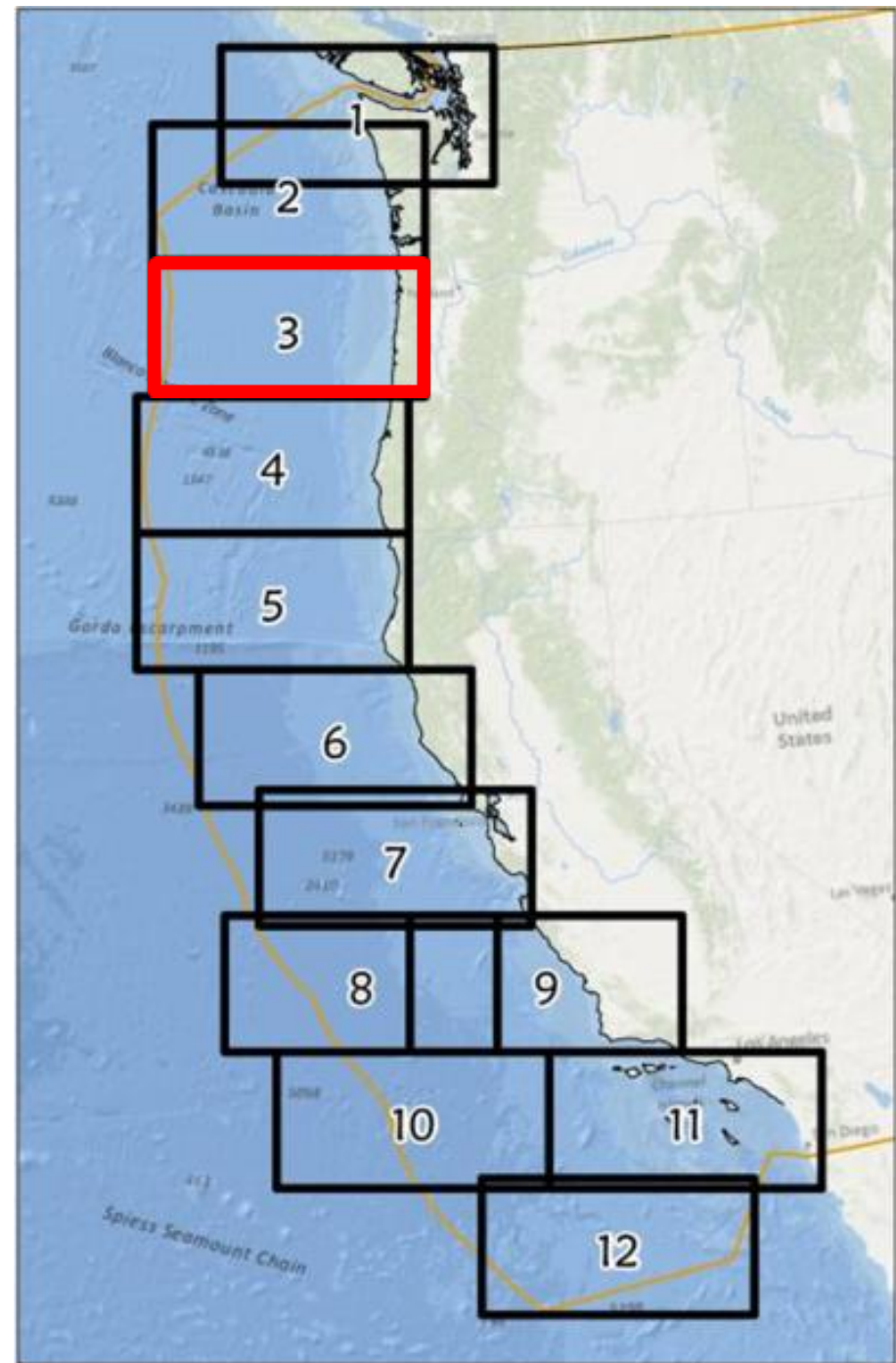


August 23, 2012



# Phase I Products

12 comparison map panels encompassing the US EEZ for seafloor habitat show change in knowledge between 2005 and 2011



# Findings regarding physical habitat:

## — Washington:

- 176 new sources of bathymetry and imagery
  - Puget Sound and continental slope areas
- 42 new sources of habitat maps
  - OCNMS and San Juan Islands
  - Outer coast nearshore from historic data

## — Oregon:

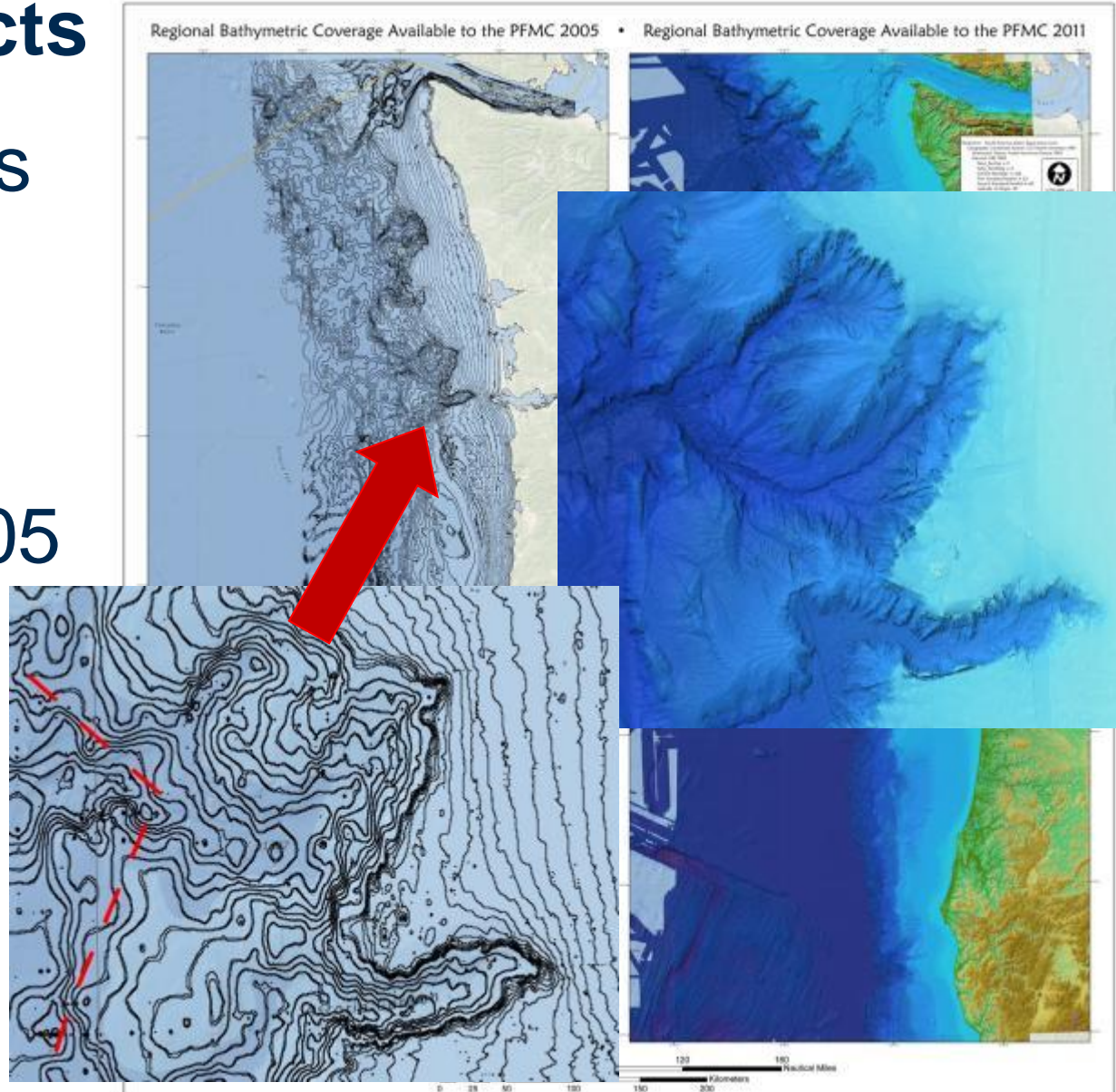
- 86 new sources of bathymetry and imagery
  - State and Nearshore up to ~60% from ~6 to 7% in 2005
  - Academic mapping offshore
- 30 new sources of habitat maps
  - All nearshore sources mapped for habitat, ~60% state waters
  - Offshore shelf and slope – a few new hard areas identified

## — California:

- 431 new sources of bathymetry and imagery
  - CA State waters coverage level is at 100% of mainland waters
- 191 new sources of habitat maps
  - Tier 2 CSUMB maps complete, Tier 3 USGS maps in progress

