Oregon Marine Reserves

Human Dimensions Monitoring Report 2010-2011

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Contributing Authors

Thomas C. Swearingen, Ph.D., Marine Reserves Human Dimensions Project Leader, Oregon Department of Fish and Wildlife
Cristen Don, Marine Reserves Program Leader, Oregon Department of Fish and Wildlife
Melissa Murphy, Former Socioeconomic Analyst, Marine Reserves Program, Oregon Department of Fish and Wildlife
Shannon Davis, The Research Group, Corvallis, Oregon
Hilary Polis, The Research Group, Corvallis, Oregon

Cover Photo: Devil's Punch Bowl Overlook Facing South, Otter Rock, Oregon, June 29, 2013.

Oregon Department of Fish and Wildlife
Marine Resources Program
2040 SE Marine Science Drive
Newport, OR 97365
(541) 867-7701 x228

www.dfw.state.or.us/MRP/
www.oregonocean.info/marinereserves

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Executive Summary

I. General Description of Research Purpose and Scope

In 2008, the state of Oregon began a process to establish a limited system of marine reserve sites within state territorial waters. The state established its first two sites in 2009: (1) Redfish Rocks Marine Reserve and Marine Protected Area, located on the south coast of Oregon near Port Orford, and (2) Otter Rock Marine Reserve, located on the central coast near Depoe Bay.

The *Oregon Marine Reserve Policy Recommendations* (OPAC, 2008) provide the basis for marine reserve monitoring. The Oregon Department of Fish and Wildlife (ODFW) is the designated lead agency responsible for implementing Oregon's system of marine reserve sites. ODFW established a program for marine reserves implementation in 2009. One component of the implementation process was the execution of a human dimensions monitoring program.

The Human Dimensions Monitoring Program has been developed by ODFW staff in collaboration with external scientists and marine reserve community members (Murphy, et. al., 2012). Detailed analyses and results are to be presented in biennial monitoring reports. A comprehensive evaluation of Oregon's marine reserve sites will occur in 2023. A minimum time frame of 10 to 15 years is necessary to begin to assess substantive ecological changes. To assist the state's evaluation of the marine reserves, the human dimensions research is designed to determine if (a) Marine reserves increase knowledge of nearshore resources and uses which contributes to resource management; and (b) Individual marine reserves and the entire system avoid significant adverse social and economic impacts to ocean users and coastal communities.

Human dimensions monitoring of Oregon's marine reserve sites is designed to determine the direct and indirect social, cultural, and economic impacts which result from reserve site implementation. Relevant populations include related ocean users, communities of interest, communities of place, and the citizens of Oregon. The intent is to design a monitoring program that provides area specific data, but addresses a sufficiently broad scope of research to be relevant to marine and coastal natural resource management issues throughout Oregon.

This report serves as the first biennial monitoring report covering baseline data collected for the Redfish Rocks and Otter Rock Marine Reserve sites.

II. Site Specific Research: Communities of Place (Community Sociology)

To assess the impacts of marine reserve implementation on the affected local communities (communities of place), baseline socio-economic data were collected to establish a descriptive community profile and to provide more in depth information than provided by the NOAA coastal community profiles (Norman, et. al., 2007). Relevant information included such topics as community history, geography, demographics, economic structure, cultural identity with oceans, occupation identity, and future challenges and issues. A brief description of these studies follows.

Redfish Rocks. Port Orford was initially supported by the timber, mining, and commercial fishing industries. These industries have declined in recent decades, but commercial fishing continues to be a mainstay of Port Orford's economy (City of Port Orford, 2013).

Port Orford residents are culturally connected to the ocean through the fishing and tourism industries. Many Port Orford residents are dependent on fishing for their livelihoods, and residents have a continued interest in maintaining Port Orford as a working commercial fishing town. In addition, tourists are often drawn to Port Orford for the fishing community feel, scenic value, and the popular annual arts and seafood festival held every Labor Day (Norman, et. al., 2007).

The Redfish Rocks site was originally proposed in 2008 by the local non-profit Port Orford Ocean Resource Team (POORT). In 2010, POORT formed a separate Redfish Rocks marine reserve community team that could more broadly represent the local community. The team works in collaboration with the ODFW Marine Reserves Program to provide a community perspective for successful implementation of the Redfish Rocks Marine Reserve.

This study identified significant issues which the study community faces in the future:

A. Port Orford must determine how to provide the services necessary to care for an aging population.
B. Development and retirement pressures will continue to attract more affluent residents, which will make affordable housing an issue for less affluent local residents, as has been the case in the nearby coastal town of Bandon.
C. Many residents believe that the town is in need of revitalization before it can become an overnight destination, rather than a place which most tourists simply pass through (Shoji, 2006).
D. Sedimentation around the dock has reduced the number of hours that boats can utilize the hoist services. Sand inundation has become severe enough to have significant economic impacts on the Port Orford fishing community (Kirby and Kellner, 2010). Army Corps of Engineers dredging is soon planned for Port Orford (USACOE, 2012).

