

**OREGON NEARSHORE STRATEGY  
IMPLEMENTATION  
SIX YEARS – PROGRESS TO DATE AND NEXT STEPS**



## Acknowledgements

Published in 2006, Oregon's statewide comprehensive conservation strategy is comprised of two documents: the Oregon Conservation Strategy and the Oregon Nearshore Strategy. In 2012 ODFW undertook efforts to further unify the two documents. Documenting the progress made to implement the 16 recommendations of the Oregon Nearshore Strategy was part of this process. This work could not have been accomplished without the interactive efforts of the many individuals, agencies, and organizations that developed the Oregon Nearshore Strategy <http://www.dfw.state.or.us/mrp/nearshore/index.asp>

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### **Acronyms:**

BOEM	Bureau of Ocean Energy Management
CCA	Coastal Conservation Alliance
DLCD	Oregon Department of Land Conservation and Development
DSL	Oregon Department of State Lands
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FMP	Fisheries Management Plan
HDMR	Human Dimensions Monitoring and Research
MOU	Memorandum of Understanding
MRP	Marine Resources Program
MSC	Marine Stewardship Council
NAC	Nearshore Advisory Committee
NEDA	Nearshore Ecological Data Atlas
NFCP	Native Fish Conservation Policy
NOAA	National Oceanic and Atmospheric Administration
NWRS	National Wildlife Refuge System
OCEAN	Oregon Coalition for the Education of Anglers
OCDG	Oregon Coastal Data Group
OCMP	Oregon Coastal Management Plan
OCZMA	Oregon Coastal Zone Management Association
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OFWC	Oregon Fish and Wildlife Commission
OPAC	Ocean Policy Advisory Council
OPRD	Oregon Parks and Recreation Department
ORBS	Ocean Recreational Boat Survey
OSG	Oregon Sea Grant
OSMB	Oregon State Marine Board
OSP	Oregon State Police
OSU	Oregon State University
PIT	Passive Integrated Transponder
POORT	Port Orford Ocean Resources Team
ROV	Remotely Operated Vehicle
SAC	Sport Advisory Committee
SEACOR	Shellfish and Estuarine Assessment of Coastal Oregon
SSNERR	South Slough National Estuarine Research Reserve
TSP	Oregon Territorial Sea Plan
USACOE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

## EXECUTIVE SUMMARY

Since the Oregon Nearshore Strategy was published in 2006, staff members of the Oregon Department of Fish and Wildlife's (ODFW) Marine Resources Program (MRP) have been working to implement its 16 recommended actions. These actions are grouped into 1) education and outreach, 2) research and monitoring and 3) management and policy. The implementation progress made from 2006 through 2011 is summarized below. Based on the contributions of multiple participating projects and programs, next steps for future implementation efforts are also identified.

### **I. EDUCATION AND OUTREACH**

**1.) *Marine Resources Program Website.*** The MRP has made significant improvements to the content, design, and effectiveness of its website. A committee was created to improve the content and accessibility of the MRP website. The addition of a "Projects" page provides easy access to many of the activities overseen by the MRP. Statistics are being collected to provide information on the effectiveness of the website. Several projects, including the Shellfish and Estuarine Assessment of Coastal Oregon (SEACOR), the Black Rockfish Passive Integrated Transponder tagging project and the Marine Reserves Program, created new webpages. Online fishery information has improved and in-season regulation changes are posted quickly. Reorganized webpages reflect changes within the structure and function of the MRP. Overall, the MRP website has been substantially improved with streamlined content, the addition of new material and links to research projects and regulation information.

**2.) *Nearshore Advisory Committee.*** The Nearshore Advisory Committee (NAC) created in 2006 in direct response to this recommendation. This committee had representatives from fishing and conservation interests as well as the biological and social sciences. The NAC guided implementation actions, acted as an advisory group to MRP and served as a liaison between ODFW and its constituents. The NAC met in 2006 and 2007 to review accomplished actions and promote the formation of local community action teams designed to facilitate implementation. An executive order by the Governor to create a marine reserve network diverted staff resources so further NAC meetings were put on hold. Several advisory groups, such as the razor clam advisory group, the commercial nearshore fishery advisory panel and the marine reserve community teams have developed since 2006. These groups perform some similar functions to the NAC. The MRP may implement a restructured NAC in the future.

**3.) *Media Coverage.*** Materials for communicating with the general public and the media have been steadily improving in both quality and quantity. New materials include identification guides, fishing information and research handouts. Staff-run media events and public meetings have also been increasing. MRP staff attend sportsman shows, state and county fairs and other local outreach events. Staff host many public meetings on policy and management of the nearshore. MRP staff continually respond to requests from media, including local and regional newspapers, online outlets and radio shows. News articles on nearshore marine resources are increasing, and ODFW and MRP are now using social media outlets. By developing a diverse array of new materials utilized at an increasing number of events and public meetings, MRP staff continue to strengthen the quality and quantity of connections with constituents.

**4.) *Communication Partnerships.*** MRP has established new communication partnerships, as well as strengthened collaboration with existing partners. MRP hosted new saltwater angler education events, as well as logbook workshops with commercial fishermen set up specifically for education and outreach. The Marine Reserves Program implemented a new public process through which pilot and proposed marine reserves were developed. Each of the two pilot reserves is supported by a community team comprised in part of a working group specifically designated for outreach and education efforts. Information gathered by community teams informs the public process and allows for successful implementation of Oregon's marine reserves. This partnership has provided a new

model for future planning efforts. MRP has expanded current communication and outreach partnerships and continues to employ innovative means to communicate with its constituents.

**I. EDUCATION AND OUTREACH: *Next Steps.*** Significant improvements to education and outreach efforts were made; however, there are areas for additional improvement. The location of in-season regulation changes could be more prominent on the MRP website and links to additional sources of information outside MRP could be expanded. Systems established for regularly updating information for distinct projects could be expanded to encompass all projects. Dedicated staff would simplify website management protocols. Development of media materials that strengthen and expand understanding of nearshore marine resources is an area of ongoing improvement. In the future, MRP could improve oversight of social media outlets and develop methods for regularly updating these outlets. Partnerships for outreach and education are key to successful management. Efforts will continue to establish and strengthen collaborative relationships.

## **II. RESEARCH AND MONITORING**

**5.) *Nearshore Research and Monitoring Capabilities.*** MRP expanded capabilities to conduct research and to create and maintain monitoring programs. MRP has been working to alleviate staff limitations. The quality of data collected by existing monitoring programs has been enhanced and new research and monitoring activities have been initiated. The development of at-sea capabilities has been a continual focus of the MRP and new methods for conducting research in a challenging nearshore environment were developed. The creation of marine reserves in Oregon's nearshore will provide information that prior methodologies could not. MRP continues to improve and refine capabilities for research programs and monitoring efforts.

**6.) *Assessment/Indicator Strategies for Nearshore Species.*** The MRP is committed to the development of stock assessments or alternative assessment methodologies. MRP provides a wide range of data for stock assessments and participates in the evaluation of many federal stock assessments. The MRP has focused on the development of alternative assessment techniques for data-poor species, a process supported by targeted data collections from many projects and programs in MRP. This research includes exploring different sources of mortality, habitat associations and population information.

**7.) *Nearshore Habitat Research and Monitoring.*** Recent extensive efforts have mapped and characterized approximately 53% of Oregon's territorial sea. The Marine Habitat project is involved with this statewide effort by prioritizing and groundtruthing nearshore areas. The Marine Habitat project collaborates with Oregon State University and National Oceanic and Atmospheric Administration's Hydrographic Surveys Division. A south coast kelp survey was completed in 2010. Other MRP projects collected new information, such as pinniped, groundfish, and shellfish habitat associations and characterization of biological communities in Oregon's marine reserves. The Technical and Data Services Section provided additional data storage capacity for large, spatially based datasets.

**8.) *Marine Mammal-Fisheries Interaction Research and Monitoring.*** The Marine Mammal Program focused on research and the reduction of pinniped conflicts with fisheries. Research includes observations of predation events, analysis of fecal samples and monitoring foraging behaviors of seals and sea lions. Additional efforts include mitigating conflicts between sea lions and the summer sport salmon fishery on the lower Rogue River. Marine Mammal Program staff also participated in two public workshops about the potential for people to be harmed by marine mammals. Other groups at MRP that contribute to this recommendation include the Derelict Gear project by removing derelict fishing gear and the Commercial Dungeness Crab project by providing information on fishing effort.

**9.) *Socioeconomic Research and Monitoring for the Oregon Coast.*** MRP directly sponsored and contributed to several socioeconomic reports and analyses conducted by outside organizations.

Many projects are contributing information and data to socioeconomic reports. Much of the progress made is a result of the creation of the Marine Reserves Program, which houses the Socioeconomic project that focuses solely on socioeconomic research throughout the coast. A draft Human Dimensions Monitoring and Research plan was developed, with assistance from external experts and community team members. MRP has developed extensive socioeconomic information pertinent to the Oregon nearshore environment over the last six years.

**10.) Monitor Nearshore Strategy Action Effectiveness.** In 2008, MRP presented a two-year progress report documenting implementation progress to the Oregon Fish and Wildlife Commission. The Nearshore Resources project documented implementation actions and progress made from 2006 through 2011, identified data gaps and next steps, and provided an overall review of the 16 recommendations. This process also included updating information on Oregon's 53 Oregon Nearshore Strategy Species. This document provides the results of that work as part of a voluntary revision.

**II. RESEARCH AND MONITORING: Next Steps.** Research and monitoring efforts continue to develop and evolve. Multiple projects following up on research between 2006 and 2011 are planned. The implementation of the marine reserves continues to enhance MRP's research and monitoring capabilities. The Marine Habitat project will be involved with the nearshore mapping efforts and will continue with multiple collaborative research projects with other MRP staff. Socioeconomic efforts could be expanded coastwide. In addition to detailing current implementation actions, the MRP will monitor future progress and evaluate the effectiveness of the actions taken.

### **III. MANAGEMENT AND POLICY**

**11.) Native Fish Conservation Policy – Conservation Plans.** To date, no Oregon Nearshore Strategy Species have been reviewed under the auspices of the Native Fish Conservation Policy (NFCP) and no conservation plans have been developed under the NFCP. Many Oregon Nearshore Strategy Species are harvested species that are already managed through other ongoing efforts. Multiple MRP projects have created and contribute to existing and developing management plans. Many projects within MRP collect data and information on Oregon Nearshore Strategy Species that could potentially be used in future plans.

**12.) Commercial Nearshore Fishery Management Plan.** Simultaneous implementation of multiple recommendations was thought to be best handled by the development of a Nearshore Fishery Management Plan (Nearshore FMP). This FMP focuses on commercially and recreationally harvested fish and invertebrate species that MRP is responsible for managing. A draft Framework for the Nearshore FMP was developed and underwent a substantial review process. Groundfish, shellfish, and coastal pelagic species have been identified for inclusion in the Nearshore FMP.

**13.) Recreational Groundfish Fishery Management Review.** The Sport Groundfish and Halibut project continues to improve management of this important fishery through evaluating regulation effectiveness and employing adaptive management strategies. The Sport Groundfish and Halibut project solicits input from a Sport Advisory Committee, created in 2006, on potential management measures. The Sport Groundfish and Halibut project is actively involved with angler education programs because of their reliance on the quality of this data.

**14.) Estuarine Fish and Wildlife Management.** The Shellfish Program significantly increased the capacity for research, monitoring and management of estuarine shellfish. The SEACOR project is now permanent within the Shellfish Program. The Shellfish Program manages multiple recreational and commercial fisheries that occur in estuaries. There is an ongoing effort to identify successful management strategies for these resources and much of their recent research supports the management of these fisheries. The Marine Fisheries Section also developed an outline of an

estuary habitat section that may be fully developed for incorporation into the Oregon Nearshore Strategy component of the Oregon Conservation Strategy during the 10-year revision.

**15.) Shellfish Conservation and Harvest Management Plan(s).** There is an ongoing effort within MRP to identify successful management strategies for shellfish resources. The Shellfish Program is beginning to develop formal management plans for some shellfish fisheries. The commercial abalone fishery was closed and the commercial clam fishery is now regulated under a limited entry permit program. There have been changes in the structure of the Marine Fisheries Section that will improve the management of shellfish resources and MRP will continue to implement management measures as needed.

**16.) Inter-agency Management Coordination.** There has been significant progress made in terms of collaboration and communication between MRP and other agencies and organizations. Many new partnerships have been formed. Existing partnerships and collaborative efforts have been strengthened and partnerships pre-dating this recommendation have continued to mature. The list of partner agencies and organizations is unique to each project or section within MRP and includes a wide suite of federal and state agencies, local government, tribes, and non-governmental organizations.

**III. MANAGEMENT AND POLICY: Next Steps.** The development of the Nearshore FMP continues to evolve. Future work includes development of resource analyses and harvest strategies for individual fisheries. The Sport Groundfish and Halibut project will continue to assess the management needs for the recreational groundfish fishery. Research and monitoring efforts that benefit estuarine species and habitats continue and would support the eventual incorporation of estuaries into the Oregon Nearshore Strategy. The potential effects of invasive species in Oregon's nearshore should be considered in estuarine management. The MRP will continue to promote collaborative efforts in order to sustainably manage and conserve nearshore resources.

**Conclusions:** Implementation of the Oregon Nearshore Strategy has provided task prioritization and focus for MRP staff and resources. The MRP, other state and federal agencies, conservation organizations, industry, academia, and others with an interest in Oregon's nearshore have been actively promoting and using the Oregon Nearshore Strategy as a resource in marine resource conservation, management and policy processes. There are still considerable roadblocks impeding the full implementation of the recommendations and MRP will require further commitments in staff and funding. The progress detailed in this document will allow staff to prioritize efforts over the next four years and will provide a basis for the upcoming 10-year revision to the Oregon Conservation Strategy and its marine component, the Oregon Nearshore Strategy.

## INTRODUCTION

The Oregon Nearshore Strategy is the marine component of the Oregon Conservation Strategy. Since the adoption of the Oregon Nearshore Strategy in December 2005, the Oregon Department of Fish and Wildlife's (ODFW) Marine Resources Program (MRP) staff have been working to implement the 16 recommendations presented in the Oregon Nearshore Strategy. These recommendations fall into three categories: education and outreach, research and monitoring, and management and policy. Detailed discussions of each recommendation can be found in Chapter VI of the [Oregon Nearshore Strategy](#). Since January 2006, significant progress has been made implementing each of the recommended actions. Members of the Nearshore Resources team met with MRP project and program leaders to discuss the progress made on each recommendation. The results are detailed below. Additional steps for future implementation efforts are also identified.

### Participating Projects & Programs<sup>1</sup>:

- MARINE RESOURCES PROGRAM
  - Marine Fisheries Section
    - State Fishery Management Program
      - Nearshore Resources Project
      - Commercial Dungeness Crab Project
      - Coastal Pelagic Species Project
      - Sport At-Sea / Biological Sampling Project
      - Black Rockfish Passive Integrated Transponder Tag Project
    - Commercial Groundfish Project
    - Sport Groundfish and Halibut Project
    - Marine Fisheries Analyst
  - Resource Assessment and Management Section
    - Shrimp and Research Project
    - Marine Habitat Project
    - Marine Reserves Program
      - Socioeconomic Project
    - Marine Mammal Program
    - Shellfish Program
      - Shellfish and Estuarine Assessment of Coastal Oregon Project
  - Technical and Data Services Section
    - Field Operations – Finfish
    - Ocean Recreational Boat Survey
  - Derelict Gear Project
  - Policy Project
  - Public Information Officer

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<sup>1</sup> Please note that this is not a comprehensive list of all projects and programs within the MRP. Only participating projects/programs are listed.

## **I. EDUCATION AND OUTREACH**

### **1.) Marine Resources Program Website.**

*Improving the appearance, visibility and effectiveness of the MRP website by expanding opportunities for disseminating information to the public: increase educational materials; provide information on MRP research projects; post upcoming or in-season changes to state regulations; and provide clear links to related information such as federal regulations.*

Summary of Progress:

Since early 2006, the MRP has significantly improved the content, design, and overall usability of the MRP website. The MRP website is more prominently featured on the main ODFW website, only two clicks away from the homepage. A MRP website committee was created in 2008 to improve the content of the MRP website. There is now a “Projects” page that provides easy access to many of the activities overseen by MRP staff. A great deal of new information is posted online, including fish and shellfish identification, commercial and recreational fishery information, regulations and ongoing research efforts. Monthly statistics are now collected to provide information on the effectiveness of the MRP website. In 2011, ODFW completed a “re-design” of its entire website, including the MRP website, to improve its appearance and effectiveness.