# Phase I Products

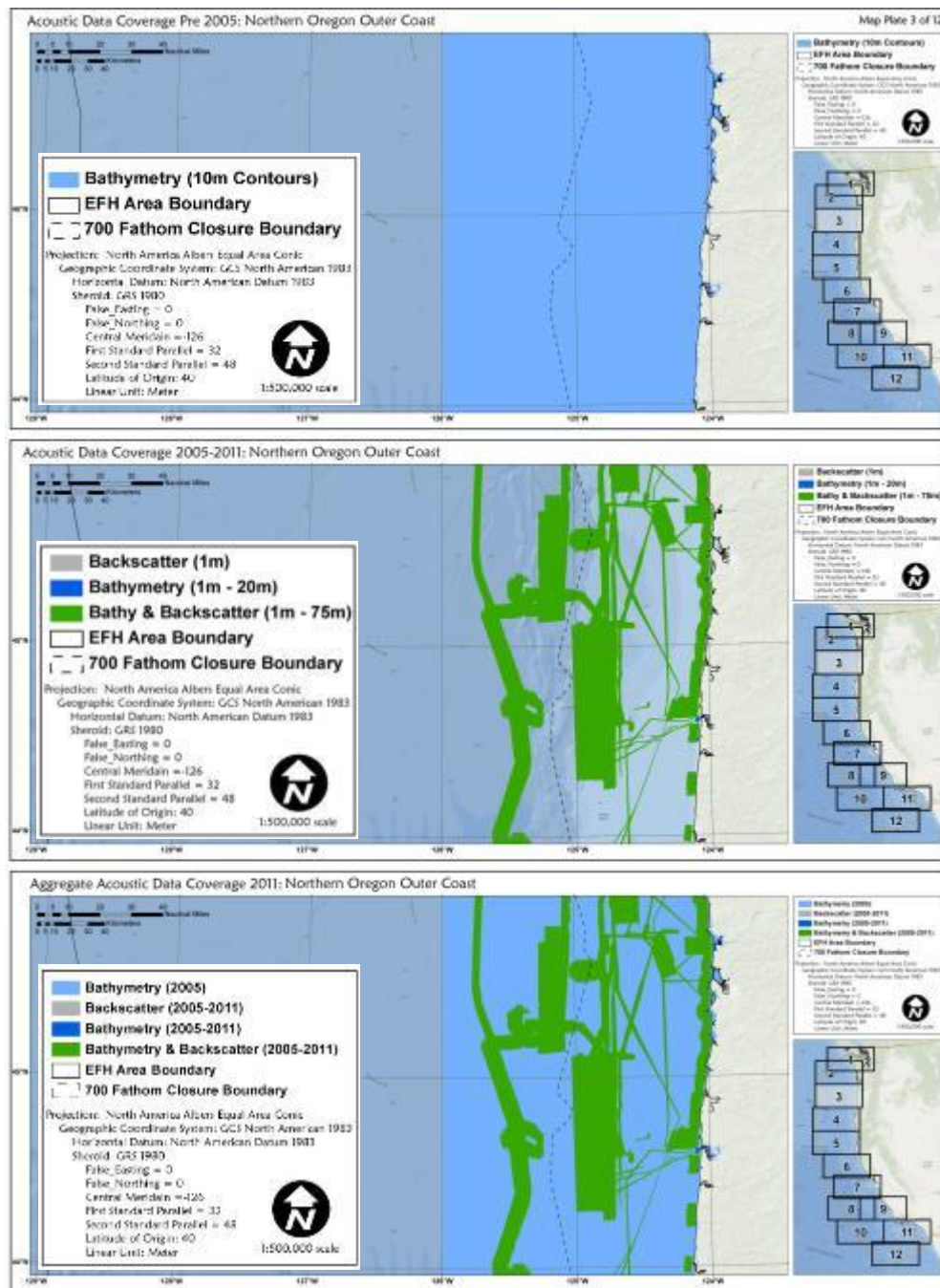
- Comparisons for regional bathymetric coverage between 2005 and 2011