Otter Rocks. Two studies were conducted of the communities associated with Otter Rock Marine Reserve in Newport and Depoe Bay. The cultural attachments of these communities to fishing and the amenities of coastal residence generally reflect fishing community values of many coastal communities. There is a strong personal identity with the occupational community of fishermen and a strong attachment to place. Depoe Bay may be even more dependent on tourism than Port Orford, particularly recreational fishing and charters. Newport has a much more diversified economy than either of the other two communities.

The community of Newport is connected to the Otter Rock Marine Reserve through the community's strong involvement in marine research and fishing. Newport is a known hub for marine science on the Oregon Coast. Hatfield Marine Science Center is home to a number of Oregon State University marine research labs and several governmental research agencies.

The fishing industry also continues to play a key role in shaping the community. The city has a strong working waterfront with fish processing, ship maintenance and other fishing support service facilities. There are an estimated 450 to 500 fishermen in Newport; most people have a family member or friend who works in the fishing industry. This has created an occupational community of interest for those involved in Newport's fishing industry, which enhances the cultural value of fishing to the area (Package and Conway, 2010).

Newport has a potential for economic development in marine research and education (City of Newport, 2013). The city is currently renovating the international terminal of the port to enhance opportunities for international shipping. Additional growth is anticipated in its existing fishing, seafood processing and tourism industries (City of Newport, 2013).

Uncertainty concerning the future of Newport's fishing industry creates challenges for the city and port planning. In addition to the current federal Rockfish Conservation Areas (RCAs) implemented by the Pacific Fishery Management Council, and the state's marine reserves restrictions, fishermen are concerned more restrictions may occur with wave energy development. Competition for space, combined with rising prices for fuel, insurance, and other overhead costs, could result in financial pressures on the Newport fishing industry (Package and Conway, 2010).

During the 1980's, the economic development emphasis placed on tourism and research increased tensions between the tourism and seafood industries. Competing agendas for Yaquina Bay port and harbor development persists (Norman, et. al., 2007).

Depoe Bay has cultural and economic connections to the ocean through its fishing and tourism industries. In recent decades, Depoe Bay has shifted from a prosperous fishing village with a few tourist attractions to primarily a tourism destination with the feel of an historic fishing village (Depoe Bay Chamber of Commerce, 2013). To highlight these attachments, the city hosts numerous festivals and special events throughout the year. The annual Salmon Bake has been celebrated every year since the first fish fry festival in 1930 (Murphy and Hall, 2013).

Depoe Bay fishermen have faced many of the same challenges as those at Newport and Port Orford; increasing fuel and vessel-related costs, more fishing regulations, dredging problems, and economic downturns. These difficulties have caused a decrease in the number of commercial fishermen and an increase in the number of charter and private recreational fishing slips in the town. Depoe Bay doesn't have the infrastructure necessary to support these changes, so the city will need to adapt in order to support the growing population of recreational fishermen.

As is true for many coastal communities, Depoe Bay and Newport have a disproportionate number of residential households in the lowest income bracket in comparison to the rest of the state. As housing costs then become a burden for these families, it is difficult for businesses in these communities to find long-term workers for trade and service jobs, especially in the tourism sector. The large shift in employment demand from natural resource and manufacturing jobs to service-related jobs in the last four decades along the Oregon Coast only exacerbates this issue (Sweeden, et al., 2008).

III. Site Specific Research: Economic Impact Analysis

Economic Impacts of Marine Commercial and Recreational Fishing

A regional economic impact (REI) analysis was conducted to determine the impacts of commercial and recreational landings at Port Orford (Redfish Rocks), Newport, and Depoe Bay (Otter Rock).

Otter Rock. Data are divided into Newport and Depoe Bay when possible. However, many statistics are only expressed in terms of totals for the combined ports. Harbors in the Newport port group are: Newport, Depoe Bay, Siletz Bay, and Waldport.

In 2010, a total of 349 vessels delivered commercial landings to Newport. The total catch in 2010 was 62.6 million round pounds, and the total ex-vessel revenue was $30.6 million. A total of 12 vessels delivered landings to Depoe Bay in 2010. The total commercial catch was 35.8 thousand round pounds, and the total ex-vessel revenue was $72,300. The average annual commercial fishing industry economic contributions between 2008 and 2011 were $157 million in total personal income to the general Newport area economy. Commercial fishing represented the equivalent annual average of 4,865 jobs for the Newport area economy between 2008 and 2011. Fishing income represented 19% of all earned income and 10% of all income sources for the Newport port group

The estimated recreational catch in Newport in 2010 was 110,316 fish, and the total number of recreational angler days was 43,467. The estimated recreational catch in Depoe Bay was 120,004 fish, and the total number of recreational angler days was 18,708. The annual economic contribution of recreational fishing to the Newport economy (in thousands of dollars) totaled $5,823.7 in 2011.