Several additions and updates to the website provide information about MRP research and how the results are used. Notably, the Shellfish Program webpages have significantly expanded. New webpages for the Shellfish and Estuarine Assessment of Coastal Oregon (SEACOR) project’s ongoing research detail the results from recent work in Coos and Tillamook bays (2008-2011) and include interactive maps. Publications that resulted from these research seasons are also posted. The Shellfish Program developed a system to update its webpages, which now include commercial and recreational shellfish fisheries information. The Marine Mammal project’s webpage was created in 2005, and significantly updated in 2008 and 2010 to include recent research, reports and publications. The Marine Habitat project updated its mission statement, goals, and summary statements on its webpage. Reports describing the project’s research efforts from 2006 through 2011 have been added. The Shrimp and Research project (Research Project) routinely posts new publications, and since 2006, has posted two informational reports and nine peer-reviewed publications. The Black Rockfish Passive Integrated Transponder (PIT) tagging project, ongoing since 2002, created a new webpage that includes information on the project, its results and how the project has been used to inform management. This webpage also provides links to information on other common nearshore fish. Finally, ODFW developed a system to upload and view videos on its website through You-Tube. Videos posted to date include underwater research footage showing bycatch reduction devices in action, rockfish being released after being lowered to depth in a recompression cage. There is also underwater footage of nearshore habitat and species collected with remotely operated vehicle (ROV) by the Marine Habitat project and Marine Reserves Program during research operations. A video about the Black Rockfish PIT tag project is in production and will be added soon.

In addition to research and project information, MRP staff routinely post changes to commercial and recreational regulations online. The Sport Groundfish and Halibut project staff regularly update and clarify regulation language online, mainly in response to public inquiries. The Shellfish Program quickly posts seasonal shellfish closures. Both the Coastal Pelagic Species and Nearshore Resources projects update the MRP website to reflect in-season changes and closures. Overall, the MRP has been very consistent about quickly posting upcoming or in-season commercial and recreational regulation changes. Clear links related to federal management processes and commercial fisheries regulations are also now provided on the Groundfish, Halibut and Coastal Pelagic Species webpages.

Online information dissemination has become an increasingly collaborative effort with outside agencies and entities. The new webpage for the Marine Reserves Program is located on the Oregon Ocean Information website. This website has information on other topics, including marine spatial planning, seafloor mapping efforts, and the Oregon Territorial Sea Plan (TSP). There are links to this website on the MRP website. The Marine Reserves Program directly manages the content of its section of the Oregon Ocean Information website. The content will reflect the change in focus of the program, from the development to the implementation of the marine reserves. The Marine Reserves Program consistently uses its webpage as a major outreach tool; however, they also utilize other outreach tools to provide opportunity for public comment. When Oregon's marine reserve regulations took effect in January 2012, the Marine Reserves Program posted regulation information on their section of the Oregon Ocean Information website and on the MRP website.

In addition to the Oregon Ocean Information website, MRP worked collaboratively with the Oregon Department of Land Conservation and Development (DLCD) and others to develop the Oregon Marine Map website. Oregon Marine Map is a publically accessible interactive mapping website containing numerous marine biological, oceanographic and socioeconomic data layers. MRP contributed funding and oversight for website development, and provided most of the biological data. The state's TSP planning process provided the impetus for original site development; however, the site will provide a decision support tool for any future marine spatially-dependent management process off of Oregon. The site will be continually updated and expanded over time, and much of the data will be downloadable from the Oregon Ocean Information website.

Overall, the MRP website has been substantially improved. The additional material, links to publications, research projects and regulation information provides extensive new information to user groups. Systems for regularly updating this information have been established. Webpages have been reorganized to improve their appearance and provide easier access to information. These website changes also reflect changes in the structure and function of MRP projects and programs.

#### Next Steps:

MRP staff continue to implement changes and develop plans for the website. The use of videos opens a new avenue to provide the public with a look at the underwater world off Oregon's coast and a better understanding of the MRP. The Marine Mammal project is investigating a live tracking system for its tagged animals as an additional educational component to its webpage. Although in-season fishery regulation changes are updated continually, these changes could be more prominently featured. The systems established for regularly updating web content by some projects could be adapted for use by others. Providing links to websites with additional relevant information is an area of ongoing improvement. The MRP website committee will continue to discuss and implement large scale changes to MRP's website. Additional staff dedicated to website management is a possible mechanism to continue to improve the quality of the MRP website.

#### **2.) Nearshore Advisory Committee.**

*Form a nearshore advisory committee to provide advice on, and assistance with, implementing the Oregon Nearshore Strategy, and to conduct regular reviews and updates*

#### Summary of Progress:

The NAC was created in 2006 as a direct response to this recommendation. This committee consisted of 10 representatives of fishing and conservation interests as well as the biological and social sciences. The NAC helped to prioritize the implementation actions recommended by the Oregon Nearshore Strategy, served as an advisory group to the MRP and as a liaison between ODFW and its constituents. Their meetings were open to the public, and meeting notes were posted online on the Oregon Nearshore Strategy webpage. During these meetings, NAC members provided

formal and informal reviews of implementation actions, prioritized implementation recommendations and promoted the formation of community teams that facilitate Oregon Nearshore Strategy implementation at the local level. The NAC met twice in late 2006 and once in 2007. Executive decisions made by the Governor in 2008 assigned marine reserves planning responsibilities to ODFW, diverting limited ODFW nearshore staff resources to that process.

A number of new advisory groups have developed since the adoption of the Oregon Nearshore Strategy. These groups perform some similar functions to the NAC; however, each of these groups focuses on more specific topics and issues rather than the larger integrated view of Oregon's nearshore resources envisioned for the NAC. The Sport Advisory Committee (SAC) was created in 2006, the Razor Clam advisory group in late 2005, and the Nearshore Commercial Fishery Advisory Panel was created in 2009. These advisory groups provide industry feedback on management issues and connect MRP with its constituents. In 2010, multiple community action teams were created as a part of the public process for planning and implementation of marine reserve sites. Two community teams, totaling 25 volunteers, assisted ODFW with the implementation of Oregon's first two pilot marine reserves. Three additional teams, with 96 volunteers, participated in developing recommendations for three new marine reserve sites. Community team members were charged with information exchange between their constituents and the Marine Reserves Program.

MRP is participating in other efforts to evaluate nearshore resource management and conservation needs through an integrated, coastwide approach. For example, MRP is participating in a federal marine spatial planning effort. MRP provides ODFW's representative on the Bureau of Ocean Energy Management (BOEM) Oregon Outer Continental Shelf Renewable Energy Task Force. Also, a Nearshore Taskforce created by the Oregon legislature in 2010 and was asked to recommend a long-term funding and coordination strategy for management of Oregon's nearshore resources. MRP staff participated in this effort and contributed to the August 2010 final report. This report outlined six interrelated recommendations to provide mechanism to strengthen science-based decision making regarding Oregon's nearshore ocean resources.

#### Next Steps:

Since April 2007, subsequent NAC meetings have been postponed due to a reorganization of staff resources away from a direct focus on Oregon Nearshore Strategy implementation. The MRP may reconstitute this committee in the future, pending resolution of budgetary and staffing issues. The functions and structure of the NAC may need to be updated given the development of additional advisory bodies. MRP staff from multiple programs and projects are participating in ongoing discussions regarding the potential re-formation of this committee. The MRP plans to continue with other advisory groups while the issues surrounding the NAC are resolved. The Shellfish Program plans to reform a general advisory group to provide shellfish-specific advice and information. Other advisory groups meet on an ongoing basis, continuing to provide a mechanism for communication between the MRP and user groups.

### **3.) Media Coverage.**

*Increase and expand development of materials supporting media coverage of nearshore marine resource topics*

#### Summary of Progress:

Materials for dissemination to the public and the media have been steadily improving in both quality and quantity. In 2009, the Shellfish Program developed brochures for the recreational crab and clam fisheries. The SEACOR project developed brochures for each of its main research sites, Coos and Tillamook bays, which include project information and results. The SEACOR project and the South Coast Shellfish Biologist created "traveling materials", such as bulletin boards, display

boxes and other hands-on activities for use at public outreach events. In 2005 and 2006, the Coastal Viewing Report and the Marine Fishing Reports were created by MRP staff to keep the general public aware of current events and fishing opportunities on the coast. These recreation reports are updated weekly, posted on the ODFW website and used by the media as an information source. The recreation reports are sent to more than 18,000 subscribers via e-mail and over 200 media outlets statewide. The recreation report webpage receives more than half a million visits per year. In 2010, MRP's Public Information Officer copied VHS videos teaching about Oregon estuaries onto DVD and developed teaching guides to be distributed with the new DVDs.

The Derelict Gear project, in cooperation with the Hatfield Marine Science Visitor Center, created a permanent display on derelict fishing gear located at the visitor center. The Marine Habitat project developed stock video of ROV footage to provide to the media. The Black Rockfish PIT tagging project produced a how-to-tag documentary that details the tagging process for prospective volunteer fishermen, which can be found on their new webpage. Finally, the Marine Fisheries Section developed identification guides for groundfish species, including the "Red Rockfish Identification Guide" card, all of which are available online. The Ocean Recreational Boat Survey (ORBS) uses this guide in cooperation with the Oregon Coalition for the Education of Anglers (OCEAN) to educate anglers on species identification.



*ODFW employee describing groundfish identification to a member of the public. Photo: ODFW.*

Staff-run media events and public meetings have also increased in frequency. MRP staff attend sportsman shows, state and county fairs, and other local events such as Seafest (2006 -2009; Newport) or the Salty Dog convention (2006-2011; Newport, Salem, and Seaside). The Commercial Dungeness Crab project hosted "Crab Summits", held every other year (2005 – 2011). At these summits, different user groups attempt to reconcile some of the larger issues within the ocean Dungeness crab fishery. The Sport Groundfish and Halibut project staff hosted "open houses" to answer management and regulation questions, teach fish and shellfish identification and demonstrate proper release techniques for rockfishes. The Marine Reserves Program hosted many public meetings as part of the planning and implementation process for marine reserves. The Marine Reserves Program will continue to disseminate information about the reserves, including research findings, to the public and the media.

MRP staff continually respond to requests from media outlets of various types. These include local and regional newspapers, online media outlets, and radio shows. Marine Mammal project staff respond to many requests regarding sea lion predation on salmon at Bonneville Dam and Willamette Falls. The Marine Reserves Program uses frequent press releases for both public meetings and regulations. They also use a listserv, with over 600 subscribers, to disseminate information to a more targeted audience. All staff of the Marine Fisheries Section frequently respond to media requests for information and insight into nearshore issues and management.

The number of news articles related to nearshore marine resources is increasing. In 2006, the "ODFW in the News" publications list was created by the agency's Information and Education Division (outside the MRP). This weekly publication centralized staff access to all media regarding ODFW activities and staff, including those at the MRP. There are two new ways the Information and Education Division tracks media coverage. First, in the early 2000s, a clipping service began to be

used (when ODFW is mentioned, they will clip out the article). Second, beginning in 2006, a Google search is performed multiple times a week, with “ODFW” as a key search term. The MRP Public Information Officer regularly contributes to these reports. ODFW and MRP are now using social media outlets, such as Twitter and Facebook, to increase information exposure.

In summary, the MRP developed a substantial amount of new materials for disseminating information to the general public and the media. These materials are used at an increasing number of events and public meetings, better connecting MRP staff and their constituents.

#### Next Steps:

Development of media materials that strengthen and expand a common understanding of nearshore marine resource topics is an area of ongoing improvement. The MRP Public Information Officer, working with Information and Education Division staff, is planning a blog to post information on regulations and responses to inquiries from the public. A system needs to be developed to update social media outlets easily and quickly in a consistent manner. The MRP would like to develop outreach materials for the major commercial and recreational fisheries if adequate funding can be found. Once these materials are developed, they can more easily be updated by existing MRP staff.

#### **4.) Communication Partnerships.**

*Develop new and expand existing partnerships for communication, education and outreach on nearshore topics and issues; work with partners to develop new mechanism for information dissemination.*

#### Summary of Progress:

MRP staff have established new communication partnerships and strengthened existing collaborations. On-going partnerships include the Oregon Department of Agriculture (ODA), DLCD, Oregon Department of State Lands (DSL), Oregon Institute of Marine Biology, the South Slough National Estuarine Research Reserve (SSNERR), the United States Fish and Wildlife Service (USFWS), Oregon Sea Grant (OSG), and Oregon State University (OSU). Some new partnerships are with the Port Orford Ocean Resources Team (POORT), the Oregon Coastal Data Group (OCDG), the National Wildlife Refuge System (NWRS), the Oregon State Marine Board (OSMB), OCEAN and the Coastal Conservation Alliance (CCA). The POORT signed a Memorandum of Understanding (MOU) with the MRP in 2008. The OCDG created a clearinghouse for all estuarine datasets collected by various agencies and private research in 2011. The NWRS collaborated with the MRP on joint survey efforts in Oregon estuarine wildlife refuges. The OSMB assisted the MRP with the collection of socioeconomic and participation information for saltwater fishing. Together, the MRP, OCEAN and the CCA assembled to create additional outreach materials and events. Wherever possible, these projects attempt to maximize public access to their research and materials. An increasing number of projects are using the internet and the ODFW website as a clearinghouse for information.

In addition to forming new partnerships, MRP staff are creating new mechanisms to connect directly with the public. The MRP’s Public Information Officer, along with other MRP staff, participated at Seafest in 2005 – 2007, and 2009. More than 16,000 people attending these events had the opportunity to see ODFW’s ROVs and the underwater video taken off our coast. Staff also answered questions about the live marine animals on display, demonstrated proper use of devices for fishermen to bring fish back down to depth for release when fishing, and distributed handouts. MRP staff developed new saltwater angler education events during the last several years. In 2009, the MRP hosted these events in Brookings, Newport and Depoe Bay and in 2010, at Gold Beach and Tillamook. These events included fish and shellfish identification, release techniques for



*The Shellfish Program developed traveling materials for outreach events, such as this new touch tank. Photo: Brandon Ford.*

salmon and rockfish (specifically, yelloweye and canary rockfishes) and distribution of informational handouts. At some events, fish identification challenges were conducted to match pictures of several rockfish species with live or dead specimens. The MRP hosted three logbook workshops (2006-2010) with commercial nearshore groundfish fishermen specifically for educational and outreach purposes. These workshops informed fishermen on how the MRP uses logbook data so logbooks can be completed more effectively. At a workshop in 2006, both nearshore commercial and recreational fishermen were invited to learn about the federal stock

assessment process and provide information to the assessor for the 2007 black rockfish assessment. This meeting was beneficial for all parties and improved relations between commercial and recreational fishermen. All of these events are indicative of the expansion of outreach mechanisms at the MRP.

Beginning in 2009, the Marine Reserves Program implemented a large-scale public process through which development of recommendations for new marine reserve sites was accomplished. Twenty-five volunteers participate on two community teams for the two pilot marine reserve sites. The community team for each of these two marine reserves also established working groups specifically for outreach and education efforts. These volunteers represented eight different interest groups and were charged with exchanging information between the MRP and constituents. The Marine Reserves Program also worked with 96 volunteers that participated in three community teams for three new marine reserve sites following the establishment of the pilot sites. Although not always possible, the Marine Reserves Program actively sought people with local connections to participate in these teams. These community teams provide the basis for the successful continued implementation of Oregon's marine reserves and provide a new model for future nearshore outreach efforts.

MRP has continued to expand current communication and outreach partnerships. At the same time, the MRP continues to employ innovative mechanisms to connect with the public and other agencies and entities involved with nearshore issues. These efforts will contribute to the long-term successful management of the nearshore by increasing constituent involvement and awareness.

#### Next Steps:

The MRP believes that education and outreach partnerships are key to a successful management system and will continue efforts to expand and strengthen these partnerships.

## **II. RESEARCH AND MONITORING**

### ***5.) Nearshore Research and Monitoring Capabilities.***

*Improve and expand the capabilities of research and monitoring programs for nearshore living marine resources using the Strategy Species and Watch list species to prioritize efforts; collaborate with agencies, universities, fishing industry, and the public to meet this need.*

Summary of Progress:

The MRP is consistently improving and expanding the capabilities of its research and monitoring programs. Two long-term fisheries monitoring programs, ORBS for recreational harvest sampling and the commercial finfish harvest sampling project, continued to be refined. The Shellfish Program developed novel or continued existing recreational harvest surveys, including bay clams, razor clams, and ocean and estuary crab. The Shellfish Program continued to monitor the commercial shellfish fisheries, including the urchin, flat abalone, crab, bay clam and spot prawn fisheries. The SEACOR project finished its shellfish assessments and research in Tillamook Bay in 2011. Results from this project will be used to inform shellfish stock assessments. The Marine Mammal project continued monitoring programs and initiated research projects. One new research project uses cutting-edge technology to study behavior of California and Steller sea lions with tags that provide information on depth, water temperature, and GPS determined locations via cell phone connections.

There are several new programs that expand MRP's research and monitoring capabilities. For example, in 2006, ODFW, in collaboration with OSU, University of Oregon, and National Oceanic and Atmospheric Administration (NOAA) Fisheries, developed an integrated harmful algal bloom monitoring and event response program. This new program, Monitoring Oregon's Coastal Harmful Algae, has been collecting data since 2007. ODFW staff, in conjunction with ODA, monitor 10 sites along the Oregon coast for any potential signs of the phytoplankton that cause domoic acid or paralytic shellfish poisoning. The SEACOR project was made a permanent part of the Shellfish Program in early 2010, which greatly increases the long-term ability to conduct research. In 2009, a Marine Reserves Program was established to develop and evaluate a limited-system of marine reserve sites that will enhance the ability to conduct research and monitor changes over time.