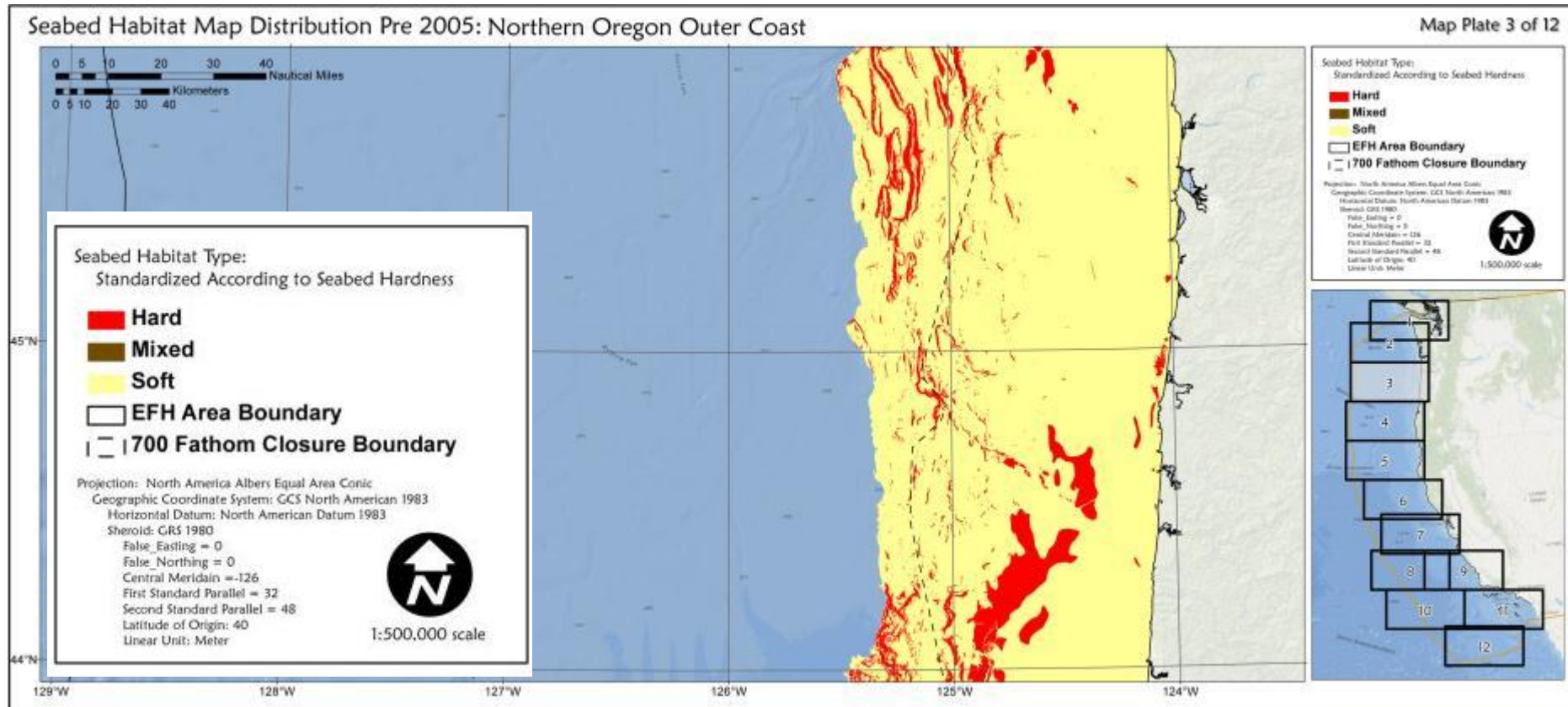
# Phase I Products

- Comparisons for regional survey coverage between 2005 and 2011



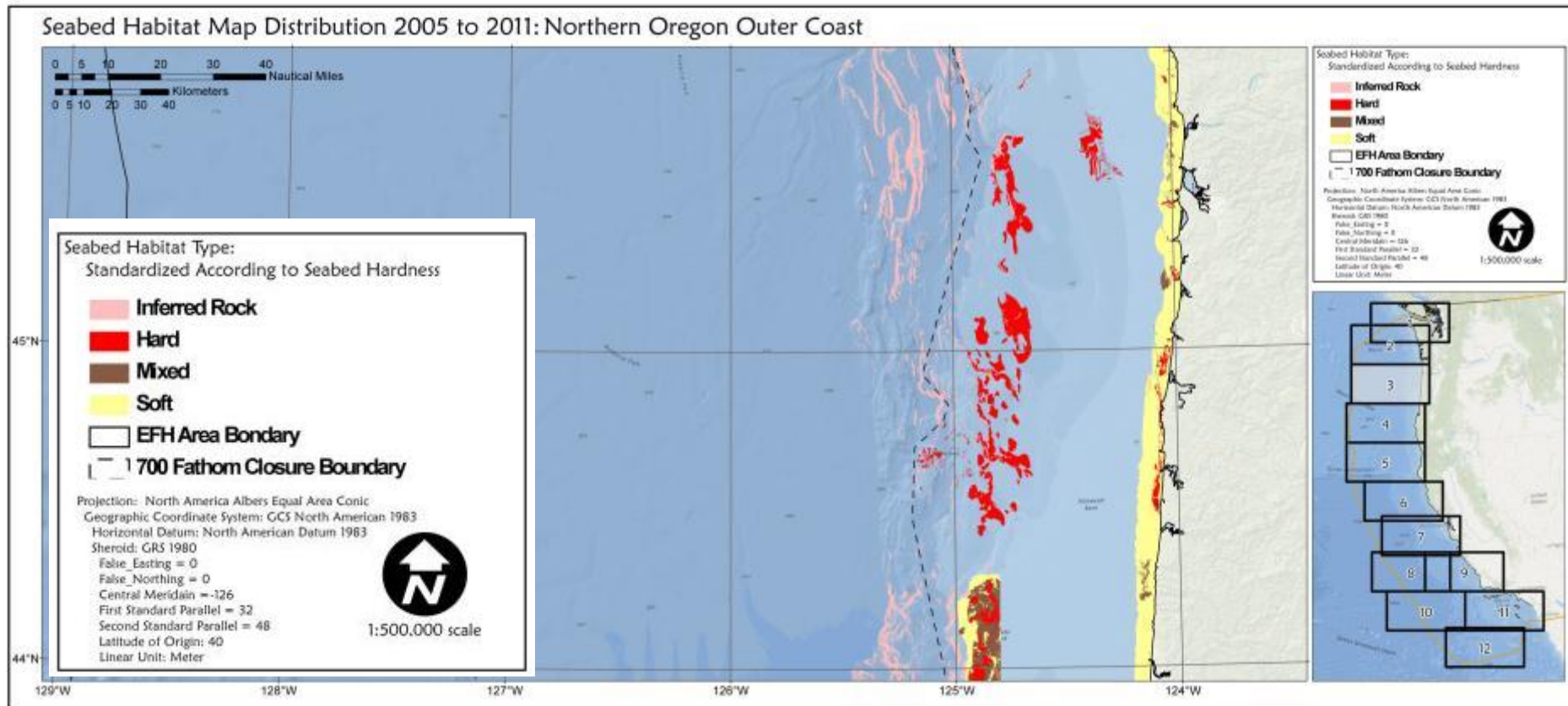
# Seafloor Habitat Map 2005

## Map Plate 3 of 12, Northern Oregon Coast



# Seafloor Habitat Map 2005 to 2011

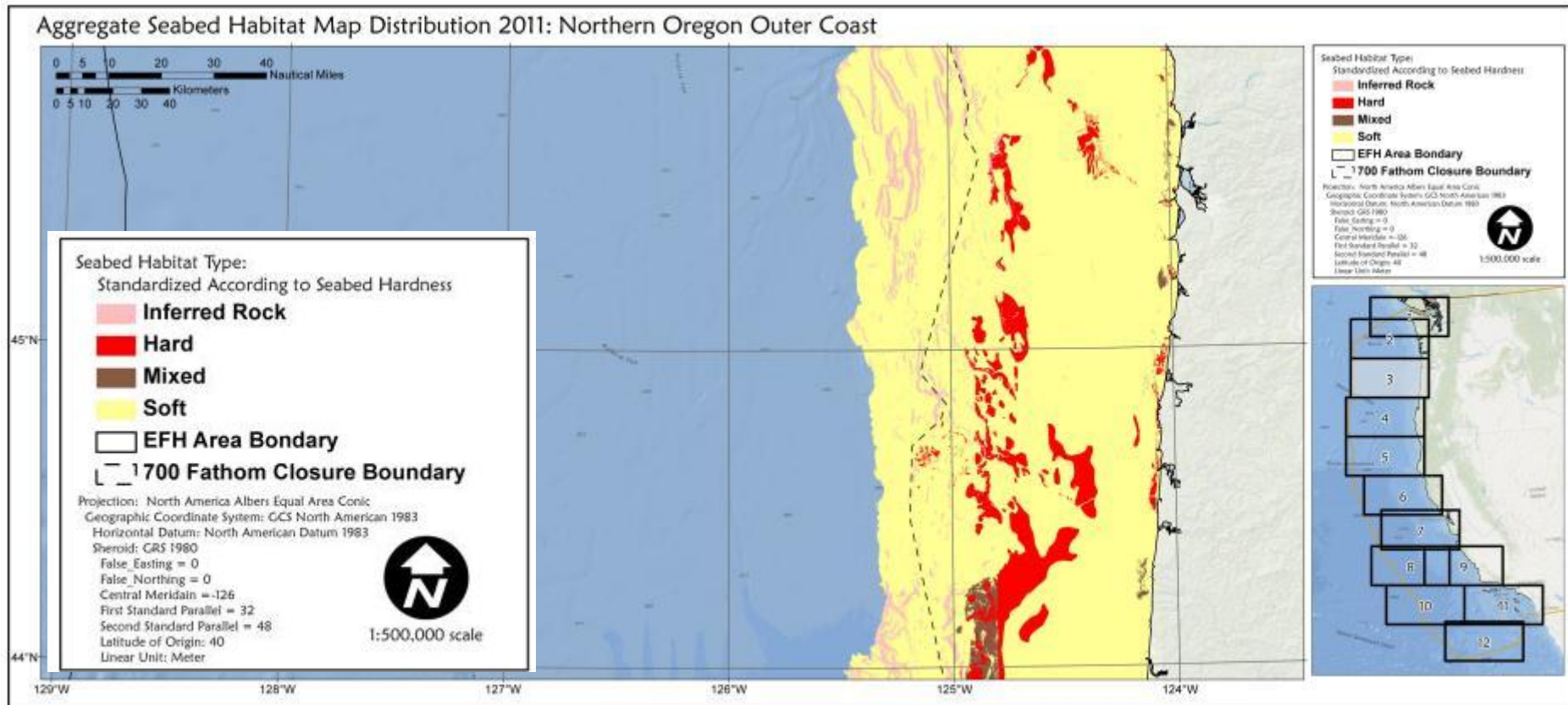
## Map Plate 3 of 12, Northern Oregon Coast