The development of at-sea research and monitoring capabilities has been a continual focus of the MRP. These capabilities depend on access to suitable vessel platforms, which may be either contracted or owned by ODFW. For many applications, vessel ownership is the most cost-effective strategy long-term and MRP has pursued this approach when feasible. The MRP acquired a new boat specifically for use on the south coast, greatly increasing the capacity to conduct research off southern Oregon. Transporting boats to and from Newport often led to missed sampling opportunities because of the typically short weather windows in Oregon. The acquisition of this south coast-based vessel has freed up vessels for other research projects. The SEACOR project



*One of two new MRP boats in action in Tillamook Bay with the SEACOR project. Photo: ODFW.*

also acquired a new boat in 2011. It is a custom Koffler boat built specifically for this project's research activities. This is now their primary research vessel for estuarine and bay intertidal habitat and shellfish surveys.

Improvements in the quality of data collected by fishery monitoring programs have expanded research and monitoring capabilities. Species sorting requirements for commercial landings continue to be refined. In 2008 the MRP published a diagram to help explain changes that have occurred over the past several decades in multi-species category groupings; this assists users of historic species catch composition data interpret fishery landing data correctly. Port samplers frequently share their expertise in identifying species that may be difficult to distinguish with fish plant personnel responsible for sorting. The ORBS is continually adding species to their sampling protocol, including Oregon Nearshore Strategy Species such as market squid and giant octopus. Managers at the MRP are also working with federal scientists and managers to continually improve bycatch models for non-target species. For example, the bycatch model for the nearshore commercial groundfish fishery was created in mid-2005, and has since been updated and improved multiple times. Additional ORBS and commercial samplers have been added during the winter season to more completely assess effort and catches throughout the year. The Technical and Data Services Section at MRP continues to promote electronic data management to streamline data processing and analysis.

Oregon Nearshore Strategy and Watch List Species have provided focus for research and monitoring efforts within the MRP. The Research project developed a caging system equipped with a video camera to study the behavior of rockfish with barotrauma (pressure-related injuries) after



*The Research project's video lander at work in the Red Fish Rocks marine reserve on the south Oregon coast. Photo: ODFW.*

being brought back to depth of capture and released. This caging system allows the Research project to estimate 48-hour post-discard survival of rockfishes as a function of depth of capture. The Research project completed studies of rockfish movement using acoustic telemetry and tagging technology at two reef complexes (Cape Perpetua and Siletz Reef). The Research project also developed a "video lander", an upright frame with a video camera on top, complete with lights, a battery pack, and a

digital video camera. The video lander is being evaluated as a tool for monitoring and surveying in high relief rocky habitat. Marine Habitat project personnel conducted an aerial survey of canopy-forming kelp forests off Oregon's south coast using an advanced digital image acquisition system. These kelp forests are primarily made up of bull kelp which is a Strategy Species. This survey was performed to update information from the 1990s on the distribution and abundance of kelp forests.

The Marine Habitat project's research and monitoring efforts relied heavily upon ODFW's ROV as its primary tool for research, monitoring, and assessment efforts. The ROV has been used to monitor the ecological effects of hypoxia (very low dissolved oxygen levels) on the rocky reef biological communities off Cape Perpetua. This work is now being done in collaboration with OSU to collect oceanographic data in conjunction with the visual surveys. Since 2005, the ROV was used to survey Nehalem Bank, Stonewall Bank, Redfish Rocks, Orford Reef, Humbug Reef, Cape Perpetua, Siletz Reef, and Cape Foulweather. The Marine Habitat project continues to develop fishery independent survey methods to assess and monitor fish and invertebrate species associated with nearshore rocky reefs which are difficult to survey with traditional trawl survey techniques. Significant improvements have been made to the ROV system, including a more precise tracking system and an upgrade to high-definition video.



*Two wolf eels seen by the ROV on a nearshore rocky reef. Photo: ODFW.*

The Marine Fisheries Section and ORBS continued to improve sampling in the sport groundfish fishery. In 2011, the federal Marine Recreational Information Program funded ORBS to augment port sampling throughout the year, which directly improved the quantity and quality of recreational fishing data. Over-winter sampling is being conducted during the 2011-12 winter to provide a full year picture of recreational groundfish activities. This full year sampling is being conducted in all ports with the potential for groundfish activity including: Garibaldi, Pacific City, Depoe Bay, Newport, Charleston, Bandon, Port Orford, Gold Beach, and Brookings. ORBS also began implementing video boat counts in 2008. Currently, ORBS is using the video boat count systems at five ocean entrances (Newport, Winchester Bay, Charleston, Gold Beach, and Brookings) and is exploring using the technology in two other locations (Columbia River and Garibaldi). While there are limitations to this technology, there are also advantages. The video system can collect information over longer time periods, reducing possible biases of the effort estimates. It allows staff to spend more time sampling at the docks, as opposed to conducting the counts manually. ORBS is continuing to collect information on length and weight of fish caught, major reef fishing locations and released species. In 2009, sampling protocol was modified to collect approximate fishing depths when prohibited species are released. This new information allowed the Marine Fisheries Section to update the depth-based mortality models for overfished species.

The limited-system of marine reserves established in Oregon's nearshore waters expands the capabilities of ODFW's ongoing research and monitoring efforts. Marine reserves monitoring will provide information that the MRP's current methodologies are unable to provide, such as the age structure of an unfished population or trophic interactions in the absence of fishing. After a process that began in 2000, two pilot reserves, the Redfish Rocks Marine Reserve and the Otter Rock Marine

Reserve, were established by the Oregon Legislature in 2009. The ODFW Marine Reserves Program developed two dedicated monitoring programs, ecological and human dimensions. These new monitoring efforts collect information to evaluate the effects of the marine reserve sites over time and also contribute insight for the management of nearshore resources in general. The Marine Reserves Program developed a suite of tools and survey techniques used to conduct ecological baseline surveys at the two pilot reserves in 2010 and 2011, prior to harvest restrictions taking effect in January 2012. For example, the Marine Habitat project and Marine Reserves Program collaborated to conduct a baseline ecological characterization of deeper rocky reefs in the Redfish Rocks Marine Reserve and associated comparison areas with the ROV. Baseline information will be compared to future surveys following the closures to measure and evaluate progress towards reserve and protected area objectives. The Marine Reserves Program continues to refine and improve upon these designs for work specific to the marine reserve sites, and plan for the implementation of three additional marine reserves at Cape Falcon, Cascade Head, and Cape Perpetua.

MRP developed the Nearshore Ecological Data Atlas (NEDA) in response to a need to assemble marine ecological spatial data as part of the state's TSP planning process. NEDA consists of marine biological, habitat, and oceanographic spatial data collected from internal and outside sources such as NOAA, OSU, USFWS, and many others. Examples of datasets include OSU's seafloor habitat maps, seabird data from 20 years of nearshore surveys, seabird nesting colonies and pinniped haulouts, modeled fish distribution data, and upwelling intensity. NEDA also includes analytical products such as modeling results that identify important nearshore ecological areas. The Oregon Marine Map website (described in Recommendation 1) displays many of the NEDA data layers. The NEDA will be updated and expanded over time.

Availability of staff is often a limiting factor in the capacity of a program to conduct research and run monitoring programs. MRP has been actively working to reduce this bottleneck and a number of recent staff changes have increased research and monitoring capabilities. The Shellfish Program added a permanent program leader position. There are two new full-time staff at MRP that enter and compile logbook data from various fisheries. Other new positions, such as the Marine Fisheries Analyst, the Ocean Energy Coordinator, and the Commercial Dungeness Crab Project Leader, have expanded staff availability. Additionally, several assistant project leader positions have been filled, increasing each section's capacity for successful monitoring and research programs.

As MRP personnel and projects expand, new office and lab space is required. The Marine Reserves Program, the SEACOR project and the Marine Habitat project expanded into a new building in Newport. The SEACOR project also currently has an agreement with the US Environmental Protection Agency (EPA) Pacific Coastal Ecology Branch in Newport for additional laboratory space.

In summary, the MRP continues to improve, add, and refine capabilities for research programs and monitoring efforts. These programs are designed to gather the information needed to manage Oregon's nearshore living marine resources.

#### Next Steps:

While significant improvements have been made in MRP's capabilities, there are additional improvements anticipated. MRP staff are working to re-implement the Shore and Estuary Boat Survey, created to fill in data gaps associated with shore and estuary angling. The Shellfish Program plans to expand their recreational crab and clam harvest surveys to additional locations. Preliminary surveys have been conducted in Coquille, Umpqua, Siuslaw and Nehalem bays, though data collection is not yet sufficient to confidently estimate total catch or effort. Expansion of these surveys will be pursued as staffing allows. The SEACOR project plans to work in Yaquina Bay in 2012 and Netarts Bay in 2013. They also plan to amend existing large-scale assessments to

emphasize specific and targeted research questions. The data and information collected during these studies will be useful for incorporating estuaries as a nearshore habitat during the 10-year revision of the Oregon Nearshore Strategy.

There are multiple projects planned that will follow-up on research that began between 2006 and 2011. The Research project is continuing efforts to survey the abundances of nearshore rocky reef fishes with their video lander system. The Research project is also working on a high definition video camera version of their lander to improve species identification and have ordered new equipment for surveys with low water visibility. The Marine Habitat project is upgrading the ROV to include a downward-facing high-definition video camera for fine-scale habitat and invertebrate identification, as well as adding still photo capability to this and the primary forward-facing video camera. The development and implementation of the state marine reserves will continue to enhance MRP's research and monitoring capabilities in the future. The Marine Reserves Program will begin ecological and human dimensions monitoring at the three new marine reserves starting in 2012. They will also have routine reviews of their monitoring program so they can modify their sampling plans based on the feedback from those reviews.

### **6.) Assessment/Indicator Strategies for Nearshore Species.**

*Develop stock assessment and/or stock assessment indicator strategies for priority nearshore groundfish and shellfish species*

Summary of Progress:

The MRP is committed to the development and promotion of stock assessments or alternative stock assessment methodologies as a tool for sustainable management of Oregon's nearshore resources. For example, the Shellfish Program completes annual assessments for razor clams on the Clatsop county beaches. They also developed an index of abundance of sea urchins at Port Orford reef on



*An ODFW employee inserting a PIT tag into a black rockfish at sea. Results from this ODFW project were used in the 2007 federal black rockfish stock assessment. Photo: ODFW.*

the south coast that can be evaluated over time. The Marine Fisheries Section is involved with the federal stock assessment process, and played a large role in the completion of the black rockfish assessment in 2007, and the lingcod and cabezon assessments in 2009. MRP staff provide a wide range of data for federal stock assessments, participate in the evaluation of many assessments, and are partially responsible for implementing the results. MRP staff also regularly contribute to federal Stock Assessment and Review panels.

A new marine fisheries analyst position, intended to focus on the development of alternative stock assessment techniques for data-poor species, began at MRP in 2008. Staff from the Marine Fisheries Section and the Commercial Dungeness Crab project continues to develop stock condition indicators as a part of that fishery's Marine Stewardship Council (MSC) sustainability certification process. The Marine Mammal project also contributes information from long-term monitoring projects for federally mandated annual pinniped stock assessments.



*Harbor seals hauled out on a sandbar in Alsea Bay. The Marine Mammal project contributes information on pinnipeds to federal stock assessments. Photo: ODFW.*

Many aspects of MRP's work support resource assessments through targeted data collections. The Marine Habitat project developed methods to estimate abundance of fishery target species and to characterize invertebrates on rocky reefs through ROV surveys in nearshore waters. The Shellfish Program's surveys provide indications of relative population sizes for integration into assessments. The SEACOR project is collecting species and habitat-specific information intended for use in future shellfish assessments. Within the Field Operations - Finfish project, the Brookings Port Biologist is conducting an ongoing south coast kelp greenling research project. This is a cooperative project with south coast fishermen collecting specimens for age and growth on this commercially and recreationally important nearshore species. The Research projects' studies have focused on rockfishes, especially on collecting information on abundance indices, discard mortality, and ecology/life history information. Between 2006 and 2011, the Research project worked to improve understanding of discard mortality in multiple rockfish species. Their research has shown that discard mortality as a result of barotrauma differs by species, and that management measures to reduce discard mortality must be tailored accordingly. The Research project is collecting age and maturity information on nearshore species, which can be directly utilized in stock assessments. MRP staff published several reports between 2006 and 2011 regarding maturity in cabezon, yelloweye rockfish, quillback rockfish, and china rockfish. Maturity data collections have also been initiated for kelp greenling and several rockfish species.

#### Next Steps:

The Shellfish Program is planning a flat abalone assessment. A native oyster monitoring and assessment program is also under development. The Marine Fisheries Section is currently developing a Nearshore Fisheries Management Plan (Nearshore FMP) that will outline priorities for stock assessments among the nearshore fishes and assist with the development of alternative assessment techniques for species with very little information. While many projects at the MRP work to contribute information and data to stock assessments, progress on alternative stock assessment techniques for data-poor and cryptic species will remain a future focus. Indicators of stock and habitat status are also being developed through the SEACOR and Marine Habitat projects. Data collected by the Marine Reserves Program within the state marine reserves may inform future stock assessments by providing information on unfished populations.

## 7.) Nearshore Habitat Research and Monitoring.

*Map and characterize nearshore rocky reefs and determine species-habitat associations. Use the information to improve stock assessments and provide information for management.*

Summary of Progress:

Prior to the beginning of recent mapping efforts in 2009, only ~ 6% of Oregon's territorial sea, which encompasses the majority of the nearshore, had been mapped using high-resolution sonar technologies (e.g. multibeam bathymetry/backscatter and sidescan sonar). As of the summer of 2011, approximately 53% of Oregon's territorial sea had been mapped. The Marine Habitat project has been involved with this statewide mapping effort by prioritizing areas to be mapped and



*ODFW ROV being deployed. The ROV provides a way to survey species abundance, habitat characteristics and species-habitat associations. Photo: ODFW*

groundtruthing some of the rocky reef maps. These data represent a dramatic improvement in the knowledge of seafloor habitats in the nearshore and will have significant applications to management. The Marine Habitat project collaborated on this large-scale project with OSU and NOAA's Hydrographic Surveys Division. In 2008, the Marine Habitat project, in the process of groundtruthing United States Geological Survey's (USGS) bathymetry data, discovered the largest

known sand dollar bed in Oregon (~3 kilometers<sup>2</sup>). New seafloor mapping data indicate that these beds may be prevalent throughout nearshore sandy habitats off northern Oregon. Comprehensive map products from this work will be completed and available to the public in 2012.

Separately, the Marine Habitat project has characterized the biota occurring on multiple nearshore rocky reefs, such as Cape Foulweather, Otter Rock, Redfish Rocks, and Siletz Reef. These efforts have been in collaboration with the Marine Reserves Program at MRP, the USGS, and the Active Tectonics and Seafloor Mapping Lab at OSU. The Marine Reserves Program worked directly with this lab to develop seafloor profiles for the pilot and proposed marine reserves. The Marine Reserves Program also worked with the Marine Habitat project to use ROV surveys to assess habitat characteristics for these locations. The Marine Reserves Program has been groundtruthing these habitat assessments with visual surveys, which include SCUBA, ROV, and video lander surveys. These surveys also collect information on species-habitat associations. All habitat types are included in the assessments and will provide information on less studied habitats in the Oregon nearshore, such as unconsolidated sediment/soft bottom habitats.

The SEACOR project mapped and assessed species-habitat associations in Coos (2008-2009) and Tillamook bays (2010-2011). They plan to eventually visit all 19 of Oregon's major estuaries to collect similar information. SEACOR has also digitized all of the habitat distribution information

from ODFW-OSU surveys conducted in the 1970s. This will assist with long term efforts to develop spatial analyses and predictive capabilities for shellfish resources within Oregon's estuaries.

In 2006, the Marine Habitat project collaborated with the Research project on work at Nehalem Banks, which provided information on trawl impacts to soft bottom habitats. The Marine Habitat project conducted an aerial survey of canopy-forming kelp forests occurring offshore of Oregon's south coast using an advanced digital multispectral image acquisition system. This survey provides information on the distribution and abundance of kelp forests, which are important ecologically and highly variable over time. In collaboration with OSU, Marine Habitat project personnel annually monitor the rocky reef biological communities responding to hypoxia at Cape Perpetua, off of Oregon's central coast. The Marine Habitat project has collected and analyzed data from surveys designed to examine



*The Marine Habitat project conducted a survey of south coast kelp beds in 2010. Photo: ODFW.*

the ecological consequences of the nearshore hypoxia phenomenon. Hypoxia can affect habitat suitability for marine organisms, primarily invertebrates that provide biogenic structure and are unable to escape the low oxygen conditions. In 2010, these surveys were expanded to Yaquina Head and Siletz Reef in order to improve the study by adding scientific control sites.

The Marine Mammal project develops habitat association information for pinnipeds from aerial surveys and telemetry data. The majority of this information is contained in spatially explicit databases, which allows for more efficient mapping and spatial analysis. The Marine Mammal project also provides this information to other agencies, such as the United States Army Corps of Engineers (USACOE), to assist with reducing conflicts between development projects and marine mammals. The Technical and Data Services Section assists with all these efforts by providing additional data storage capacity for large, spatially based datasets.

Significant progress has been made in habitat research and monitoring. The information gathered by extensive mapping efforts and species-habitat association work accomplished in Oregon's nearshore waters and estuaries are available for use in stock assessments and management.