# Aggregate Seafloor Habitat Map 2011

## Map Plate 3 of 12, Northern Oregon Coast



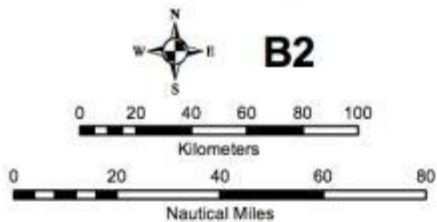
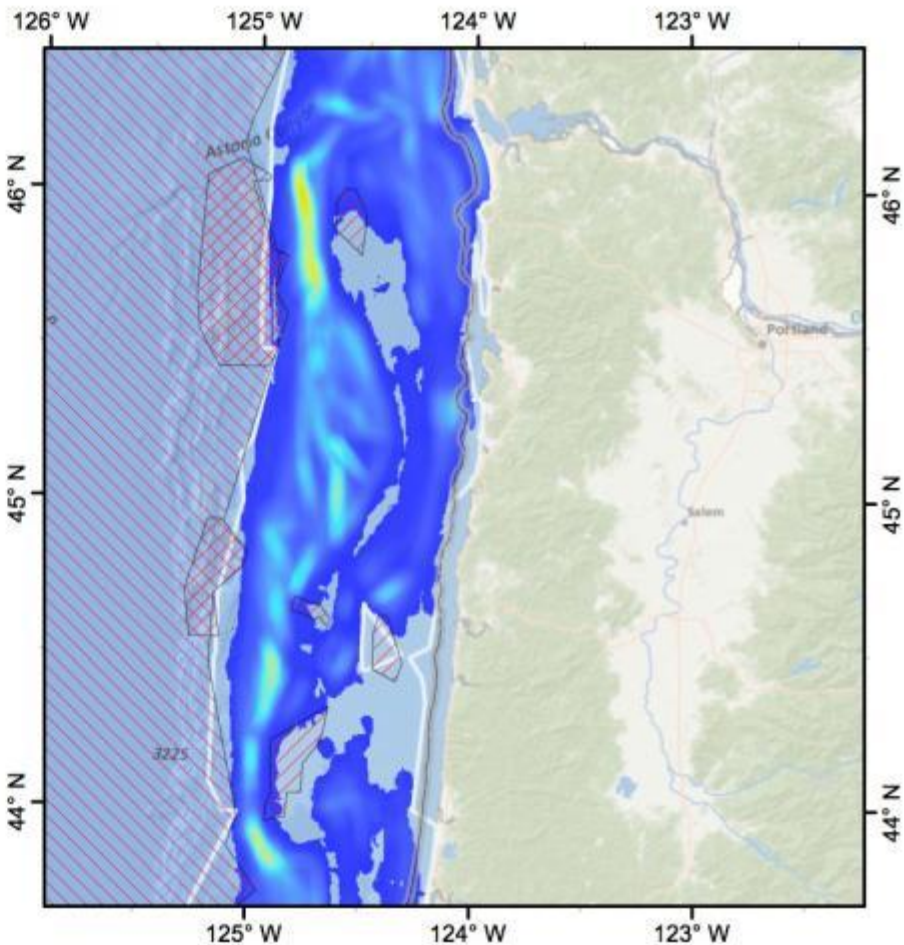
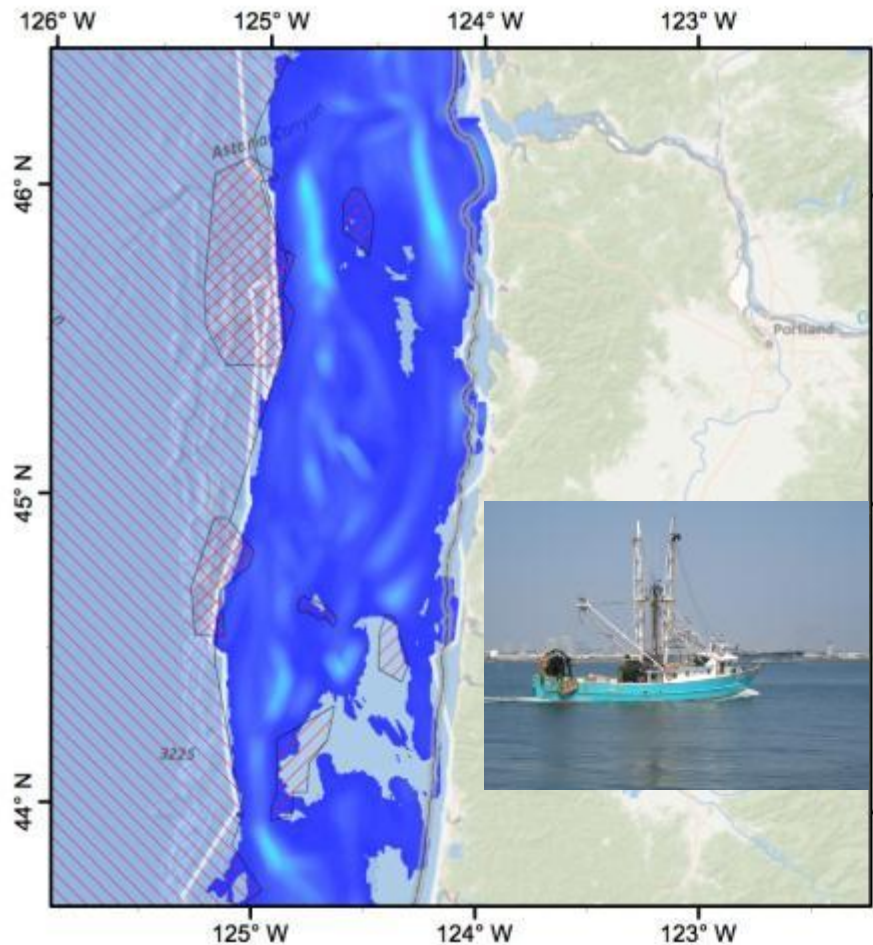
# **Other Phase I products developed for the Groundfish EFH 5-year review**

- Footprints and intensity of commercial trawl and fixed gear fishing effort
- Fishery observer derived catch of corals and sponges in the bottom trawl fishery

Before: 2002–2006

# Bottom Trawl Fishing Effort (PacFIN)

After: 2006–2010



Map Scale: 1:2,400,000  
Date Saved: 20 Aug 2012

Effort (km/km<sup>2</sup>)

High : 221.931

Low : 0.008

Extent Polygon

EFH Cons. Area

State Territorial Sea

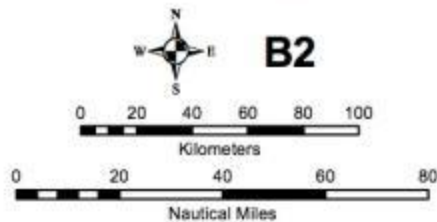
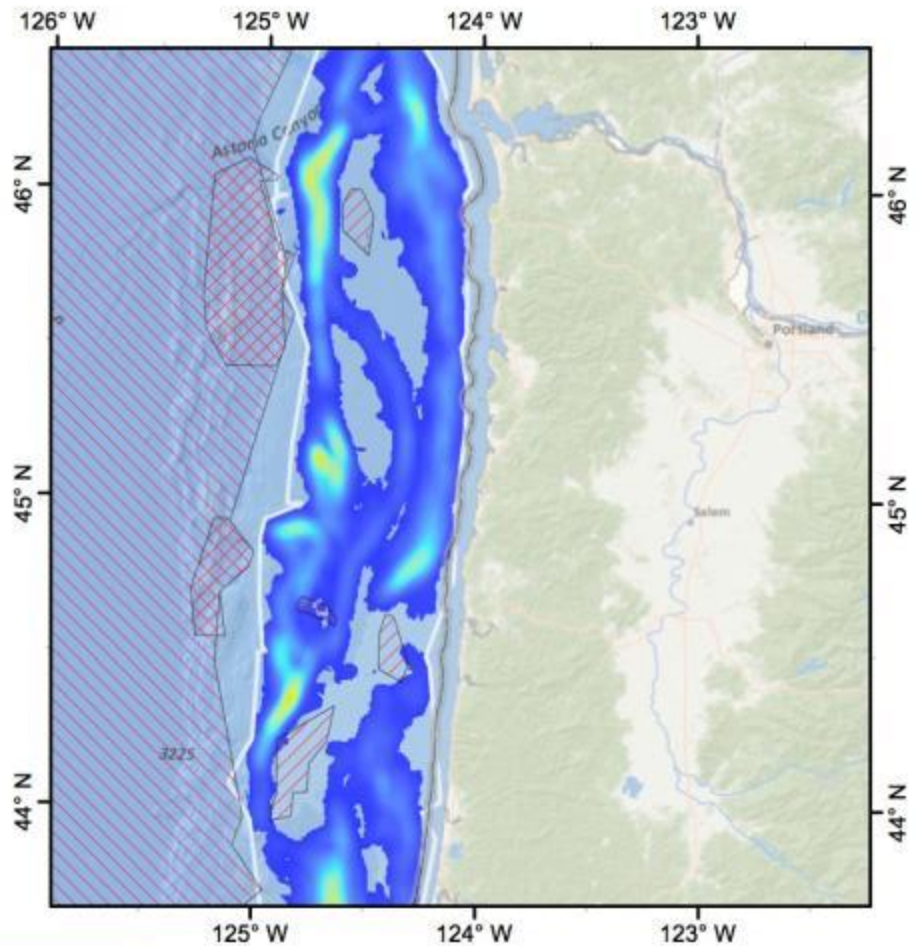
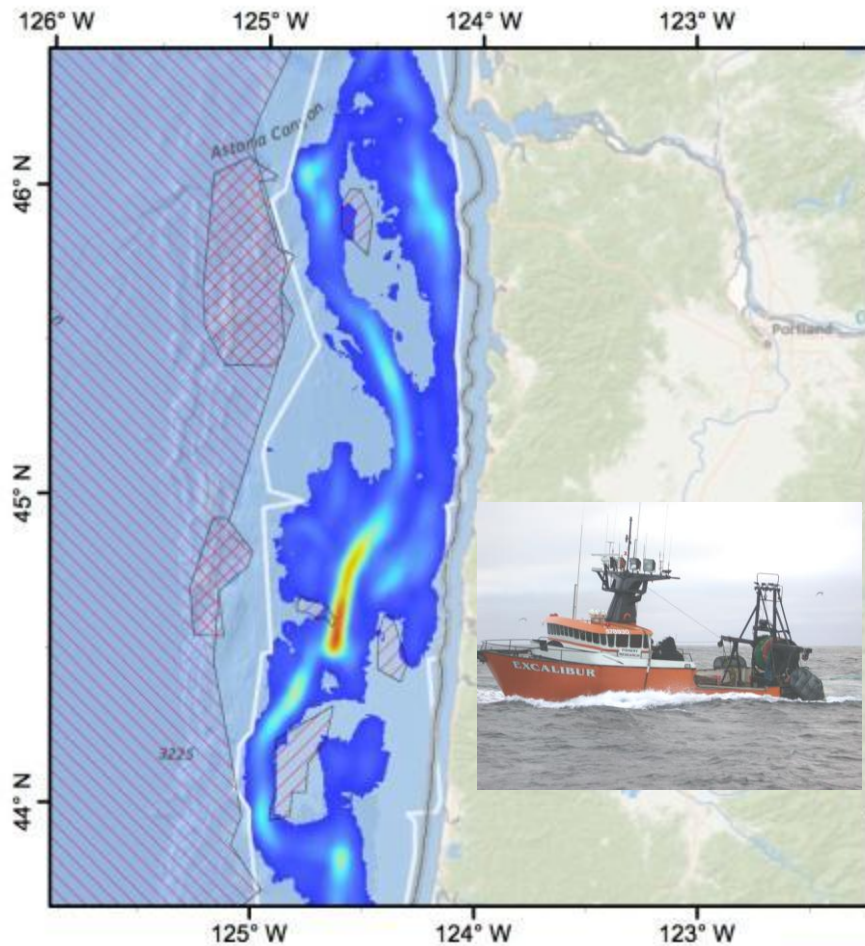