#### Next Steps:

The Marine Habitat project will continue its involvement with the statewide nearshore mapping efforts, including additional groundtruthing and identification of biogenic habitat (e.g. sand dollar beds). In collaboration with the Marine Reserves Program and the Research project, the Marine Habitat project will continue work on multiple targeted research projects as well. A joint ROV-video lander survey is planned to re-assess trawl impacts at Nehalem Bank. MRP staff suggests this recommendation be expanded to include all nearshore habitat types, as opposed to only nearshore

rocky reefs. This expansion would provide information on habitats, such as soft bottom, that are less well studied. The Marine Reserves Program is continuing to develop datasets on all species and habitats within the pilot and proposed marine reserves. The SEACOR project is continuing to develop species-habitat associations in estuaries and is planning work in Yaquina and Netarts bays in 2012 and 2013. The SEACOR project is developing sub-tidal survey assessment techniques to fill the subtidal shellfish data gap. They also plan to map the shellfish and habitat data within Oregon's estuaries to update the original ODFW habitat distribution maps from the 1970s. Developing the capabilities for short-term projects related to dredge-fill events and mitigation on shellfish and estuarine habitats is also a priority for the SEACOR project.

### **8.) Marine Mammal- Fisheries Interaction Research and Monitoring.**

*Identify and evaluate conflicts between marine mammals, fisheries, and fish resources in coastal rivers, bays, and nearshore ocean*

#### Summary of Progress:

The main focus of the Marine Mammal project has been the reduction of pinniped predation on Endangered Species Act (ESA)-listed salmon at Bonneville Dam. This project directly observes predation events, analyzes fecal samples, and tags and monitors the foraging behaviors of individual sea lions. The Marine Mammal project significantly contributes to the larger, collaborative efforts to reduce mortality of ESA-listed salmon in the Columbia River.

The Marine Mammal project is involved with other related research and monitoring projects on the Oregon coast. In 2006, the Marine Mammal project began assisting with mitigating conflicts between sea lions and the summer sport salmon fishery on the lower Rogue River in collaboration



*Stellar sea lions are found along the coast, but some travel up the Columbia River where they prey on white sturgeon. Photo: ODFW.*

with NOAA Fisheries. Specifically, the Marine Mammal project monitors the local hazing program and reports annually on the program's activities. The Marine Mammal project continues to estimate predation by Steller sea lions on white sturgeon in the Columbia River. This work began in the late 2000s when Steller sea lion abundance increased in the area just below Bonneville Dam with expanded efforts between 2008 and 2011. The Marine

Mammal project also conducts coastwide studies of Steller sea lion food habits, and published a manuscript on this subject in 2011.

During 2009-2011, the Derelict Gear project removed derelict crab pots that posed a risk for marine mammal entanglements and developed tools for the fishing industry to address derelict gear in the future. To build upon the progress made by the completed Derelict Gear project, the

Commercial Dungeness Crab project has joined an on-going and industry-driven partnership with the Oregon Dungeness Crab Commission and NOAA Marine Debris Program to continue removing derelict crab gear. In addition, the Commercial Dungeness Crab project provided information on Dungeness crab fishing effort to NOAA Fisheries from 2009 to 2011. This information was intended to be used to compare the distribution of crab fishery gear to marine mammal movements to evaluate opportunities to mitigate marine mammal entanglement risk. Beginning in 2006, state observers on recreational groundfish charter trips now document interactions with marine mammals. Over 500 trips have been observed to date with a small number of marine mammal interactions documented.



*Fishermen retrieving "pot gear" during the Derelict Gear project. Photo: Brandon Ford.*

Overall, the MRP has made significant progress identifying, evaluating, and mitigating marine mammal-fishery interactions from 2006 to 2011.

#### Next Steps:

The Marine Mammal project, along with other MRP programs and projects, will continue to monitor and evaluate marine mammal-fisheries interactions. MRP staff suggests that this recommendation be expanded to include additional ESA-listed species where fisheries conflicts are a concern, and to incorporate potential conflicts with non-extractive uses, such as tourism.

### **9.) Socioeconomic Research and Monitoring for the Oregon Coast.**

*Sponsor socioeconomic analyses for the Oregon coast including coastal community demographic trends and economic and social contributions of industries that depend on nearshore resources*

#### Summary of Progress:

Between 2006 and 2011, the MRP directly sponsored and contributed to multiple socioeconomic reports and analyses. During 2010 and 2011, the MRP contracted with Ecotrust to develop a Shoreside Economic Analysis and Model for the TSP. This study was conducted to gain a better understanding of the importance of coastal economies and communities to the state of Oregon as a whole and to utilize this information in the marine spatial planning process under the TSP revision.

Much of the progress made on this recommendation is a direct result of the creation of the Marine Reserves Program within MRP. The Marine Reserves Program now has a Socioeconomic project, focused solely on the human dimension aspect of marine reserves on the Oregon coast. This project was a key component to the marine reserves development process. Beginning in 2010, the Socioeconomic project staff, with input from external experts and marine reserve community team members, developed a Human Dimensions Monitoring and Research Plan (HDMR plan). The plan provides a framework for socioeconomic research and monitoring. In addition to focusing on site specific research, the project attempts to collect data to more broadly inform nearshore management issues.

Some of the efforts outlined in the HDMR plan framework have already begun. Baseline data collection began in 2010, concurrently with the implementation process for the two pilot marine reserve sites. Analysis of fisheries data from the commercial logbook programs is ongoing. The Shellfish Program and the Commercial Dungeness Crab project provided information on commercial crab harvest to the Marine Reserves socioeconomic research project. Socio-cultural profiles of fishing communities connected to the marine reserve or marine protected areas are developed through in-person and phone interviews. Information on direct usage and activities in marine reserve sites is being collected through in-person observations. A spatial model to evaluate

economic impacts and effects using both habitat and biological data is under development. The Marine Reserve Program sponsored a project with OSU and OSG to develop indicator lists of ecosystem services for each of the pilot marine reserves. These lists will be used to evaluate how communities use and value the nearshore environment over time. Future work will be conducted to analyze the “attitudes and perceptions” of coastal and statewide stakeholders and to understand the economic impact of recreational fishermen visiting Oregon’s coastal fishing grounds and communities.

Many programs and projects at MRP are also contributing information and data to socioeconomic reports. Members of the Marine Fisheries Section contribute to annual commercial fishery economic reports that ODFW contracts out to private parties. The Sport Groundfish and Halibut project staff regularly provide data to NOAA Fisheries annual fisheries economic reports. There have been four coastal or state-wide socioeconomic reports that have come out between 2006 and 2011. MRP staff members contributed data to all of these reports and the MRP Public Information Officer summarized them to be more accessible to a wider audience. In particular, MRP contributed information to a 2008 contracted study to differentiate shellfish harvest from other types of fishing in order to more fully evaluate its economic value.

In summary, the MRP has developed extensive socioeconomic information pertinent to the Oregon nearshore environment over the last six years. On-going data collection and analysis, both internal and external, will further the understanding of the relationships between Oregon’s nearshore resources and coastal communities.

#### Next Steps:

Much of the research outlined above is ongoing. MRP programs and projects continue to be involved with socioeconomic reporting and research for the Oregon coast. The Marine Reserves Program will continue to characterize socioeconomic information for the pilot and proposed marine reserves. Implementation of the HDMR plan will continue and develop over time. The Marine Reserves Program will re-evaluate the HDMR plan every five years. Methods developed through this program could be applied to other locations on the Oregon coast in the future. Expanding current efforts focused on the state marine reserves system to coastwide studies is key to successful future implementation of this recommendation. Methods for collecting socioeconomic information from coastal communities will continue to develop. Additional funding and support staff are needed to augment current efforts, and will be absolutely necessary for expanded efforts.

#### **10.) Monitor Oregon Nearshore Strategy Action Effectiveness.**

*Monitor the effectiveness of implemented Oregon Nearshore Strategy actions*

#### Summary of Progress:

MRP staff presented a report that documented Oregon Nearshore Strategy implementation progress to the Oregon Fish and Wildlife Commission (OFWC) in 2008. The report detailed progress made from 2006 to 2008 on the 16 recommendations and outlined specific roadblocks to implementation, such as newly emerged issues, a reorganization of staff resources, and funding limitations.

The Nearshore Resources project evaluated implementation efforts from 2006 to 2011 as part of a voluntary revision process. This report identified areas for improvement and data gaps, and compiled staff input on the 16 recommendations. The Nearshore Resources project also reviewed and updated the status and information available for each of the 53 Oregon Nearshore Strategy Species. This information was compiled in an updated version of List of Oregon Nearshore Strategy Species table that includes new information on ESA listings, stock status, and recent research (see Appendix A).

To guide adaptive management of nearshore resources, the MRP has sought and received public feedback on the effectiveness of specific Oregon Nearshore Strategy implemented actions. The Field Operations – Finfish project discussed improvements to the MRP website with local fishermen. This discussion focused on how the website is used, ways to improve the website, and making it a better communication tool for fishermen. Various other MRP projects also continually solicit feedback from advisory groups and the general public on management measures and to improve communication. When the limited entry program for the nearshore commercial groundfish fishery began in 2004, in-season regulation changes were distributed to the processing plants only, consistent with other MRP managed fisheries. However, in public meetings in 2006, Nearshore Resources project staff heard that the fishermen would like these regulation changes mailed to them directly. Staff responded to this input. Now, any regulation changes, including in-season changes, are mailed or emailed to individual permit holders and posted on the MRP website. This provides a more timely notice, especially for in-season changes. At subsequent public meetings, fishermen expressed their appreciation of these actions.

In summary, the actions taken to implement the Oregon Nearshore Strategy recommendations have been well documented and extensive feedback on their effectiveness has been received from stakeholders.

#### Next Steps:

Documenting implemented actions provides the groundwork for monitoring, reviewing and evaluating their effectiveness. Methods to objectively measure the effectiveness of implementation action need to be developed further. Outside evaluation of implementation progress, like that envisioned for the NAC, could help provide measures of success. The upcoming 10-year revision of the Oregon Nearshore Strategy provides an opportunity to document progress, evaluate actions that have already been implemented, and shape future implementation actions.

### **III. MANAGEMENT AND POLICY**

#### **11.) *Native Fish Conservation Policy – Conservation Plans.***

*Review the Oregon Nearshore Strategy Species list to identify priority species in need of conservation plans under Oregon’s Native Fish Conservation Policy*

Summary of Progress:

To date, no Oregon Nearshore Strategy Species have been reviewed under the auspices of the Native Fish Conservation Policy (NFCP) and no conservation plans have been developed under the NFCP. Although the NFCP may be applicable to the biology and management of Oregon Nearshore Strategy Species, the policy has specific benchmarks that are difficult to evaluate or implement given the current knowledge level for many species. The efforts undertaken to improve and expand nearshore research and monitoring are starting to close these data gaps. The recent ESA-listing of two Oregon Nearshore Strategy Species, eulachon and green sturgeon, brought renewed focus to conservation measures for these species at both the federal and state level. A number of protective management measures have been adopted for both these species. For example, in 2010, the OFWC adopted regulations to restrict the types of bycatch reduction devices allowed in the Oregon pink shrimp fishery to those most efficient for reducing bycatch of eulachon. These new regulations were developed by MRP staff. The NFCP calls for incremental planning and implementation. These efforts must be consistent with available funding, departmental priorities, and consultation with tribal governments, management partners and the public. Presently the federal plans for both eulachon and green sturgeon are still under development and ODFW staff are involved in the process.

Beyond developing conservation plans for Oregon Nearshore Strategy Species, projects within MRP contribute to the implementation of current conservation plans. The Marine Mammal project is involved with reducing loss of multiple native fish stocks managed under the NFCP. Many MRP projects collect data and information on Oregon Nearshore Strategy Species that could potentially be used in future conservation plans.

Next Steps:

ODFW will continue to participate in the development of federal plans for eulachon and green sturgeon. The Marine Fisheries Section suggests a closer look at how current management approaches interact with the NFCP is warranted and should be a future priority.

#### **12.) *Commercial Nearshore Fishery Management Plan.***

*Review and update the interim management plan for Oregon’s nearshore commercial groundfish fishery*

Summary of Progress:

To implement this recommendation and complementary aspects of several other Management and Policy recommendations, MRP determined the best approach would be to develop a comprehensive Nearshore FMP. This Nearshore FMP focuses on commercially and recreationally harvested fish and invertebrate species that predominantly occur, or are commonly harvested, within Oregon’s nearshore waters (<30 fathoms). The Fisheries Management Section took the lead on the development of this plan.

The outline of the Nearshore FMP contains three major sections: the Framework, Resource Analyses, and Harvest Management Strategies. The Framework section draft underwent a technical review in 2007. Following a post-technical review in 2010, staff re-organized structure of the Nearshore FMP and the goals were refined. Throughout 2010 and 2011, the Framework section

was updated and significantly strengthened. The Framework provides the scope of the management plan, background information, management goals, and articulates the policies and guidelines that are to be applied by the MRP in managing nearshore fisheries. The Framework also outlines all of the elements required in the Resource Analyses and Harvest Management Strategy sections for each fishery under the plan. As of 2011, groundfish, shellfish, and coastal pelagic species fisheries have been identified to be included in the Nearshore FMP.

**Next Steps:**

The development of the Nearshore FMP continues to evolve. The process through which this FMP is created, added to, and reviewed is anticipated to be finalized in 2012. Public involvement and comment will be part of this process. Future work will include creating resource analyses and developing fishery harvest strategies for individual fishery sectors that articulate general management practices. Multiple MRP programs and projects will be increasingly involved in future Nearshore FMP implementation. Development of the Nearshore FMP will include collaboration between the MRP, academia, the commercial fishing industry, recreational fishing interests, and conservation organizations. The Nearshore FMP will provide consistent structure for ongoing successful management of Oregon's nearshore fisheries.

**13.) Recreational Groundfish Fishery Management Review.**

*Evaluate immediate and long-term management needs for Oregon's recreational groundfish fishery*

**Summary of Progress:**

The Sport Groundfish and Halibut project within the Marine Fisheries Section continued to improve the management of the recreational groundfish fishery between 2006 and 2011. The team continually evaluates effectiveness of regulations and employs adaptive regulation changes. For example, project staff reviewed management actions in recent years and noted that in-season closures for cabezon were needed every year since 2006. In response, project staff created a novel sub-bag limit in an effort to slow the catch of cabezon and allow for year-round fishing opportunity. Members of the project evaluated the effectiveness of this management measure and consulted with the SAC on regulation changes for the 2012 season.

In the early 2000s, multiple groundfish species were declared overfished. The Marine Fisheries section reviewed Oregon's recreational groundfish fishery and determined that yelloweye and canary rockfish were the species of greatest concern. Retention of these species is prohibited, but mortality of released fish after being brought to the surface still impacts these stocks. Sport Groundfish and Halibut project staff develop annual depth restriction alternatives designed to reduce both the encounter rate and release mortality for overfished species. The Sport Groundfish and Halibut project has solicited input from the SAC on potential management measures, including depth restriction alternatives, since 2006. Depth restriction adjustments have been increasingly used as a tool for managing of the recreational groundfish fishery. These adjustments are



*This yelloweye rockfish caught during an ODFW research trip was released live using a recompression device. Photo: ODFW.*

used in-season to manage catch of overfished species as the season progresses, taking into account that the availability of shallow depth reefs can impact ports differentially. Project staff continually assess management measures throughout the year. In 2011, Sport Groundfish and Halibut project staff evaluated how changes to the marine bag limit affect impacts to overfished species.

In 2009 and 2010, the Sport Groundfish and Halibut project used improved release mortality rates of federally-declared overfished species to provide additional fishing opportunity for groundfish. A recreational groundfish fishery model is used to estimate impacts to overfished species and has been continually updated from 2006 to 2011. Prior to 2011, this model used release mortality information from observed charter trips. Beginning in 2009, the ORBS program within MRP began taking information on the depth fishing activity and catches occurred, which turned out to be in shallower water than many of the observed trips. Putting this new information into the existing model revealed that the impacts for overfished species had been overestimated. These results allowed the Sport Groundfish and Halibut project to increase fishing opportunities for healthy stocks of groundfish species.

Knowledgeable recreational anglers provide quality information to managers and tend to be active stewards of the resources. The Sport Groundfish and Halibut project staff are actively involved with angler education programs in cooperation with the OCEAN. These programs include developing guides to assist with groundfish identification, which can be difficult in closely related species such as rockfishes. The Sport Groundfish and Halibut project promotes the use of recompression devices for releasing certain fish species. Research conducted by the Research project at MRP indicates high survival rates when these devices are utilized correctly. Wider use of these devices could potentially reduce overfished species impacts in the sport fishery.

Management of the recreational groundfish fishery is continually reviewed and evaluated. The Sport Groundfish and Halibut project has continued to improve management of this important fishery since 2006 through new management techniques and updated information on overfished species. These changes have provided opportunities to evaluate management needs for the recreational groundfish fishery in Oregon.