Map 2 of 8

Search Radius: 3,000 m  
Cell Size: 500 m



# Before: 2002–2006 Mid-Water Trawl Fishing Effort (At-Sea & Shoreside Sectors) After: 2006–2010



B2

Effort ( $\text{km}/\text{km}^2$ )

High : 53.669

Low : 0.008



Extent Polygon



EFH Cons. Area



State Territorial Sea



Map 2 of 4

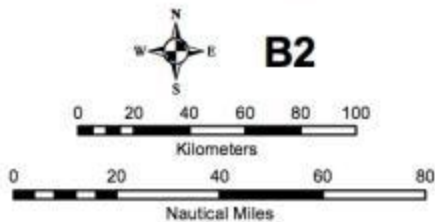
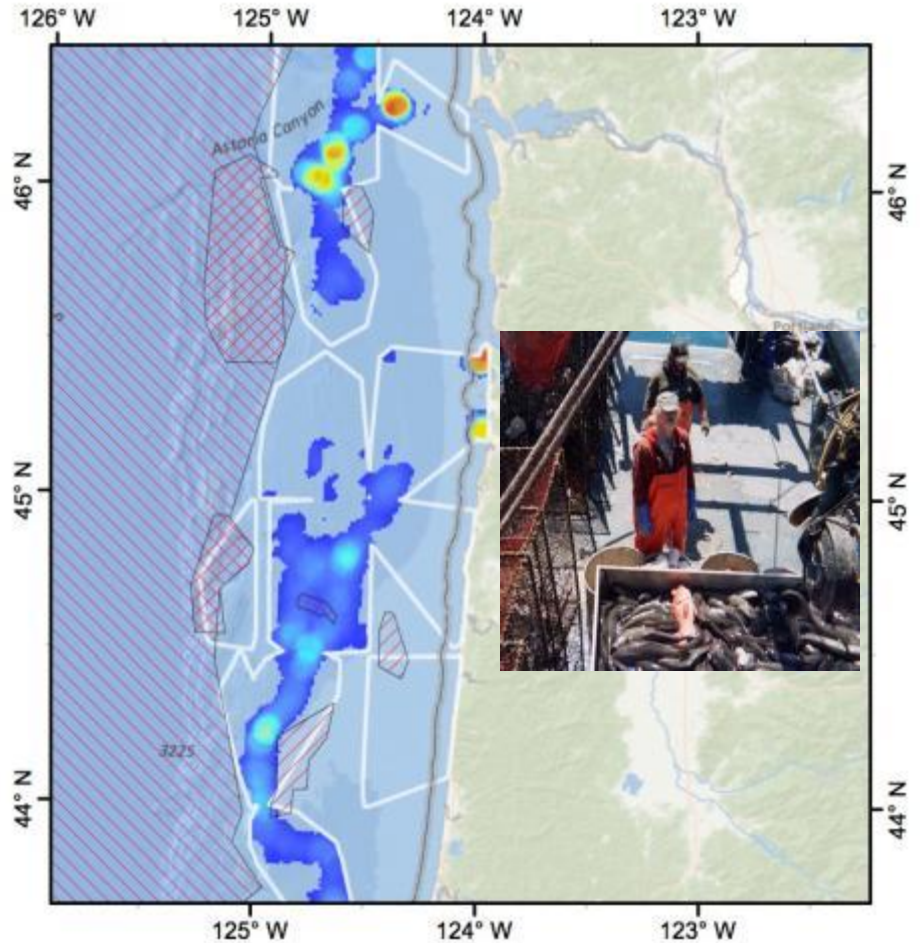
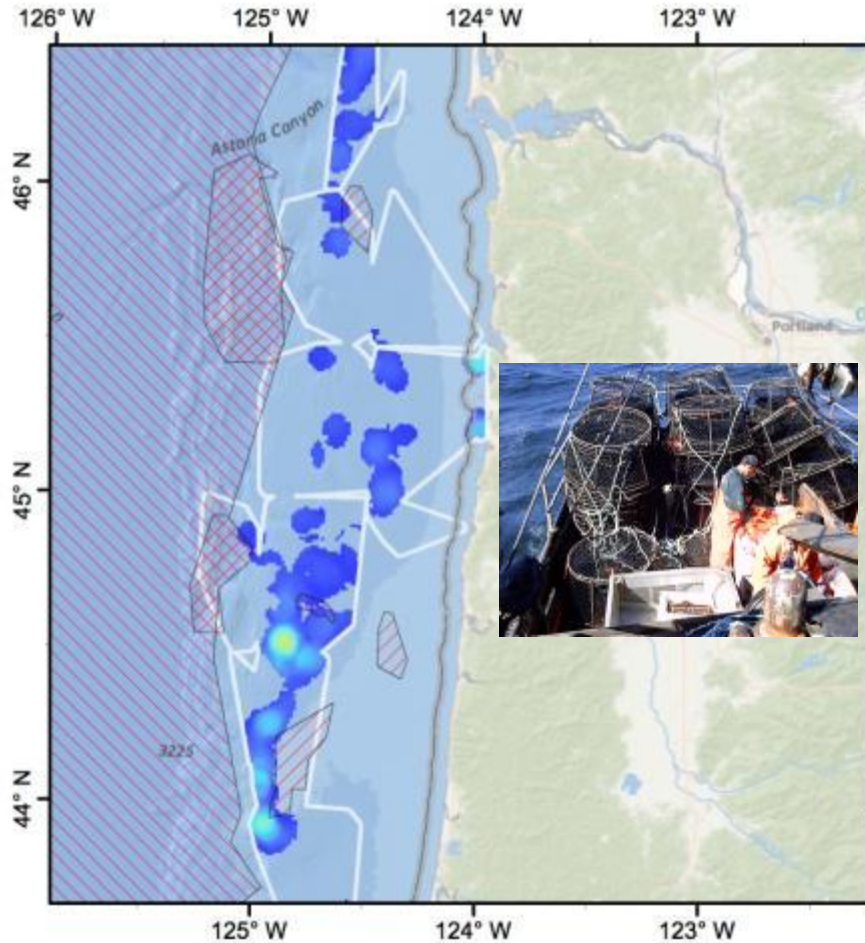
Search Radius: 3,000 m  
Cell Size: 500 m



Before: 2002–2006

# Fixed Gear Fishing Effort (WCGOP)

After: 2006–2010



Map Scale: 1:2,400,000  
Date Saved: 20 Aug 2012



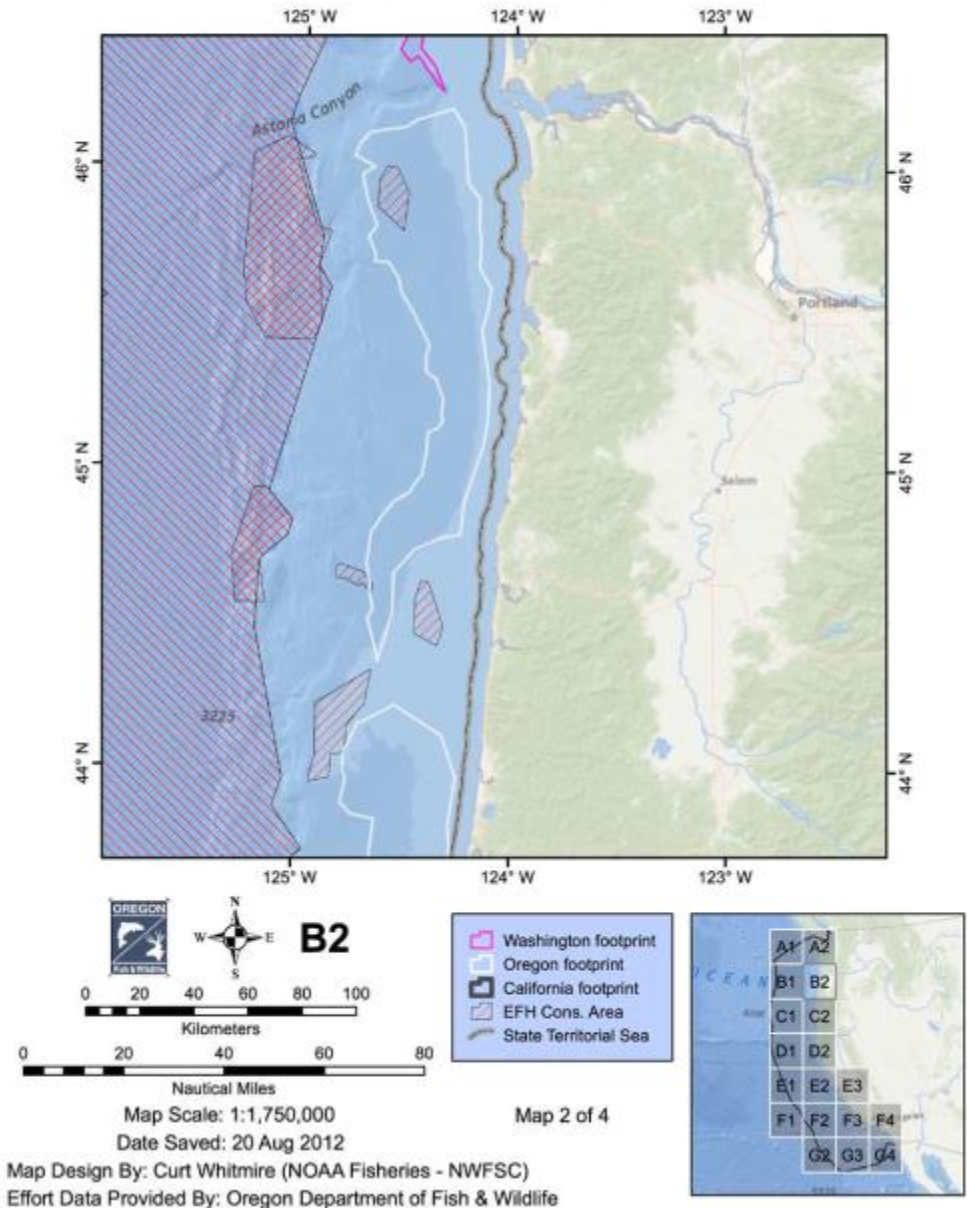
Map 2 of 9

Search Radius: 5,000 m  
Cell Size: 1,000 m

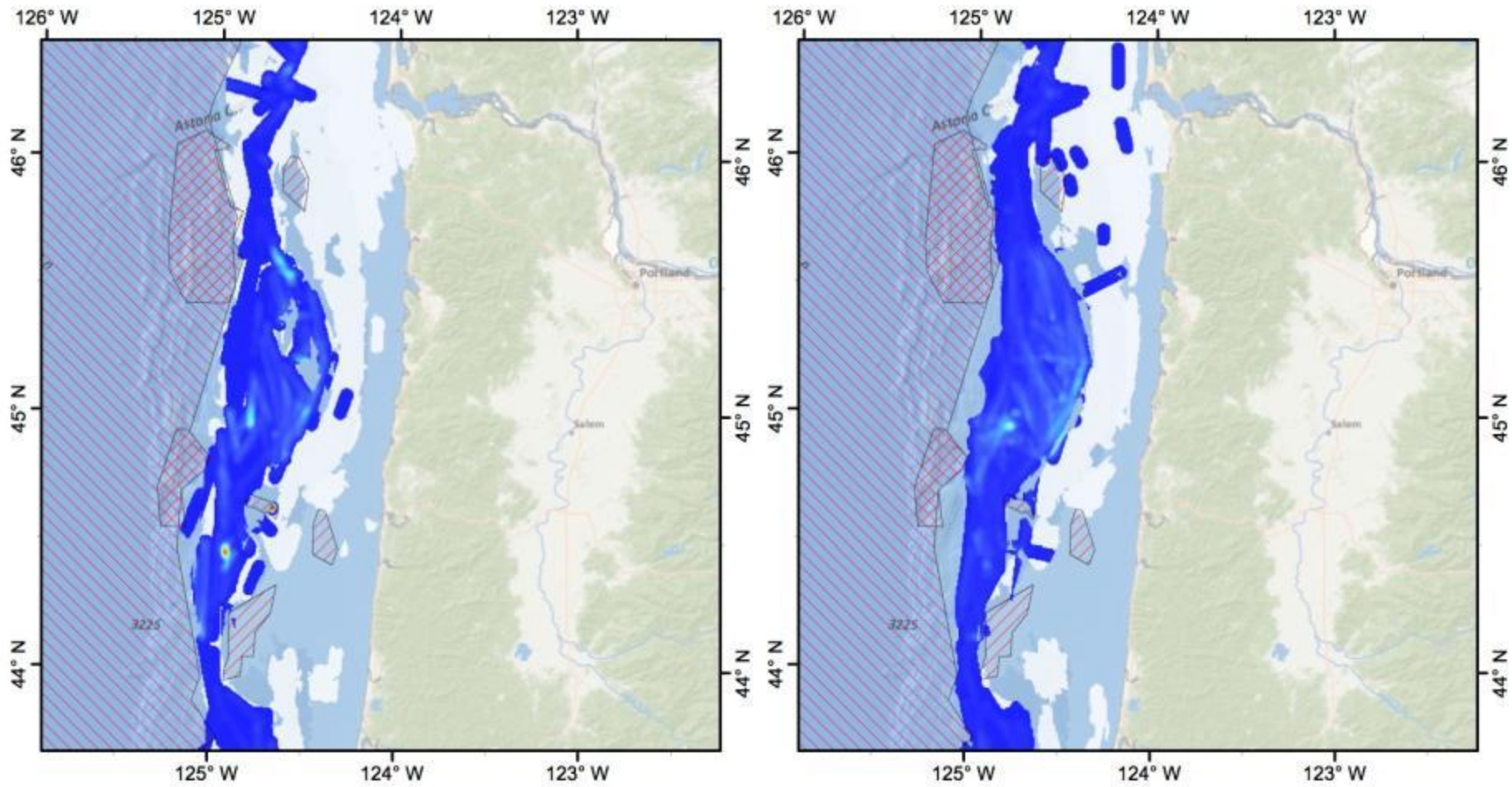
## Pink Shrimp Fishing Footprint (Bottom Trawl Gear)


Non-Magnuson Act  
Fisheries Effects -  
the EFHRC requested  
spatial footprints of  
state• -managed  
bottom contact gear  
fisheries