*ODFW actively promotes the use of recompression devices for releasing rockfish species. Photo: ODFW.*

## Next Steps:

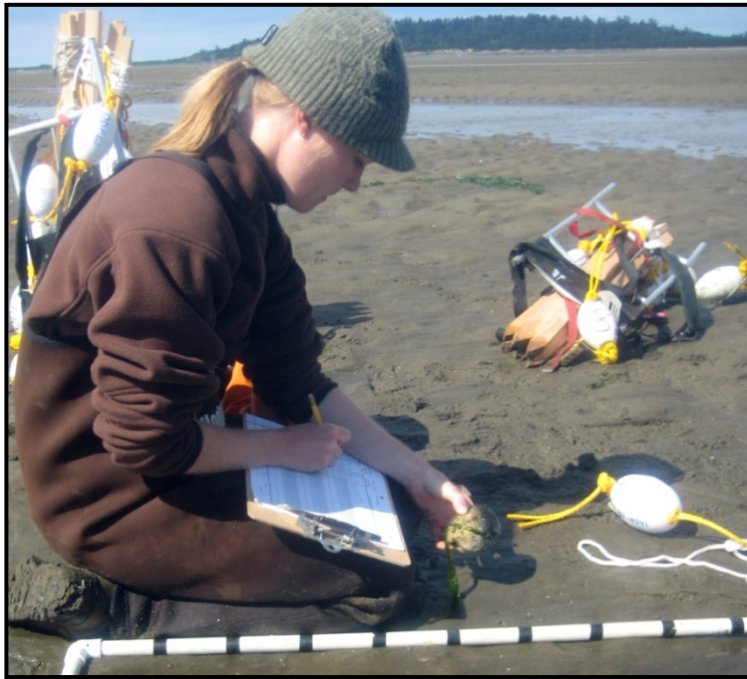
The MRP will continue to assess and respond to management needs for the recreational groundfish fishery in the future. Continued implementation of this recommendation is integral to the development of the Nearshore FMP (see Recommendation 12). The Nearshore FMP will seek to identify management needs for the recreational and commercial groundfish fishery. The Sport Groundfish and Halibut project staff will be involved in the development of the harvest strategy for this fishery. The Marine Fisheries Section suggests that formalized benchmarks be developed for this recommendation in order to more accurately assess progress.

### **14.) Estuarine Fish and Wildlife Management.**

*Develop and implement science-based management strategies for Oregon's estuarine fish and wildlife resources*

#### Summary of Progress:

Since 2006, the MRP has been continually building the Shellfish Program to improve their capacity to provide research, monitoring, management, and outreach efforts for estuarine resources. The



*SEACOR project staff hard at work in Tillamook Bay. The SEACOR project is now a permanent part of the Shellfish Program at MRP. Photo: ODFW.*

Oregon Nearshore Strategy was used during strategic planning for the Shellfish program to help identify program priorities, specific projects, and how the program could assist in Oregon Nearshore Strategy implementation. As a result, the Shellfish Program conducts expanded research and monitoring efforts in many Oregon estuaries. The SEACOR project is also now a permanent group within the Shellfish Program, significantly increasing research capacity.

The Shellfish Program manages multiple recreational and commercial fisheries that occur within estuaries, including recreational and commercial bay crab, clams, and others. There is an ongoing effort to identify successful management strategies for these state-managed shellfish resources. The Shellfish

Program and the SEACOR project plan to create a long-term research and monitoring plan designed specifically for estuarine shellfish resources. Their research throughout 2006 to 2011 provides baseline information to support the development of this plan. The Marine Fisheries Section is working to fully incorporate the marine aspects of estuaries into the Oregon Conservation Strategy by developing an outline of an estuary section similar to those for other habitats detailed in the Oregon Nearshore Strategy. The estuary section may be incorporated during the 10-year revision. The Shellfish Program was also vital to the initial development of the draft Nearshore FMP Framework (see Recommendation 12).

Various programs and projects at the MRP participate in current management of estuaries and their associated resources. The Marine Mammal project, the Marine Habitat project, and the Shellfish Program consult with USACOE and local government agencies for dredge and fill operations in multiple Oregon estuaries. Input for these operations falls into a larger state and federal coastal management scheme, for which MRP is a regular participant and contributor. The Shellfish Program and other MRP staff also reviewed and recommended revisions to Oregon's estuarine habitat classification system in 2007 and 2008. This effort was in cooperation with the SSNERR, the Oregon Coastal Management Program (OCMP), and DSL.

Non-native and invasive species were identified as a concern for both Oregon's estuaries and nearshore waters in the Oregon Nearshore Strategy. Available information about non-native species' range, colonization potential, and severity of their impacts is limited. To begin to address this need, the MRP initiated an effort in 2010 to compile and evaluate information on non-native and invasive species in Oregon's nearshore and estuarine environments. The MRP reviewed available online data and consulted with experts at Williams College, OSU, USGS Western Fisheries Research Center, and EPA Western Ecology Division. Based on information gleaned from these sources, a list of non-native and potentially invasive species was developed (see Appendix B). For each species, habitat information was collected and species were identified as being primarily associated with nearshore or estuarine systems. In addition, species have been categorized as 1) present in Oregon and having a known threat to native species, 2) present in Oregon with an unknown threat to native species, or 3) present in Washington or northern California and known to pose a threat to native species.



*This native mud shrimp collected from an Oregon estuary is infected with the parasitic Griffin's isopod. Scientists believe this invasive parasitic isopod species came from Asian waters and has caused declines in mud shrimp populations along the U. S. west coast. Photo: Ralph Breitenstein, Oregon State University*

These efforts undertaken by MRP in the last six years will contribute to science-based management in both estuarine and nearshore environments.

Next Steps:

Continued support of research on estuarine species and habitats through the Shellfish program and the SEACOR project is vital to continued implementation of this recommendation. Efforts to fully incorporate the ocean-estuary connection into the Oregon Nearshore Strategy will continue during the 10-year review of both documents that comprise the Oregon Conservation Strategy. Including shellfish in the Nearshore FMP will develop harvest strategies for these estuarine resources and Shellfish Program staff will be participants in the ongoing development of the FMP. Continued research on non-native and invasive species is needed and efforts to address their potential effects should be considered when developing estuarine management strategies. Continued coordination with federal agencies and local governments will be important in managing estuarine fish and wildlife resources.

### **15.) Shellfish Conservation and Harvest Management Plan(s).**

*Develop conservation and harvest management plans for commercially and recreationally harvested shellfish*

Summary of Progress:

There is an ongoing effort within the MRP to identify successful management strategies for shellfish resources. Evaluation of current management strategies for shellfish resources is one of the keys to this effort. As of 2011, both MRP staff and the razor clam advisory committee determined that the existing informal management plan is working well, and as such, development of a formal harvest management plan is a low priority. The commercial abalone fishery was closed in 2009, due to concerns regarding sustainability of harvest levels. In 2011, the Shellfish Program assessed the viability and sustainability of the Tillamook intertidal commercial cockle fishery. This information and assessments from the SEACOR project in Tillamook Bay will inform allocation discussions between the commercial and recreational fisheries. The subtidal commercial cockle fishery developed between 2006 and 2011, and is now regulated by ODFW as a limited entry permit program. Between 2006 and 2011, MOUs between ODFW, Washington Department of Fish and Wildlife and California Department of Fish and Game for the continued management of Dungeness crab were revised. These MOUs provide a management and research framework to support the development of shellfish conservation and management plans. There have also been a number of changes in the structure of the Marine Fisheries Section that improved the management of shellfish resources, including the creation of a Commercial Dungeness crab project and the addition of a marine fisheries analyst position.



*SEACOR project staff setting up a shellfish growth experiment. Results from this type of work may contribute to future stock assessments. Photo: ODFW*

Next Steps:

Commercial Dungeness Crab project staff will be creating a research plan as a requirement of the MSC fishery certification. This plan will directly support the continued successful management of the Dungeness crab fishery. The Shellfish Program will continue to incorporate ecosystem considerations into estuarine resource management strategies. Planning is also underway for subtidal studies to assess clam brood stock populations that will inform future resource management. In addition, incorporating shellfish resources into the Nearshore FMP will lead to explicit harvest management strategies for these important resources. Further development of the FMP and continuing to identify successful management strategies for shellfish resources are needed to address this recommendation fully.

### **16.) Inter-agency Management Coordination.**

*Improve communication and collaboration with state and federal agencies, local governments, and tribes on issues affecting nearshore resources and related management*

Summary of Progress:

Between 2006 and 2011, MRP made significant progress with collaboration and communication with other agencies and organizations (see Table 1). Many partnerships that pre-date this recommendation from the Oregon Nearshore Strategy have continued to grow and improve throughout this period. MRP also formed many new partnerships in recent years. MRP filled or added a number of support positions that help improve coordination with other agencies. These positions include several assistant project leaders and a dedicated marine fisheries analyst. Each particular project or section within MRP has a different list of partner agencies and organizations.

**Table 1: Partner agencies and associated collaborative efforts**

<b>Partner Agencies/Groups</b>	<b>Collaborative efforts with ODFW's Marine Resources Program</b>
Bureau of Ocean Energy Management	<ul style="list-style-type: none"> <li>• Review of the Oregon Territorial Sea Plan</li> <li>• Marine spatial planning</li> <li>• Review ocean energy development in federal waters</li> </ul>
California Department of Fish and Game	<ul style="list-style-type: none"> <li>• MOU on Dungeness crab management</li> </ul>
Coastal Conservation Alliance	<ul style="list-style-type: none"> <li>• Creation of outreach materials</li> </ul>
Coastal Counties	<ul style="list-style-type: none"> <li>• Ocean Policy Advisory Council</li> </ul>
Confederated Tribes of Siletz Indians	<ul style="list-style-type: none"> <li>• Implementation of fish and wildlife consent decree and related fish and wildlife harvest issues</li> </ul>
Confederated Tribes of the Grand Rhonde	<ul style="list-style-type: none"> <li>• Implementation of fish and wildlife consent decree and related fish and wildlife harvest issues</li> </ul>
Environmental Protection Agency	<ul style="list-style-type: none"> <li>• Collaborative research in estuaries</li> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> <li>• Consultations on non-native and invasive species</li> </ul>
Federal Energy Regulatory Commission	<ul style="list-style-type: none"> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> </ul>
Hatfield Marine Science Visitor Center	<ul style="list-style-type: none"> <li>• Creating displays and public information on fisheries and marine research</li> </ul>
Lower Columbia Solutions Group	<ul style="list-style-type: none"> <li>• Dredge material disposal</li> </ul>
Marine Reserve Community Teams	<ul style="list-style-type: none"> <li>• Implementation of marine reserves</li> </ul>
National Wildlife Refuge System	<ul style="list-style-type: none"> <li>• Joint survey efforts in Oregon estuarine wildlife refuges</li> </ul>
NOAA Fisheries National Wildlife Refuge System	<ul style="list-style-type: none"> <li>• Fishery management policy and regulations</li> <li>• Endangered Species Act</li> <li>• Essential Fish Habitat</li> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> <li>• Harmful Algal Bloom monitoring</li> <li>• Nearshore Ecological Data Atlas</li> <li>• Pinniped hazing program in the Rogue River</li> <li>• Collect samples for mussel-watch program</li> </ul>
NOAA Fisheries - Office of Habitat Conservation	<ul style="list-style-type: none"> <li>• Oregon Task Force on Nearshore Research</li> <li>• Review of the Oregon Territorial Sea Plan</li> </ul>
NOAA Hydrographic Division	<ul style="list-style-type: none"> <li>• Territorial Sea seafloor mapping</li> </ul>
NOAA Office of Ocean and Coastal Resource Management	<ul style="list-style-type: none"> <li>• Review of the Oregon Territorial Sea Plan</li> </ul>
Ocean Policy Advisory Council	<ul style="list-style-type: none"> <li>• Review of the Oregon Territorial Sea Plan</li> <li>• Implementation of Oregon's marine reserves</li> </ul>
Oregon Coalition for the Education of Anglers	<ul style="list-style-type: none"> <li>• Educating anglers on species</li> </ul>
Oregon Coastal Zone Management Association	<ul style="list-style-type: none"> <li>• Ocean Policy Advisory Council</li> <li>• Oregon Task Force on Nearshore Research</li> </ul>

<b>Partner Agencies/Groups</b>	<b>Collaborative efforts with ODFW's Marine Resources Program</b>
Oregon Department of Agriculture	<ul style="list-style-type: none"> <li>• Harmful Algal Bloom monitoring</li> <li>• Coordination for shellfish toxin testing</li> <li>• Oyster lease review</li> </ul>
Oregon Department of Land Conservation and Development	<ul style="list-style-type: none"> <li>• Ocean Policy Advisory Council</li> <li>• Territorial Sea Planning</li> <li>• Coastal Zone Management Act federal consistency review</li> <li>• Shorezone Imagery project</li> <li>• Oregon Marine Map</li> <li>• Oregon Task Force on Nearshore Research</li> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development review</li> <li>• Revised Oregon's estuarine habitat classification system</li> </ul>
Oregon Department of State Lands	<ul style="list-style-type: none"> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development review</li> <li>• Review of Oregon Territorial Sea Plan</li> <li>• Implementation of Oregon's marine reserves</li> <li>• Revised Oregon's estuarine habitat classification system</li> <li>• Oregon Task Force on Nearshore Research</li> </ul>
Oregon Parks and Recreation Department	<ul style="list-style-type: none"> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> <li>• Implementation of Oregon's marine reserves</li> </ul>
Oregon Sea Grant	<ul style="list-style-type: none"> <li>• Oregon Task Force on Nearshore Research</li> <li>• Development of indicator lists of ecosystem services for marine reserves</li> <li>• Collaborative development of public education materials</li> </ul>
Oregon State Police	<ul style="list-style-type: none"> <li>• Fish and Wildlife Law enforcement</li> <li>• Implementation of Oregon's marine reserves</li> </ul>
Oregon State University	<ul style="list-style-type: none"> <li>• Oregon Task Force on Nearshore Research</li> <li>• Implementation of Oregon's marine reserves</li> <li>• Harmful Algal Bloom monitoring</li> <li>• Monitoring nearshore hypoxia events</li> <li>• Nearshore Ecological Data Atlas</li> <li>• Territorial Sea seafloor mapping</li> <li>• Characterizing nearshore rocky reef biota</li> <li>• Development of indicator lists of ecosystem services for marine reserves</li> <li>• Consultations on non-native and invasive species</li> </ul>
Oregon Wave Energy Trust	<ul style="list-style-type: none"> <li>• Alternative energy development</li> </ul>
Pacific Fisheries Management Council	<ul style="list-style-type: none"> <li>• Federal fisheries management</li> <li>• Participate on multiple advisory teams and advisory bodies, including: <ul style="list-style-type: none"> <li>◦ Habitat Committee, CPS management team, HMS management team, Salmon Technical team, GMT, Ecosystem Plan Development team</li> </ul> </li> <li>• Participate in Stock Assessment and Review panels</li> </ul>
Pacific States Marine Fisheries Commission	<ul style="list-style-type: none"> <li>• Recreational Fisheries Information Network</li> <li>• Pacific Fisheries Information Network</li> <li>• Implementation of tri-state MOU on Dungeness crab management</li> </ul>
Port of Newport	<ul style="list-style-type: none"> <li>• Subtidal sampling to assess NOAA pier impacts</li> </ul>

<b>Partner Agencies/Groups</b>	<b>Collaborative efforts with ODFW's Marine Resources Program</b>
Port Orford Ocean Resources Team	<ul style="list-style-type: none"> <li>• Implementation of Oregon Nearshore Strategy recommendations</li> <li>• Implementation of community and ecosystem-based management in the nearshore area off Port Orford</li> <li>• Advancement of West Coast Governors' Agreement on Ocean Health and the Ocean Action Plan</li> <li>• Cooperation on fisheries research, monitoring and management</li> </ul>
South Slough National Estuarine Research Reserve	<ul style="list-style-type: none"> <li>• Revised Oregon's estuarine habitat classification system</li> </ul>
United States Army Corps of Engineers	<ul style="list-style-type: none"> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> </ul>
United States Fish and Wildlife Service	<ul style="list-style-type: none"> <li>• Oregon Task Force on Nearshore Research</li> <li>• Nearshore Ecological Data Atlas</li> <li>• Seabird impact considerations for marine spatial planning and permit reviews</li> </ul>
United States Geographic Survey	<ul style="list-style-type: none"> <li>• Groundtruthing bathymetric data through ROV surveys</li> <li>• Characterizing nearshore rocky reef biota</li> <li>• Dredge and fill operations</li> <li>• Consultations on non-native and invasive species</li> </ul>
University of Oregon	<ul style="list-style-type: none"> <li>• Oregon Task Force on Nearshore Research</li> <li>• Harmful Algal Bloom monitoring</li> </ul>
Washington Department of Ecology	<ul style="list-style-type: none"> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> </ul>
Washington Department of Fish and Wildlife	<ul style="list-style-type: none"> <li>• Alternative energy development, dredge material disposal, seafloor and shoreline development</li> <li>• MOU on Dungeness crab management</li> </ul>
West Coast Governors' Alliance	<ul style="list-style-type: none"> <li>• Integrated Ecosystem Assessment Action Coordination Team</li> <li>• Research Action Coordination Team</li> <li>• Marine Debris Coordination Team</li> </ul>
Williams College	<ul style="list-style-type: none"> <li>• Consultations on non-native and invasive species</li> </ul>

The Shellfish Program primarily collaborates with the ODA and the Oregon State Police (OSP). They also work with the Tribal Councils, the EPA, the Port of Newport, DSL, and DLCDC on specific issues. The Shellfish Program also occasionally works with NOAA Fisheries on endangered species and essential fish habitat issues. The SEACOR project is more focused on research, so collaboration with federal agencies and independent programs, rather than formal partnerships, is a high priority. SEACOR primarily works with the EPA Pacific Coastal Ecology Branch and the United States Department of Agriculture Agricultural Research Service Lab. Recently, SEACOR collaborated with the DLCDC on several statewide issues and specific projects, including the ongoing Shorezone Imagery project. In 2010 and 2011, the SEACOR project and others in the Shellfish Program also participated in several workshops to evaluate climate change threats to estuaries as part of the development of the Oregon Adaption Framework for climate change.

Marine Fisheries Section staff work closely with the West Coast Governor's Alliance, Pacific States Marine Fisheries Commission, the International Pacific Halibut Commission, OSP, and Oregon Parks and Recreation Department (OPRD). Many Marine Fisheries Section staff participate in PFMC teams and advisory bodies. Those include the Habitat Committee, the Coastal Pelagic Species management team, the Groundfish management team, the Highly Migratory Species management team, the Salmon Technical team, and the Ecosystem Plan Development team. These management teams are essential collaborative efforts among state, federal and tribal representatives involved with managing marine resources. There is also substantial involvement with the multiple recovery teams for ESA-listed species. The OFWC formulates general state programs and policies concerning

fish and wildlife resources and establishes regulations for recreational and commercial take. As such, Marine Fisheries Section staff continually present information to the OFWC to assist with management and conservation of nearshore resources.

In 2010, the Oregon Task Force on Nearshore Research developed a report outlining six core recommendations intended to provide a funding structure and to strengthen science-based decision making for Oregon's nearshore resources. MRP staff were on this taskforce and contributed to the final report. Partners for this effort included OSU, University of Oregon, OSG, DLCD, Oregon Coastal Zone Management Association (OCZMA), DSL, Lincoln County, commercial and recreational fishermen, members of local coastal communities, and several non-voting members from NOAA Fisheries Office of Habitat Conservation and the USFWS. The MRP Research project has collaborated with the POORT and the NOAA Fisheries on various research projects. The Marine Habitat project primarily focuses on research and monitoring. The Marine Habitat project and the Ocean Energy Coordinator have significant management responsibilities with respect to alternative energy development, dredge material disposal, and seafloor and shoreline development. These responsibilities involve coordination with other government agencies and groups such as the USACOE, EPA, NOAA Fisheries, the Washington Department of Fish and Wildlife, Washington Department of Ecology, DLCD, OPRD, DSL, Lower Columbia Solutions Group, Oregon Wave Energy Trust, OPRD, Federal Energy Regulatory Commission and Lower Columbia Solutions Group.

The MRP is also participating in a review by the DLCD of the TSP. Other organizations that are involved are the Ocean Policy Advisory Council (OPAC), the Oregon Land Conservation and Development Commission, NOAA Fisheries Office of Habitat Conservation, NOAA's Office of Ocean and Coastal Resource Management and the BOEM.

MRP has staffed the ODFW seat on the OPAC since the Council's inception in 1991. OPAC is a legislatively marine policy advisory committee to the governor, legislature, and agencies. Its membership includes representatives from coastal and marine user groups. State agencies with marine jurisdiction, OSG and the OCZMA serve as non-voting members. OPAC has been coordinating revisions to Oregon's TSP since 2008. The group first developed a marine renewable energy policy component to the plan (Part 5), which was adopted in 2009. Since that time OPAC has been developing the spatial component of the plan. MRP has participated both as a member of OPAC, and as a direct contributor to the spatial planning effort through the development of NEDA (see Recommendation 5) and specific recommendations for marine resource protection from ocean energy development. In addition to the state process, MRP is participating in a federal marine spatial planning effort, and provides ODFW's representative on the BOEM Oregon Outer Continental Shelf Renewable Energy Task Force. The MRP is also represented in the Marine Cabinet, an unofficial group of natural resource policy makers that meet with the governor's office.

In order to design, implement and monitor Oregon's current and proposed marine reserves, MRP staff coordinated with many different entities. Primary among these were the DSL, OPRD, OPAC, and the Governor's natural resources office. MRP staff coordinate with OSP on enforcement issues. The Marine Reserves Program also works with local coastal governments, including mayors, county commissioners, and city councilors. Multiple community action teams were created during the public process for the selection and implementation of the marine reserves. These included 96 volunteers that participated in three community teams for each of the proposed marine reserve sites and 25 volunteers participating on two community teams for each of the pilot marine reserves. The Marine Reserves Program also began conversations with the Oregon coastal tribes regarding the marine reserve regulations and future collaborative research. The two primary tribes at this point are the Confederated Tribes of the Grand Ronde, and the Confederated Tribes of Siletz Indians. Collaboration with many of the state entities involves not just the marine reserve-specific issues but also how the marine reserves play into the larger marine spatial planning concepts at the

state-level. Overall, the marine reserves process has improved the close ties with other state agencies and universities and brought nearshore issues to the forefront of natural resource management in Oregon. This is especially true in combination with offshore planning for wave energy and the evolving TSP.

In summary, many partnerships have been newly formed and existing partnerships and collaborative efforts have been strengthened through the continued implementation of this recommendation.

**Next Steps:**

The MRP and its associated programs and projects will continue to promote collaborative efforts with many agencies and organizations in order to sustainably manage and conserve nearshore resources. New partnerships may be necessary for emerging issues, such as climate change or wave energy.

## IV. CONCLUSIONS

As detailed above, the implementation of the Oregon Nearshore Strategy's 16 recommendations has provided both task prioritization and a focus for MRP staff and resources. The MRP, other state and federal agencies, conservation organizations, fishing organizations, academia, and others with a vested interest in Oregon's nearshore ocean have been actively promoting and using the Oregon Nearshore Strategy as a resource in state, federal, and non-governmental marine resource conservation, management and policy processes in Oregon. However, there are still considerable roadblocks impeding the full implementation of actions recommended to benefit Oregon's nearshore environment. To remedy these impediments, MRP will require further commitments in staff and funding. The progress detailed in this document will allow staff to prioritize efforts over the next four years and will provide a basis for the upcoming ten-year major review of the Oregon Nearshore Strategy component of the Oregon Conservation Strategy.

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## VI. APPENDIX A: Strategy Species Update

In 2011, the Nearshore Resources project developed a methodology to update the status and information for each of the 53 Oregon Nearshore Strategy Species. This information was compiled in an updated version of the species table in the Oregon Nearshore Strategy. For each species, Endangered Species Act listings on the United States Fish and Wildlife Service website were checked and population information in the table was updated if necessary. The Pacific Fishery Management Council stock assessments and website information were also investigated for additional stock status information. Finally, an online search for recent scientific articles related to the original “Notes on Conservation Needs” statement was also conducted.

SPECIES	NOTES ON CONSERVATION NEEDS (2011 UPDATES )	REFERENCES
<b>Bony Fishes</b>		
Black rockfish <i>Sebastes melanops</i>	Low to very low productivity. Long-term population declines in Puget Sound (WA). Large sport and commercial harvest. Incidental catch. Collected for scientific research. Significant decline in lifetime egg production per individual since 1980s. A 2007 stock assessment states that stock is currently at healthy levels.	Love et al. 2002; McCain 2003; Musick et al. 2000. O’Farrell and Botsford 2006; Sampson 2007.
Black-and-yellow rockfish <i>Sebastes chrysomelas</i>	Low productivity. Commercial harvest. Collected for public aquarium display. Southern OR is northern extent of range. Population status unknown. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010. Evidence of southern range extension in cool PDO years.	Love et al. 2002; McCain 2003. Dick and MacCall 2010; Larson 2008.
Blue rockfish <i>Sebastes mystinus</i>	Low productivity. Sport and commercial harvest. Population status unknown. First stock assessment for CA stock completed in 2008 indicated that overfishing has occurred in the past but not currently. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010 for northern stock in OR. Evidence of southern range extension in cool PDO years.	Love et al. 2002; McCain 2003. Key et al. 2008; Dick and MacCall 2010; Larson 2008.
Bocaccio <i>Sebastes paucispinis</i>	Very low productivity. CA stock listed as overfished by PFMC. Listed as species of concern by NMFS for CA waters (and possibly west coast of North America) since 1990. Puget Sound/Georgia Basin DPS listed as Endangered in 2010. Southern DPS (northern CA to Mexico) listed as species of concern since 1999. As of 2009 stock assessment, CA stock is recovering, but not rebuilt.	Love et al. 2002; Musick et al. 2000; NOAA 2004. NOAA 2011a; Field et al. 2010.
Brown rockfish <i>Sebastes auriculatus</i>	Probable low to very low productivity. Sport and commercial harvest. Concerns for potential localized population depletion. Long-term population declines in Puget Sound (WA). Population status unknown. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010.	Love et al. 2002; McCain 2003; Musick et al. 2000. Dick and MacCall 2010.
Cabezon <i>Scorpaenichthys marmoratus</i>	Assessment with CA data only; PFMC precautionary approach for harvest allocation. Sport and commercial harvest. Incidental catch. OR sub-stock assessed at healthy levels in 2009, though declining.	McCain 2003; Love 1996. Cope and Key 2009.

Canary rockfish <i>Sebastes pinniger</i>	Very low productivity. Very long lived. Listed as overfished by PPMC. Incidental catch. May be two separate subpopulations: one north and south of central OR. Primarily juveniles in nearshore. Scientific research collection. Puget Sound/Georgia Basin DPS listed as Threatened in 2010. As of 2009, stock has been delineated into two sub stocks (one in WA and OR, and another in CA).	CDFG 2001; Love et al. 2002; McCain 2003; Musick et al. 2000. NOAA 2011b; Stewart 2009.
China rockfish <i>Sebastes nebulosus</i>	Low productivity. Long lived. Very little known about early life history. Sport and commercial harvest. Collected for public aquarium display. Population status unknown. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010.	Love et al. 2002; McCain 2003. Dick and MacCall 2010.
Copper rockfish <i>Sebastes caurinus</i>	Low to very low productivity. Long-term population declines have occurred in Puget Sound (WA). Sport and commercial harvest. ESA petition in 2007 found not warranted. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010. Listed as Federal Species of Concern in WA 2010 ESA Bulletin.	Love et al. 2002; Musick et al. 2000; McCain 2003. WDFW 2010; Dick and MacCall 2010.
Eulachon <i>Thaleichthys pacificus</i>	Forage fish. Vulnerable freshwater spawning and nursery grounds. Columbia River population has declined. Other DPS may have experienced similar declines. Southern DPS (WA, OR, CA) listed as Threatened in 2010. Critical habitat designated in 2011.	Love et al. 2002; Musick et al. 2000; McCain 2003. NOAA 2011c.
Gopher rockfish <i>Sebastes carnatus</i>	Low productivity. Sport and commercial harvest. Collected for public aquarium display. Southern OR is northern extent of range. First stock assessment for northern CA stock only and population is considered healthy as of 2005.	Love et al. 2002; McCain 2003. Key et al. 2005
Grass rockfish <i>Sebastes rastrelliger</i>	Low productivity. Population status unknown. Sport and commercial harvest. Incidental catch. Central OR is northern extent of range. Potential for local depletion. Limited habitat. Life history parameters (natural mortality rate; age at maturity) recently determined in NMFS data-poor report.	Love et al. 2002; McCain 2003. Dick and MacCall 2010.
Green sturgeon <i>Acipenser medirostris</i>	Low productivity. Specialized habitat requirements. Late maturity. Long life span. Northern (Klamath and Rogue rivers) and southern (Sacramento River) DPS listed as species of concern by NMFS in 2001. Managed in conjunction with white sturgeon. Southern DPS listed as Threatened in 2006. Critical habitat designated by NMFS in 2009; Northern DPS still listed as species of concern (original listing in 2004); Boundary for the northern and southern DPS in northern CA, but populations mix offshore.	Musick et al. 2000; NOAA 2004. NOAA 2011d.
Kelp greenling <i>Hexagrammos decagrammus</i>	OR population status in good condition; coast wide population status unknown. Sport and commercial harvest. Collected for public aquarium display. First stock assessment completed in 2005; OR sub-stock estimated at healthy levels. Stock assessment uncertainty still extremely high mainly due to lack of growth data. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010.	McCain 2003. Cope and MacCall 2005; PPMC 2005a; Dick and MacCall 2010.

Lingcod <i>Ophiodon elongatus</i>	Coastal stock listed as overfished by PFMC (northern portion of stock, which includes OR, is rebuilt). Sport and commercial harvest. Scientific research collection. Important predator. Stock was listed as overfished in 1999; Overfishing last occurred in 2003. As of the 2009 stock assessment, coast-wide, the stock is now rebuilt.	McCain 2003; Musick et al. 2000. Hamel et al 2009.
Northern anchovy <i>Engraulis mordax</i>	Forage fish. Commercial harvest and minor sport harvest. Northern DPS from northern CA to British Columbia. Stock status of northern subpopulation unknown. Northern sub-population shown to be increasing in relative abundance from 1999 – 2004, with a decrease in 2005-2006. New evidence that copepod abundance may determine year-class strength.	Baraff and Loughlin 2000. Litz et al 2008.
Pacific herring <i>Clupea pallasii</i>	Forage fish. Specialized spawning habitat requirements. Population status unknown. Southeast AK DPS listed as a Candidate Species in 2007. In 2005, ESA petition for Georgia Basin (WA) DPS listing found not warranted.	Baraff and Loughlin 2000; Musick et al. 2000. NOAA 2011e; WDFW 2010.
Pile perch <i>Rhacochilus vacca</i>	Low productivity. Unknown habitats for some life history stages. Population status unknown. Sport harvest. Small commercial harvest in CA. Adults found on inshore oil platforms in CA.	CDFG 2001. Martin and Lowe 2011.
Quillback rockfish <i>Sebastes maliger</i>	Very low productivity. Long-term population declines in Puget Sound (WA). Sport and commercial harvest. Population status unknown. In 2007, ESA petition found to be not warranted. Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010. Listed as Federal Species of Concern in WA 2010 ESA Bulletin.	Love et al. 2002; McCain 2003; Musick et al. 2000. WDFW 2010; Dick and MacCall 2010.
Redtail surfperch <i>Amphistichus rhodoterus</i>	Low productivity. Unknown habitats for some life history stages. Population status unknown. Sport harvest. Minor commercial harvest along west coast. Juveniles and adults found in estuaries along CA and OR coasts.	Love 1996; CDFG 2001. Schlosser and Bloeser 2006.
Rock greenling <i>Hexagrammos lagocephalus</i>	Very little life history information. Some sport and commercial harvest. Population status unknown. Study from eastern Pacific show an extremely wide depth-range and majority of fish caught were female (~80%), suggesting a skewed sex ratio or gear selectivity. No new information from West coast found.	Eschmeyer and Herald 1983. Orlov and Zolotov 2010.
Shiner perch <i>Cymatogaster aggregata</i>	Low productivity. Sport harvest. Collected for public aquarium display. Population status unknown. Unknown habitats for most life history stages. Adults are common in estuaries as prey for salmonids. Differences in jaw bones observed within PNW that may be indicative of differences in diet.	Love 1996. Jones et al 2008; Woods 2010.
Starry flounder <i>Platichthys stellatus</i>	Sport and commercial harvest. Possible localized depletion concerns. First stock assessment in 2005 separated population into two stocks (CA and WA/OR); Northern stock is declining but still considered healthy.	McCain 2003. Ralston 2005.
Striped perch <i>Embiota lateralis</i>	Low productivity. Sport and minor commercial harvest. Population status unknown. Unknown habitats for most life history stages. Evidence of southern range extension in cool PDO years.	Love 1996; CDFG 2001. Larson 2008.