Example from Oregon  
pink shrimp fishery





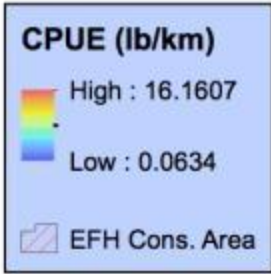


 **B2**

0 20 40 60 80 100  
Kilometers

0 20 40 60 80  
Nautical Miles

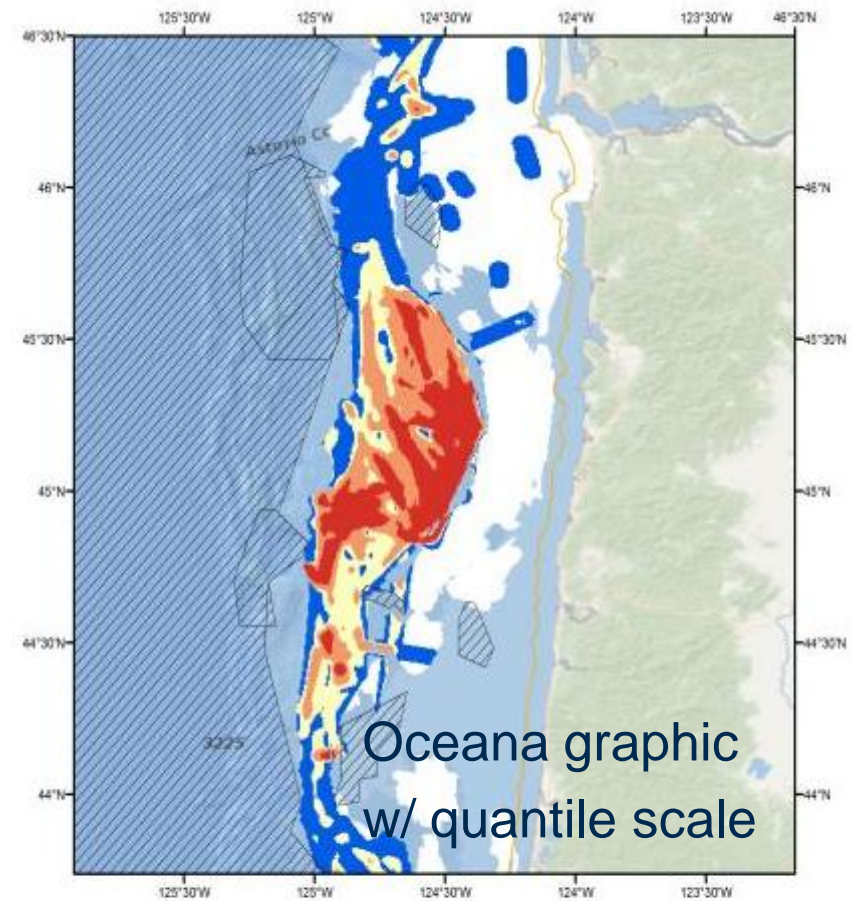
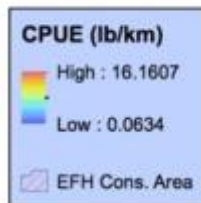
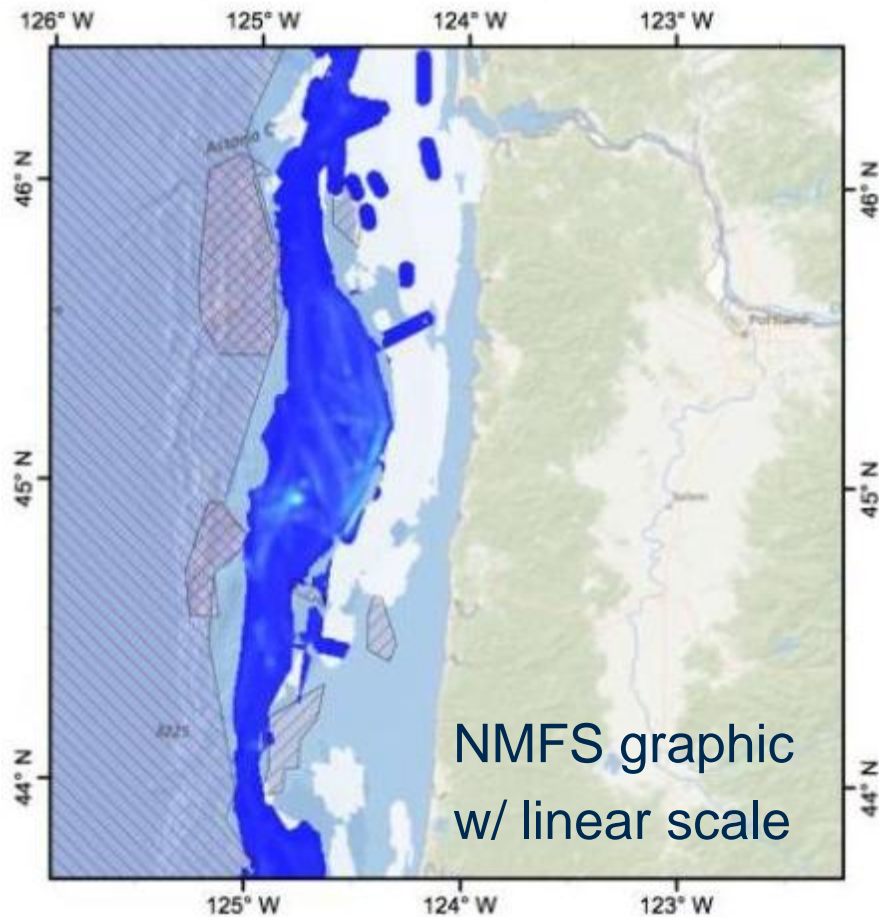
Map Scale: 1:2,400,000  
Date Saved: 20 Aug 2012  
Author: Curt Whitmire (NOAA Fisheries - NWFSC)



Map 2 of 8

Search Radius: 3,000 m  
Cell Size: 500 m

# Comparing Two Different Color Scales for Coral & Sponge Bycatch in the Pacific Coast Bottom Trawl Fishery (2006-2010)





# Consolidated GIS Data Catalog and Online Registry: A Data Portal to the EFH Database



<http://efh-catalog.coas.oregonstate.edu/overview>

September 2012 Briefing Book ... PaCOOS: West Coast Habitat Se... Index of ftp://ftp.ngdc.noaa.go... EFHRC Catalog: Substrate Data ... Capture a Screen Shot with Mac...

efh-catalog.coas.oregonstate.edu/habitat/

5-Year Review of Pacific Coast Groundfish EFH  
Consolidated Geographic Information Data Catalog and Online Registry


NOAA PaCOOS





















Overview Substrate Maps Biogenic Maps Effort Maps **Substrate Data** Biogenic Data Effort Data Map Services Metadata

Abbreviations in the "Originator" field are as follows: CSUMB-SML = California State University, Seafloor Mapping Lab; MLML-CHS = Moss Landing Marine Laboratories, Center for Habitat Studies; NOAA OE = NOAA Ocean Explorer; NOAA NOS = NOAA National Ocean Survey; NOAA PMEL = NOAA Pacific Marine Environmental Laboratory; NSF = National Science Foundation; NSF OOI = NSF ocean Observing Initiative; OCNMS = Olympic Coast National Marine Sanctuary; OSU-AT&SML = Oregon State University, Active Tectonics & Seafloor Mapping Lab; USGS = United States Geological Survey; USN = United States Navy.

\* August 10, 2012 - Please Note, not all substrate data downloads are unique. There are a few (9) instances where the substrate data download button will provide a zipfile that's identical to a download offered at a different row or Reference #. The affected records are Rerence #'s: 119,152,153,154,155,157,165,173, and 174. This is not a mistake though it may cause confusion. The best or most current substrate map for each of these unique surveys has been incorporated into the Version 6.6 Benthic Habitat Map for Oregon.

Would you like to download all of the data below? Click the botton at right, but be patient! Download data format is ArcGIS map package (.mpk).

**Download All!** 



Ref. No.	Plate No.	Dataset	Originator	Substrate	Metadata
1	1.0	Pacific Storm 2011, OCNMS North	OCNMS		
2	1.0	San Juan Islands, WA	CFHS-MLML		
3	1.0	Elwah River Delta West	USGS		
5	1.0	Rainier 2001, Cape Flattery, OC-3 & OC-56	OCNMS		
6	1.0	Rainier 2001, Cape Flattery, OC-4 & OC-57	OCNMS		
7	1.0	Rainier 2001, Anderson Pt, OC-5 & OC-58	OCNMS		
8	1.0	Rainier 2002, Makah Bay, OC-6 & OC-65	OCNMS		
9	1.0	Rainier 2002, Anderson Pt, OC-7 & OC-66	OCNMS		
10	1.0	Rainier 2003, Makah Bay, OC-8 & OC-69	OCNMS		
		Rainier 2003, Makah Bay, OC-9 & OC-70	OCNMS		

efh-catalog.coas.oregonstate.edu/habitat





















**Download GIS Data and link to Metadata**

# Map Services: View data in Free online viewers

5-Year Review of Pacific Coast Groundfish EFH  
Consolidated Geographic Information Data Catalog and Online Registry

Overview Substrate Maps Biogenic Maps Effort Maps Substrate Data Biogenic Data Effort Data **Map Services** Metadata

Map Service Theme	ArcMap Layer File	Google Earth KMZ	EFH Viewer	ArcGIS.com Viewer
Habitat Maps Pre 2005				
Habitat Maps 2005 - 2011				
Regional Bathymetry				
Fishing Effort				
Biogenic Habitat				

**EFH Map Service Help**

This page presents a collection of web map services organized about the themes presented in Appendix C,D, and E. Where other pages have presented zipfile downloads, the services provided here are live and meant for use with various web mapping software. Your choice of service depends upon which web mapping software you have available or prefer. Briefly, free online (no download) options include ArcGIS.com or the custom EFH Viewer. Freeware (download required) options include Google Earth or ArcGIS Explorer.