Surf smelt <i>Hypomesus pretiosus</i>	Forage fish. Individual populations have small ranges. Specialized habitat requirements. Commercial fishery in WA and CA. Population status unknown. <a href="#">Extremely specialized habitat requirements for spawning beaches (temperature for substrate and air, light, etc).</a>	CDFG 2001. <a href="#">Rice 2006.</a>
Tiger rockfish <i>Sebastes nigrocinctus</i>	Commercial harvest. Probable low to very low productivity. Very long lived. Long-term population declines have occurred in Puget Sound (WA). Significant research needs regarding life history. Population status unknown. <a href="#">Life history parameters (natural mortality rate; age at maturity) recently determined in NMFS data-poor report.</a>	Love et al. 2002; McCain 2003; Musick et al. 2000. <a href="#">Dick and MacCall 2010.</a>
Topsmelt <i>Atherinops affinis</i>	Forage fish. Migratory behavior unknown. Collected for public aquarium display. Population status unknown. Seven subspecies exist, demonstrating varied behavior and reflecting different environments occupied. <a href="#">Populations shown to be adversely affected when tidal sloughs are not adequately flushed.</a>	CDFG 2001. <a href="#">Madon 2008.</a>
Vermilion rockfish <i>Sebastes miniatus</i>	Low productivity. Sport and commercial harvest. Unknown habitats for some life history stages. <a href="#">First stock assessment in 2005 deemed unreliable.</a>	Love et al. 2002; McCain 2003; <a href="#">PFMC 2005b.</a>
White sturgeon <i>Acipenser transmontanus</i>	Very low productivity. Specialized habitat requirements. Inland population (ID and MT) listed as Endangered. Managed in conjunction with green sturgeon. <a href="#">No longer managed in conjunction with Green sturgeon as of 2006.</a>	Musick et al. 2000. <a href="#">NOAA 2011f.</a>
Wolf-eel <i>Anarrhichthys ocellatus</i>	Susceptible to incidental catch in pots and trawls. Developmental fishery in OR. Population status unknown. <a href="#">First recorded sighting in Baja CA in 2007.</a>	Love 1996. <a href="#">Feeney et al. 2007.</a>
Yelloweye rockfish <i>Sebastes ruberrimus</i>	PFMC listed as overfished in 2002. Very low productivity. Very long lived. Collected for scientific research. Incidental catch. Puget Sound/ Georgia Basin DPS listed as Threatened in 2010.	Love et al. 2002; McCain 2003; Musick et al. 2000. <a href="#">Wallace et al. 2005; NOAA 2011g.</a>
Yellowtail rockfish <i>Sebastes flavidus</i>	Sport and commercial harvest. Incidental catch. Collected for scientific research. <a href="#">Updated stock assessment in 2004 by PFMC. Both OR stocks found to be at healthy levels.</a>	Love et al. 2002; McCain 2003. <a href="#">Wallace and Lai 2004; PFMC 2005c.</a>
<b>Cartilaginous Fishes</b>		
Big skate <i>Raja binoculata</i>	Low to very low productivity. Incidental catch. Research needs regarding population trends. Closely related species in Atlantic experienced stock collapses and local extirpations. <a href="#">Tagging studies show most adults fairly sedentary, with long range movements mostly by immature females. Growth curve determined in Canadian waters.</a>	McCain 2003; Musick et al. 2000. <a href="#">King and McFarlane 2010.</a>
Spiny dogfish <i>Squalus acanthias</i>	Important predator. Low productivity. Long lived. Sport and commercial harvest. Collected for scientific/medical research. Population status unknown. Historic decline of west coast population in 1940s from targeted harvest. Stock assessment due in 2007. <a href="#">Life history parameters (natural mortality rate; age at maturity) determined by NMFS in 2010. Stock assessment due in 2011.</a>	Love 1996; Musick et al. 2000. <a href="#">Dick and MacCall 2010. PFMC 2010b.</a>

Invertebrates		
California mussel <i>Mytilus californianus</i>	Tribal, recreational and commercial harvest. Susceptible to trampling/ wildlife disturbance. Collected for scientific/medical research. Important habitat-forming organism. <a href="#">Study in 2008 demonstrates little coast-wide genetic variation.</a>	Morris et al. 1981. <a href="#">Addison et al 2008.</a>
Dungeness crab <i>Cancer magister</i>	Tribal, recreational and commercial harvest. Larvae important prey. No stock assessment. Regulated by size, sex, and season. Larvae sensitive to pollution. Fluctuations in ocean conditions create variability in abundance year to year. <a href="#">Timing of spring transition tied to larval success and commercial catches.</a>	Morris et al. 1981; Wolotira et al. 1989. <a href="#">Shanks and Roegner 2007.</a>
Flat abalone <i>Haliotis walallensis</i>	Little known regarding life history. Susceptible to winter storms, El Niño events, and sand inundation. Small commercial harvest. Population status unknown. Susceptible to poor water quality and pollution. <a href="#">Distribution reduced by localized extirpation in southern CA and notable declines within central CA reserves. Population status concerns in OR are related to contraction of range and development of commercial fishery.</a>	Morris et al. 1981; Wolotira et al. 1989. <a href="#">Rogers-Bennett 2007.</a>
Giant octopus <i>Octopus dofleini</i>	Concerns regarding unreported incidental catch (catch not recorded at species level). This species has been overfished in Japan in the past. <a href="#">Reclusive species susceptible to increased interaction with humans.</a>	Morris et al. 1981; Wolotira et al. 1989. <a href="#">Anderson et al. 2007.</a>
Ochre sea star <i>Pisaster ochraceus</i>	Keystone species; important predator. Collected for scientific/medical research. Susceptible to wildlife disturbance. <a href="#">Found to have ability to modulate their internal temperature through regulation of fluid in body cavity.</a>	Morris et al. 1981. <a href="#">Pincebourde et al. 2009.</a>
Purple sea urchin <i>Strongylocentrotus purpuratus</i>	Sport and commercial harvest. Susceptible to trampling/wildlife disturbance. Collected for aquarium trade. Collected for scientific/medical research. <a href="#">Recent studies identified a new family of genes important to immune responses; Unique among invertebrates, suggesting a more complex immune system than previously thought.</a>	Morris et al. 1981. <a href="#">Terwilliger et al. 2006</a>
Razor clam <i>Siliqua patula</i>	Tribal, recreational and commercial harvest. Susceptible to disease and natural events such as El Niño. <a href="#">Increased occurrence of closures due to domoic acid concentrations in recent years.</a>	Morris et al. 1981; Wolotira et al. 1989. <a href="#">Tweddle et al. 2010.</a>
Red abalone <i>Haliotis rufescens</i>	Long lived. Specialized habitat requirements. Collected for aquarium trade. Sport harvest in OR and CA. OR is northern extent of range. Susceptible to winter storms, disease, El Niño events, sand inundation, poor water quality and pollution. <a href="#">Recent archaeological evidence suggests long-term (&gt;8,000 years) ecological resilience to fishing and environmental pressures.</a>	Morris et al. 1981; Wolotira et al. 1989. <a href="#">Braje et al. 2009.</a>
Red sea urchin <i>Strongylocentrotus franciscanus</i>	Possibly very long lived. Age at maturity unknown. Sport and commercial harvest. Collected for scientific/medical research. <a href="#">Lives in excess of 100 years.</a>	Morris, Abbott, and Haderlie 1981. <a href="#">Ebert 2008.</a>
Rock scallop <i>Hinnites giganteus</i>	Late age at maturity. Longevity and fecundity unknown. Sport harvest and minor commercial. Population status unknown. <a href="#">Sex ratio even in Gulf of CA. Evidence suggesting that this species could have increased fishery yields with a marine reserves network.</a>	Morris et al. 1981. <a href="#">Cudney-Bueno and Rowell 2008;</a> <a href="#">Cudney-Bueno et al. 2009.</a>

Marine Mammals		
California sea lion <i>Zalophus californianus</i>	Important predator. Low productivity. Populations increasing. Marine mammal-fisheries interaction management issues. Stock status relative to OSP unknown. <a href="#">Stock status is within OSP limits as of 2007.</a>	Baraff and Loughlin 2000; Brown 1997; Carretta et al. 2002. <a href="#">NOAA 2007.</a>
Gray whale <i>Eschrichtius robustus</i>	Low productivity. Habitat engineer. Special habitat needs. State listed as endangered species. Historic population decline throughout range due to harvest; current population in good standing. Distinct summer-resident population may be found in OR. <a href="#">Petition in 2010 to list the eastern DPS (eastern Pacific) as depleted under the MMPA determined to be unwarranted.</a>	Carretta et al. 2002. <a href="#">Arnold 2010; CFR 2010a.</a>
Harbor porpoise <i>Phocoena phocoena</i>	Significant research needs regarding life history and behavior. Important predator. Low productivity. Two separate stocks found in OR: 1) northern CA / southern OR stock determined to be within OSP; and 2) OR / WA coast stock status relative to OSP unknown. <a href="#">Northern CA-southern OR stock within OSP limit as of 2009; Northern OR-WA stock status is still unknown, as of 2009.</a>	Carretta et al. 2002. <a href="#">NOAA 2009a; NOAA 2009b.</a>
Northern elephant seal <i>Mirounga angustirostris</i>	Historic population decline throughout range, current population status is good. Low productivity. May be within their OSP range. <a href="#">No new information on the West coast found.</a>	Brown 1997; Carretta et al. 2002.
Pacific harbor seal <i>Phoca vitulina</i>	Important predator. Low productivity. OR and WA coast population increasing, may be nearing OSP. <a href="#">OR-WA stock is within OSP limits since 2007.</a>	Baraff and Loughlin 2000; Brown 1997; Carretta et al. 2002. <a href="#">NOAA 2011j.</a>
Steller sea lion <i>Eumetopias jubatus</i>	Important predator. Low productivity. Eastern stock (includes OR) listed as Threatened under ESA; eastern AK, WA, and OR populations stable to increasing; central and southern CA populations declining. Stock status relative to OSP unknown. <a href="#">Recovery plan states that the eastern DPS appears to have recovered as of 2008, prompting a review for delisting.</a>	Angliss and Lodge 2002; Baraff and Loughlin 2000; Brown 1997; Stone et al. 1997. <a href="#">NOAA 2011h, CFR 2010b.</a>
Algae and Plants		
Bull kelp <i>Nereocystis luetkeana</i>	Important habitat. Past commercial harvest in OR. Recreational harvest. Removal of some blades may inhibit growth of rest of kelp. Vulnerable to exposure of petroleum products. <a href="#">Removal of blades may also prevent reproduction and eventually kill plant; Also vulnerable to sediment and nutrient runoff in addition to petroleum products; New OR survey of kelp beds conducted in 2010 (results not yet available).</a>	O'Clair and Lindstrom 2000. <a href="#">Springer et al 2006.</a>
Sea palm <i>Postelsia palmaeformis</i>	Susceptible to overharvest (historic overharvest in CA, now protected). Special habitat requirements: restricted to rock exposed to heavy surf. Recreational and commercial harvest. <a href="#">Survivorship, growth, and reproductive output all affected by vertical location in intertidal and varies depending on mussel presence/density.</a>	CDFG 2001; O'Clair and Lindstrom 2000. <a href="#">Nielsen et al 2006.</a>

Surf grass <i>Phyllospadix spp.</i>	Tribal harvest. Important habitat. Specialized oceanographic requirements. Vulnerable to oil spills. Now considered a “foundational” species, due to importance of surf grass to early life history of many fishes; Found that removal of surf grass from intertidal pools affect the temperature and biological community.	O’Clair and Lindstrom 2000. Shelton 2010.
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## Acronyms and Definitions

AK	Alaska
CA	California
DPS	Distinct Population Segment
ESA	Endangered Species Act
ID	Idaho
MMPA	Marine Mammal Protection Act
MT	Montana
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OR	Oregon
OSP	Optimum Sustainable Population
PDO	Pacific Decadal Oscillation
PNW	Pacific Northwest
PFMC	Pacific Fisheries Management Council
WA	Washington (state)

**Candidate species (under ESA):** As defined by the National Marine Fisheries Service; species that are the subject of a formal petition to list under the ESA and for which NMFS has determined that a listing may be warranted (see Section 4 (b) (3) (A) of the ESA for stipulations), as well as species that are not the subject for a formal petition but for which NMFS has announced the initiation of a status review (CFR 71(200) 10-17-2006 61022).

**Critical Habitat:** As defined by the ESA; the specific areas within the geographical area occupied by the species, at the time of listing under the ESA, that have physical or biological factors that are considered essential for the conservation of the species or areas that may require special considerations or protections. Critical habitat can also include areas outside the geographical area occupied by the species at the time of listing that are essential for the conservation of the species (United States Code 16 2003 § Section 3 (5) (A)) and is designated for any species determined to be endangered or threatened under the ESA (United States Code 16 2003 § Section 3 (5) (B)).

**Distinct Population Segment:** As defined by National Marine Fisheries Service; a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The ESA provides for listing species, subspecies, or distinct population segments of vertebrate species. (NOAA 2011i).

**Endangered (under ESA):** As defined by the ESA; any species which is in danger of extinction throughout all or a significant portion of its range other than insects that constitute a pest (United States Code 16 2003 § Section 3 (6)).

**Incidental catch:** Species caught when fishing for the primary purpose of catching a different species (PFMC 2010a).

**Optimum Sustainable Population (OSP):** As defined by the Marine Mammal Protection Act; with respect to any population stock, the number of animals which will result in the maximum productivity of the population

or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element. (United States Code 16 2003 § 1362 (9)).

NOAA fisheries regulations have further defined OSP as “a population size which falls within a range from [the carrying capacity of the] ecosystem to the population level that results in maximum net productivity (CFR 50 Ch. II 10-1-2008 edition § 216.3)

**Overfished:** As defined by the Pacific Fisheries Management Council; any stock or stock complex whose size is sufficiently small such that a change in management practices is required to achieve an appropriate level and rate of rebuilding. The term generally describes any stock or stock complex determined to be below its overfished/rebuilding threshold. The default proxy is generally 25 percent of its estimated unfished biomass; however, other scientifically valid values are also authorized (PFMC 2010a).

**Overfishing:** Fishing at a rate or level that jeopardizes the capacity of a stock or stock complex to produce a maximum sustainable yield on a continuing basis. More specifically, overfishing is defined as exceeding a maximum allowable fishing mortality rate (PFMC 2010a).

**Pacific Decadal Oscillation (PDO):** As defined in Mantua et al. 1997; a reoccurring pattern of ocean and atmospheric variability centered over the North Pacific basin at the mid-latitudes that oscillates on an interdecadal time scale. This climate variability is “a long-lived El Nino-like pattern” (Mantua 2000) that can affect coastal sea and continental air temperatures from Alaska to California (Mantua et al. 1997).

**Threatened (under ESA):** As defined by the ESA; any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (United States Code 16 2003 § Section 3 (20)).

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## VII. APPENDIX B: Non-Native Species

As acknowledged in the 2006 Oregon Nearshore Strategy, non-native species are altering and degrading habitats, increasing threats to native species, and in some cases impacting local economies or causing extensive problems for marine coastal systems of Oregon. Non-native species can be transported locally, regionally, or around the world and introduced to Oregon’s nearshore systems by way of several mechanisms such as hitch-hiking in ballast water or in ocean currents. Once a species has been introduced it can affect food sources, alter habitats, expose native communities to diseases or toxins, or act as parasites of juvenile and adult members of coastal fisheries species. For many introduced species, the severity of the potential ecological threat is not yet known. Many of these species could be deemed invasive in the future, but further efforts to assess impacts are needed. These efforts are a priority for conservation of natural systems because invasions become more complicated to address over time and management measures that respond to the first arriving individuals are most effective.

During the voluntary revision of the Oregon Conservation Strategy and its marine component, the Oregon Nearshore Strategy, efforts have begun to assess available data regarding existing or potential future threats to Oregon’s nearshore and estuarine communities. The Oregon Department of Fish and Wildlife’s Marine Resources Program reviewed available online data and consulted with experts at Oregon State University, the Environmental Protection Agency Western Ecology Division, United States Geological Survey Western Fisheries Research Center, and Williams College. Based on information gleaned from these sources, a list of non-native species was developed. For each species, habitat information was collected and species were identified as being primarily associated with nearshore or estuarine systems.

<b>Non-Native Species</b>	<b>Nearshore<sup>a</sup></b>	<b>Estuarine<sup>b</sup></b>	<b>1: OR Invasive<sup>c</sup></b>	<b>2: OR Non-native<sup>d</sup></b>	<b>3: WA or CA Invasive<sup>e</sup></b>
<b>Bony Fishes</b>					
<b>American shad</b> <i>Alosa sapidissima</i>	X		X		
<b>Atlantic salmon</b> <i>Salmo salar</i>	X				X
<b>Brown trout</b> <i>Salmo trutta</i>	X				X
<b>Chameleon goby</b> <i>Tridentiger trigonocephalus</i>		X			X
<b>Inland silverside</b> <i>Menidia beryllina</i>		X			X
<b>Rainwater killifish</b> <i>Lucania parva</i>		X		X	
<b>Shimofuri goby</b> <i>Tridentiger bifasciatus</i>		X			X
<b>Shokifaze goby</b> <i>Tridentiger barbatus</i>		X			X
<b>Striped bass</b> <i>Morone saxatilis</i>	X		X		
<b>Threadfin shad</b> <i>Dorosoma petenense</i>	X			X	
<b>Western mosquito fish</b> <i>Gambusia affinis</i>		X		X	

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Yellowfin goby</b> <i>Acanthogobius flavimanus</i>		X			X
<b>Invertebrates</b>					
<b>Acorn barnacle</b> <i>Amphibalanus improvisus</i>	X	X		X	
<b>Ambiguous bryozoan</b> <i>Anguinella palmata</i>		X			X
<b>American Atlantic sponge</b> <i>Prosuberites sp.</i>		X			X
<b>Amethyst gem clam</b> <i>Gemma gemma</i>		X			X
<b>Amphipod</b> <i>Ampelisca abdita</i>		X			X
<b>Amphipod</b> <i>Ampithoe lacertosa</i>	X	X		X	
<b>Amphipod</b> <i>Ampithoe valida</i>		X		X	
<b>Amphipod</b> <i>Chelura terebrans</i>	X				X
<b>Amphipod</b> <i>Corophium alienense</i>		X			X
<b>Amphipod</b> <i>Eobrolgus spinosus</i>		X		X	
<b>Amphipod</b> <i>Erichthonius brasiliensis</i>		X		X	
<b>Amphipod</b> <i>Gammarus daiberi</i>		X			X
<b>Amphipod</b> <i>Grandidierella japonica</i>	X	X		X	
<b>Amphipod</b> <i>Incisocalliope derzhavini</i>	X			X	
<b>Amphipod</b> <i>Leucothoe sp.</i>		X			X
<b>Amphipod</b> <i>Melita nitida</i>		X		X	
<b>Amphipod</b> <i>Melita sp.</i>		X			X
<b>Amphipod</b> <i>Microdeutopus gryllotalpa</i>		X			X
<b>Amphipod</b> <i>Monocorophium acherusicum</i>	X	X		X	
<b>Amphipod</b> <i>Monocorophium insidiosum</i>	X	X			X
<b>Amphipod</b> <i>Monocorophium uenoi</i>		X			X
<b>Amphipod</b> <i>Paradexamine sp.</i>		X			X
<b>Amphipod</b> <i>Parapleustes derzhavini</i>		X		X	
<b>Amphipod</b> <i>Ptilohyale littoralis</i>		X		X	
<b>Amphipod</b> <i>Sinocorophium heteroceratum</i>		X			X
<b>Amphipod</b> <i>Stenothoe valida</i>		X			X
<b>Amphipod</b> <i>Transorchestia enigmatica</i>		X			X