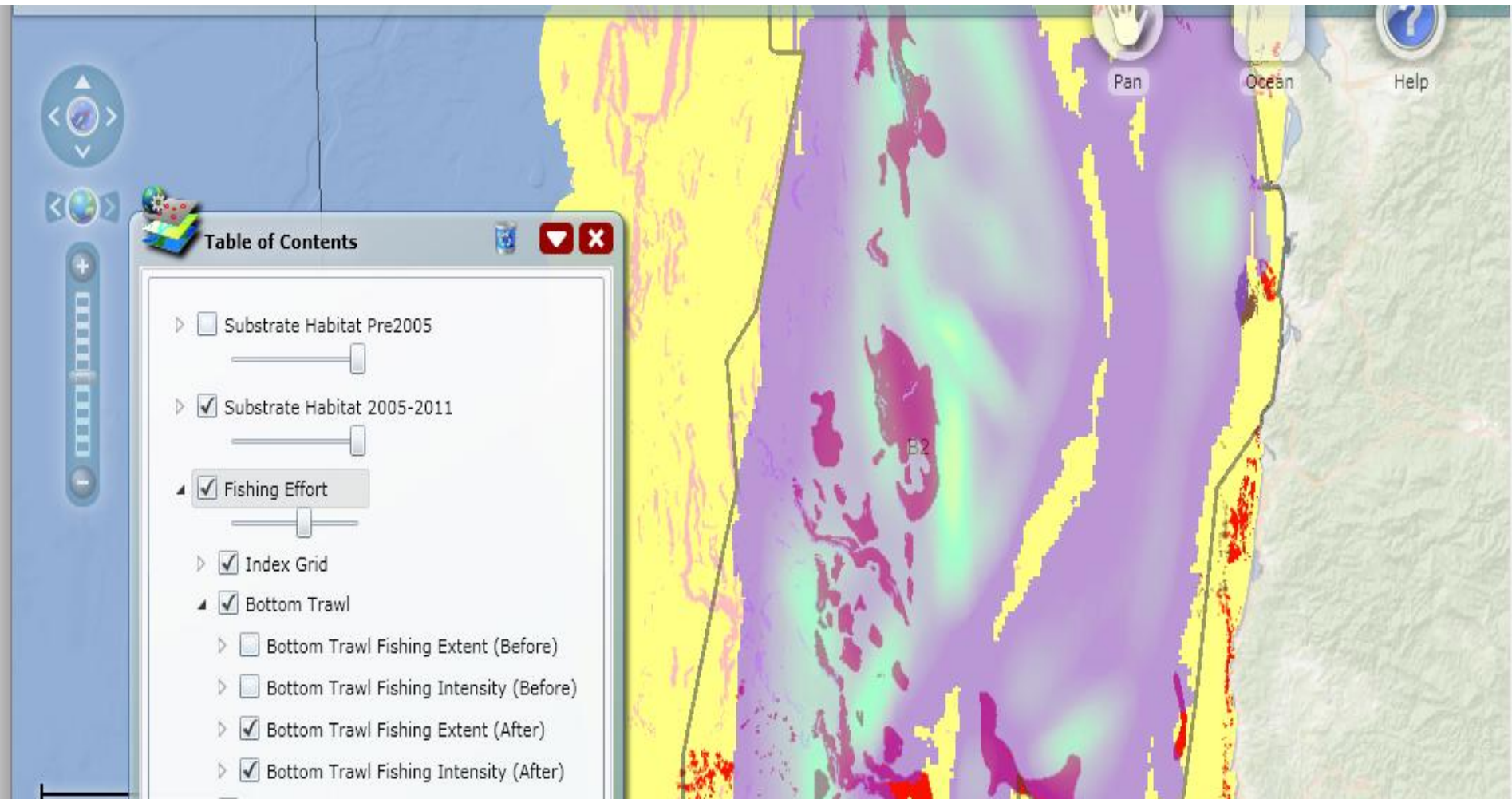
**Map Service Theme:**

**ArcMap Layer File:** An ArcMap .lyr file is directly readable by ArcGIS Software. Pressing this button downloads a .lyr file to your computer. The file does not contain actual data, but rather links to the data provided via our map server and includes display and rendering specific properties.

**Google Earth KMZ:** KML (Keyhole Markup Language) is an XML-based language for managing the display of three-dimensional geospatial data in Google Earth, Google Maps, Google Mobile, ArcGIS Explorer, and WorldWind. (The word Keyhole is an earlier name for the software that became Google Earth: the software was produced by Keyhole, Inc. which was acquired by Google in 2004. The term

# Interactive Map Site

## Bottom Trawl Intensity and Extent Overlay on Substrate





# **Additional Phase I Products in Support of 2011 Five-Year Review**

- Life history summaries using updated information for 91 groundfish species:  
Followed species grouping for FMP, flatfishes (65), other flatfishes (66), rockfishes (90), other rockfishes (85), and other groundfishes(120)
- Significant updates have been made to the Habitat Use Database that was developed for the 2005 groundfish EFH EIS.

# **Additional Phase I Products in Support of 2011 Five-Year Review**

Available Habitat Relevant Models, e.g.,

- Habitat suitability probability models
- Ecopath/Ecosim models
- Atlantis model

# **Additional Phase I Products in Support of 2011 Five-Year Review**

Newly Identified Non-Fishing Threats and Potential Adverse Effects to EFH beyond those identified in FMP:

- Alternative energy development
- Desalination
- Activities that contribute to climate change and ocean acidification
- LNG

# **Additional Phase I Products in Support of 2011 Five-Year Review**

Prey species (loss of prey species may be an adverse effect on EFH)

- Summary of new information on prey species

# Recommendations

1. Analyze new information gathered in the EFHRC Phase 1 Report in order to inform decisions to modify the 2006 groundfish EFH regulations.
2. Conduct visual, no-take surveys of fishes and habitats inside and outside current EFH closures, in order to evaluate the effectiveness of these conservations areas.
3. Conduct high-resolution seafloor mapping (bathymetry, back-scatter, and associated interpreted substrata types), particularly on the shelf and slope associated with EFH conservation areas.
4. Improve the Habitat Use Database (HUD):
5. Improve understanding of habitat condition, including adverse effects of fishing gear to EFH, across the geographic range of groundfishes.
6. Advance understanding of the effects of a changing climate on groundfishes.
7. Evaluate potential adverse effects from fishing and non-fishing activities on the major prey species in the diets of groundfishes.

## **Acknowledgements**

- Funding from the NMFS Office of Habitat Conservation to the NW and SW Fisheries Science Centers
- NMFS NW and SW Regions
- Pacific Fisheries Management Council  
K. Griffin, C. Tracy
- NMFS NW and SW Science Centers
- Oregon State University Cooperative Institute for Marine Resources Studies
- University of California Santa Cruz Cooperative Institute for Marine Ecosystems and Climate





# How does meeting the terms of confidentiality impact the display of bottom trawl effort?

Latitude Range	Inside + Outside				Outside	
	BEFORE	% Coast	AFTER	% Coast	BEFORE	AFTER
48 - 49	83,719	8.3%	32,379	2.9%	1.0%	6.9%
47 - 48	87,351	8.7%	117,673	10.7%	0.5%	0.4%
46 - 47	106,758	10.6%	151,336	13.8%	0.1%	0.1%
45 - 46	87,864	8.7%	150,592	13.7%	0.8%	1.4%
44 - 45	57,119	5.7%	95,984	8.7%	1.1%	0.5%
43 - 44	58,631	5.8%	105,058	9.6%	1.7%	0.5%
42 - 43	57,289	5.7%	61,419	5.6%	2.1%	3.1%
41 - 42	93,191	9.2%	94,557	8.6%	0.1%	0.2%
40 - 41	72,037	7.1%	79,091	7.2%	0.2%	0.2%
39 - 40	50,802	5.0%	41,962	3.8%	0.4%	0.5%
38 - 39	38,028	3.8%	31,016	2.8%	1.4%	1.6%
37 - 38	90,268	8.9%	69,626	6.3%	0.4%	1.9%
36 - 37	46,183	4.6%	20,613	1.9%	0.5%	12.0%
35 - 36	19,774	2.0%	4,880	0.4%	4.5%	58.8%
34 - 35	52,194	5.2%	39,560	3.6%	6.7%	9.4%
33 - 34	8,434	0.8%	2,022	0.2%	2.2%	4.6%
32 - 33	0	NA	0	NA	NA	NA
Coastwide	1,009,642	100.0%	1,097,767	100.0%	1.1%	1.8%

Before: 2002–2006

Selected Federal and State Marine Protected Areas

After: 2006–2010