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Amur River clam</b> <i>Corbula amurensis</i>		X			X
<b>Asian calanoid copepod</b> <i>Pseudodiaptomus inopinus</i>		X		X	
<b>Asian calanoid copepod</b> <i>Sinocalanus doerrii</i>		X		X	
<b>Asian clam</b> <i>Corbicula fluminea</i>		X	X		
<b>Asian copepod</b> <i>Acartiella sinensis</i>		X			X
<b>Asian copepod</b> <i>Limnoithona sinensis</i>		X		X	
<b>Asian copepod</b> <i>Tortanus dextrilobatus</i>		X			X
<b>Asian cumacean</b> <i>Nippoleucon hinumensis</i>		X		X	
<b>Asian lanternshell</b> <i>Laternula marilina</i>		X			X
<b>Asian sea-squirt</b> <i>Styela clava</i>		X	X		
<b>Asian semele</b> <i>Theora lubrica</i>		X			X
<b>Atlantic oyster</b> <i>Crassostrea virginica</i>		X			X
<b>Atlantic oyster drill</b> <i>Urosalpinx cinerea</i>		X			X
<b>Australasian burrowing isopod</b> <i>Sphaeroma quoianum</i>		X	X		
<b>Australian spotted jellyfish</b> <i>Phyllorhiza punctata</i>	X				X
<b>Australian tubeworm</b> <i>Ficopomatus enigmaticus</i>		X			X
<b>Baltic clam</b> <i>Macoma petalum</i>		X			X
<b>Bamboo worm</b> <i>Sabaco elongatus</i>		X			X
<b>Black Sea jellyfish</b> <i>Blackfordia virginica</i>		X		X	
<b>Black Sea jellyfish</b> <i>Maeotias marginata</i>		X			X
<b>Blacktip shipworm</b> <i>Lyrodus pedicellatus</i>		X			X
<b>Blue mussel</b> <i>Mytilus complex</i>	X				X
<b>Bonnet limpit</b> <i>Sabia conica</i>	X			X	
<b>Brackish water snail</b> <i>Assiminea parasitologica</i>		X		X	
<b>Brown bryozoan</b> <i>Bugula neritina</i>		X		X	
<b>Bryozoan</b> <i>Bugula stolonifera</i>		X			X
<b>Bryozoan</b> <i>Cryptosula pallasiana</i>	X	X		X	
<b>Bryozoan</b> <i>Victorella pavida</i>		X			X
<b>Bryozoan</b> <i>Watersipora arcuata</i>		X			X

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Bryozoan</b> <i>Watersipora subtorquata</i>		X		X	
<b>Bryozoan</b> <i>Zoobotryon verticillatum</i>		X			X
<b>Capitellid worm</b> <i>Capitella telata</i>		X		X	
<b>Channeled whelk</b> <i>Busycotypus canaliculatus</i>		X			X
<b>Chinese mitten crab</b> <i>Eriocheir sinensis</i>		X			X
<b>Ciliate</b> <i>Mirofolliculina limnoriae</i>		X			X
<b>Colonial tunicate</b> <i>Didemnum vexillum</i>		X	X		
<b>Common Atlantic slippersnail</b> <i>Crepidula fornicata</i>		X			X
<b>Common sea grape</b> <i>Molgula manhattensis</i>		X		X	
<b>Convex slippersnail</b> <i>Crepidula convexa</i>		X			X
<b>Copepod</b> <i>Amphiascus parvus</i>		X			X
<b>Copepod</b> <i>Corycaeus anglicus</i>		X		X	
<b>Copepod</b> <i>Coullana canadensis</i>		X		X	
<b>Copepod</b> <i>Limnoithona tetraspina</i>		X		X	
<b>Copepod</b> <i>Oithona davisae</i>		X		X	
<b>Copepod</b> <i>Oithona similis</i>		X		X	
<b>Copepod</b> <i>Pseudodiaptomus forbesi</i>		X			X
<b>Copepod</b> <i>Pseudodiaptomus marinus</i>		X			X
<b>Copepod</b> <i>Pseudomyicola spinosus</i>		X			X
<b>Copepod</b> <i>Stephos pacificus</i>		X			X
<b>Copepod</b> <i>Tortanus sp.</i>		X			X
<b>Creeping bryozoan</b> <i>Bowerbankia "gracilis"</i>	X	X		X	
<b>Crumb-of-bread sponge</b> <i>Halichondria bowerbanki</i>	X	X		X	
<b>Crustacean</b> <i>Deltamysis holmquistae</i>		X			X
<b>Crustacean</b> <i>Eochelidium sp.</i>		X			X
<b>Crustacean</b> <i>Eusarsiella zostericola</i>		X			X
<b>Crustacean</b> <i>Hyperacanthomysis longirostris</i>		X			X
<b>Crustacean</b> <i>Sinelobus sp.</i>		X		X	
<b>Delphaeid planthopper</b> <i>Prokelsia marginata</i>		X			X

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Eastern mudsnail</b> <i>Ilyanassa obsoleta</i>		X			X
<b>Eastern white slipper shell</b> <i>Crepidula plana</i>		X			X
<b>European green shore crab</b> <i>Carcinus maenas</i>	X			X	
<b>False anglewing</b> <i>Petricolaria pholadiformis</i>		X			X
<b>Flat okenia</b> <i>Okenia plana</i>		X			X
<b>Flatworm</b> <i>Koinostylochus ostreophagus</i>		X			X
<b>Foolish mussel</b> <i>Mytilus (trossulus x galloprovincialis)</i>	X				X
<b>Foram</b> <i>Trochammina hadai</i>		X			X
<b>Freshwater hydroid</b> <i>Cordylophora caspia</i>		X		X	
<b>Golden star tunicate</b> <i>Botryllus schlosseri</i>		X		X	
<b>Griffen's isopod</b> <i>Orthione griffenis</i>	X	X	X		
<b>Hard shell clam</b> <i>Mercenaria mercenaria</i>		X			X
<b>Harris mud crab</b> <i>Rhithropanopeus harrisi</i>		X		X	
<b>Hydroid</b> <i>Moerisia sp.</i>		X			X
<b>Hydroid</b> <i>Corymorpha sp.</i>		X			X
<b>Isopod</b> <i>Dynoides dentisinus</i>		X			X
<b>Isopod</b> <i>Eurylana arcuata</i>		X			X
<b>Isopod</b> <i>lais californica</i>		X		X	
<b>Isopod</b> <i>Paranthura sp.</i>		X			X
<b>Isopod</b> <i>Pseudosphaeroma sp.</i>		X		X	
<b>Isopod</b> <i>Synidotea laevidorsalis</i>		X			X
<b>Japanese clam</b> <i>Neotrapezium liratum</i>		X			X
<b>Japanese false cerith</b> <i>Batillaria attramentaria</i>		X			X
<b>Japanese littleneck clam</b> <i>Venerupis philippinarum</i>	X	X		X	
<b>Japanese mussel</b> <i>Musculista senhousia</i>		X			X
<b>Japanese nassa</b> <i>Hima fratercula</i>		X			X
<b>Japanese oyster drill</b> <i>Ocenebrellus inornatus</i>		X	X		
<b>Japanese skeleton shrimp</b> <i>Caprella mutica</i>		X		X	
<b>Lacy crust bryozoan</b> <i>Conopeum tenuissimum</i>		X		X	

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Lagoon sea slug</b> <i>Tenellia adspersa</i>		X		X	
<b>Lake Merritt cuthona</b> <i>Cuthona perca</i>		X			X
<b>Manchurian cecina</b> <i>Cecina manchurica</i>		X			X
<b>Marsh snail</b> <i>Myosotella myosotis</i>		X		X	
<b>Mediterranean blue mussel</b> <i>Mytilus galloprovincialis</i>	X				X
<b>Misaki balloon aeolis</b> <i>Eubranchus misakiensis</i>		X			X
<b>Moon jelly</b> <i>Aurelia sp.</i>	X	X			X
<b>Mysid</b> <i>Orientomysis aspera</i>		X			X
<b>Naval shipworm</b> <i>Teredo navalis</i>		X		X	
<b>New Zealand amphipod</b> <i>Paracorophium sp.</i>		X			X
<b>New Zealand mudsnail</b> <i>Potamopyrgus antipodarum</i>		X	X		
<b>New Zealand sea slug</b> <i>Philine auriformis</i>	X	X		X	
<b>Nodding head</b> <i>Barentsia benedeni</i>		X		X	
<b>Orange anemone</b> <i>Diadumene cincta</i>		X			X
<b>Orange-striped green anemone</b> <i>Diadumene lineata</i>		X		X	
<b>Oriental shrimp</b> <i>Palaemon macrodactylus</i>		X		X	
<b>Oyster redworm</b> <i>Mytilicola orientalis</i>		X		X	
<b>Pacific oyster</b> <i>Crassostrea gigas</i>		X		X	
<b>Pacific transparent sea squirt</b> <i>Ciona savignyi</i>		X		X	
<b>Pile worm</b> <i>Neanthes succinea</i>		X		X	
<b>Pink mouth hydroid</b> <i>Ectopleura crocea</i>		X		X	
<b>Polychaete worm</b> <i>Boccardia claparedei</i>		X		X	
<b>Polychaete worm</b> <i>Boccardiella hamata</i>	X			X	
<b>Polychaete worm</b> <i>Boccardiella ligerica</i>		X			X
<b>Polychaete worm</b> <i>Dipolydora quadrilobata</i>		X		X	
<b>Polychaete worm</b> <i>Eumida sanguinea</i>		X			X
<b>Polychaete worm</b> <i>Eusyllis japonica</i>		X			X
<b>Polychaete worm</b> <i>Heteromastus filiformis</i>	X			X	
<b>Polychaete worm</b> <i>Hobsonia florida</i>		X		X	

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Polychaete worm</b> <i>Manayunkia aestuarina</i>		X		X	
<b>Polychaete worm</b> <i>Polydora cornuta</i>		X		X	
<b>Polychaete worm</b> <i>Polydora limicola</i>		X		X	
<b>Polychaete worm</b> <i>Polydora neocaeca</i>		X		X	
<b>Polychaete worm</b> <i>Proceraea okadai</i>		X		X	
<b>Polychaete worm</b> <i>Pseudopolydora bassarginensis</i>		X		X	
<b>Polychaete worm</b> <i>Pseudopolydora kempii</i>		X		X	
<b>Polychaete worm</b> <i>Pseudopolydora paucibranchiata</i>		X		X	
<b>Polychaete worm</b> <i>Rhynchospio foliosa</i>		X		X	
<b>Polychaete worm</b> <i>Streblospio benedicti</i>		X		X	
<b>Polychaete worm</b> <i>Syllis cornuta</i>		X		X	
<b>Polyp aeolis</b> <i>Cumanotus sp.</i>		X		X	
<b>Purple acorn barnacle</b> <i>Amphibalanus amphitrite</i>		X			X
<b>Purple varnish clam</b> <i>Nuttallia obscurata</i>	X	X	X		
<b>Red beard sponge</b> <i>Clathria prolifera</i>		X			X
<b>Red-gilled Marphysa</b> <i>Marphysa sanguinea</i>		X			X
<b>Red-gilled mud worm</b> <i>Marenzelleria viridis</i>		X			X
<b>Ribbed mussel</b> <i>Geukensia demissa</i>		X			X
<b>Root-arm medusa</b> <i>Cladonema radiatum</i>		X			X
<b>Rope grass hydroid</b> <i>Garveia franciscana</i>		X		X	
<b>Rough periwinkle</b> <i>Littorina saxatilis</i>		X			X
<b>San Francisco anemone</b> <i>Diadumene franciscana</i>		X			X
<b>Sea grape</b> <i>Molgula citrina</i>		X		X	
<b>Sea squirt</b> <i>Diplosoma listerianum</i>		X		X	
<b>Sessile hydrozoan</b> <i>Gonothyrea loveni</i>		X		X	
<b>Single horn bryozoan</b> <i>Schizoporella japonica</i>		X		X	
<b>Skeleton shrimp</b> <i>Caprella drepanochir</i>		X		X	
<b>Starlet sea anemone</b> <i>Nematostella vectensis</i>		X		X	
<b>Steamer clam</b> <i>Mya arenaria</i>		X		X	

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Transparent sea squirt</b> <i>Ciona intestinalis</i>		X			X
<b>Tube amphipod</b> <i>Jassa marmorata</i>	X			X	
<b>Tubificid worm</b> <i>Limnodriloides monotheucus</i>		X			X
<b>Tubificid worm</b> <i>Tubificoides brownae</i>		X		X	
<b>Tubificid worm</b> <i>Tubificoides diazi</i>		X		X	
<b>Tubificid worm</b> <i>Tubificoides wasselli</i>	X				X
<b>Tunicate</b> <i>Ascidia zara</i>		X			X
<b>Tunicate</b> <i>Botrylloides perspicuum</i>		X			X
<b>Tunicate</b> <i>Perophora japonica</i>		X			X
<b>Two-groove odostome</b> <i>Odetta bisuturalis</i>		X			X
<b>Violet tunicate</b> <i>Botrylloides violaceus</i>		X		X	
<b>White anemone</b> <i>Diadumene leucolena</i>		X		X	
<b>White-tentacled japanese aeolis</b> <i>Sakuraeolis enosimensis</i>		X			X
<b>Wood boring gribble</b> <i>Limnoria quadripunctata</i>	X	X			X
<b>Wood boring gribble</b> <i>Limnoria tripunctata</i>	X	X		X	
<b>Plants and Algae</b>					
<b>American sea rocket</b> <i>Cakile edentula</i>		X		X	
<b>Asian kelp</b> <i>Undaria pinnatifida</i>	X				X
<b>Awosa</b> <i>Ulva pertusa</i>		X		X	
<b>Brass buttons</b> <i>Cotula coronopifolia</i>		X		X	
<b>Coast barbgrass</b> <i>Parapholis incurva</i>		X		X	
<b>Dead man's fingers</b> <i>Codium fragile subsp. fragile</i>		X			X
<b>Dense-flowered cordgrass</b> <i>Spartina densiflora</i>		X		X	
<b>English cordgrass</b> <i>Spartina anglica</i>		X		X	
<b>Eurasian water-milfoil</b> <i>Myriophyllum spicatum</i>		X		X	
<b>European sand spurry</b> <i>Spergularia salina</i>		X		X	
<b>European sea rocket</b> <i>Cakile maritime</i>		X		X	
<b>Japanese eelgrass</b> <i>Zostera japonica</i>		X	X		
<b>Japanese seaweed</b> <i>Sargassum muticum</i>	X		X		

## Non-Native Species

	Nearshore <sup>a</sup>	Estuarine <sup>b</sup>	1: OR Invasive <sup>c</sup>	2: OR Non-native <sup>d</sup>	3: WA or CA Invasive <sup>e</sup>
<b>Marsh fleabane</b> <i>Pluchea odorata odorata</i>		X			X
<b>Red algae</b> <i>Caulacanthus ustulatus</i>	X				X
<b>Red algae</b> <i>Ceramium kondoi</i>		X		X	
<b>Red algae</b> <i>Lomentaria hakodatensis</i>	X				X
<b>Red algae</b> <i>Polysiphonia brodiei</i>		X		X	
<b>Redtop</b> <i>Agrostis stolonifera</i>		X		X	
<b>Salt meadow cordgrass</b> <i>Spartina patens</i>		X		X	
<b>Saltmarsh rush</b> <i>Juncus gerardi</i>		X		X	
<b>Smooth cordgrass</b> <i>Spartina alterniflora</i>		X		X	
<b>Spiny naiad</b> <i>Najas marina</i>		X			X
<b>Surf diatom</b> <i>Attheya armatum</i>	X			X	
<sup>a</sup> Nearshore = species is primarily associated with the nearshore marine habitat, between the high tide line and the 30-fathom depth contour.					
<sup>b</sup> Estuarine = species is primarily associated with estuarine habitat.					
<sup>c</sup> 1: OR Invasive = non-native species is present in Oregon and is considered invasive for posing a threat to native species.					
<sup>d</sup> 2: OR Non-native = non-native species is present in Oregon and the threat to native species is unknown					
<sup>e</sup> 3: WA or CA Invasive = species is present in states adjacent to Oregon and is considered invasive.					
Species listed here are associated with nearshore and estuarine west coast habitats, as determined by analysis of data and expert review provided by James T. Carlton, Williams College; John Chapman, Oregon State University; Debbie Reusser, U.S. Geological Survey – Western Fisheries Research Center; Henry Lee, U.S. Environmental Protection Agency – Western Ecology Division; and Gayle Hansen, Oregon State University.					