Redfish Rocks. In 2010, a total of 80 vessels delivered landings to Port Orford. The total catch in 2010 was 1,485.7 thousand round pounds and the total ex-vessel revenue was $3,387.2 thousand. This includes a significant live-fish fishery in Port Orford. The commercial live fish harvest in 2010 was 180 thousand round pounds and $530,300 in ex-vessel revenue.

The average annual commercial fishing industry economic contributions between 2008 and 2012 were $4.14 million in total personal income to the Port Orford economy. Commercial fishing represented the equivalent annual average of 130 jobs for the Port Orford economy between 2008 and 2012.

In 2011[1], the sum of the estimated recreational catch in Port Orford was 4,543 fish and the total number of recreational angler days was 1,305. The annual economic contribution of recreational fishing to the Port Orford port group economy totaled $133,482 in 2011.

Spatial Modeling of the Economic Impacts of Marine Reserve Fishing Restrictions

One important issue related to marine reserve implementation is potential displacement of both commercial and recreational fishing, the magnitude of which would be determined by preexisting fishing pressure. To assess this issue, a study was conducted using a spatial economic model to estimate the economic impact of marine reserve fishing restrictions at Otter Rock and Redfish Rocks. Since secondary fisheries data are based on port rather than location, measurement of site specific impacts in this study required disaggregation of the composite data. The investigators used a creative approach using habitat as a proxy in order to allocate the proportion of each type of fishery to the reserve locations.

[1] Recreational anglers at Port Orford were not sampled by Oregon Recreational Boaters Survey samplers in 2009 or 2010, so data from year 2011 was used as a baseline instead.

Spatial harvest and habitat data were used in an economic model to estimate the value of displacing commercial and recreational harvest activities for each reserve site. The results give the maximum economic impact on ocean fisheries and coastal communities which could result from marine reserve site implementation (ignoring substitution of other fishing sites).

Otter Rock. The economic impacts associated with the displacement of fishing effort at Otter Rock were estimated using 2009 catch and economic information, which was the most recent catch data available at the time. The actual economic impact would probably be lower than this estimate, as some displaced commercial fishermen would choose to fish in other areas along the coast, rather than choose to stop fishing.

The 2009 Newport port group commercial fisheries regional economic impact (REI) was estimated at approximately $49.0 million, while the REI of the Otter Rock site harvest was estimated at about $16,000. The displaced commercial harvest at Otter Rock was thus about .03% of the total port group landings. Since the 2009 Oregon Territorial Sea commercial REI was estimated at approximately $17.7 million, the commercial harvest displaced by the Otter Rock Marine Reserve restrictions was about 0.1% of the 2009 Oregon Territorial Sea landings. The total REI from all commercial onshore landings occurring in Oregon in 2009 was $175 million. Thus the potential displaced commercial harvest at Otter Rock was about 0.01% of the total 2009 state-wide commercial onshore landings

The REI of the Otter Rock displaced recreational harvest was estimated at about $21,000. The REI of the 2009 Newport port group recreational harvest was estimated at approximately $5.1 million. Therefore, displaced recreational harvest at Redfish Rocks was about 0.42% of the REI of the 2009 Newport recreational landings. The potential recreational harvest displaced by the Otter Rock Marine Reserve restrictions was about 0.5% of the total Oregon Territorial Sea recreational landings and about 0.2% of the state-wide regional economic impacts of recreational landings.

To summarize, the estimate of the potential decrease in annual personal income from the displaced commercial catch at the Otter Rock site is $16,000. The estimate of the potential decrease in annual personal income from the displaced recreational catch at the Otter Rock site is $21,000.

Redfish Rocks. The same study projected the economic impacts of displaced fishing effort at Redfish Rocks. The REI of the Redfish Rocks site was estimated at about $42,000, while the 2009 Brookings port group commercial fisheries REI was estimated at approximately $12.0 million. This means displaced commercial harvest at Redfish Rocks was about 0.35% of the Brookings port group landings. The potential displaced commercial harvest at Redfish Rocks was about 0.2% of 2009 Oregon Territorial Sea landings and about 0.02% of the total 2009 state-wide commercial onshore landings..

The recreational REI of the Redfish Rocks site was estimated at about $25,000, which was about 1.72% of the REI of the Brookings port group recreational landings in 2009. The potential displaced recreational harvest at Redfish Rocks was about 0.6% of 2009 Oregon Territorial Sea recreational landings. The total REI from recreational onshore landings in Oregon in 2009 was $10.5 million, which means that displaced recreational harvest was about 0.2% of 2009 recreational onshore landings.

To summarize, the estimate of the potential decrease in annual personal income from the displaced commercial catch at the Redfish Rock sites is $42,000. The estimate of the potential decrease in annual personal income from the displaced recreational catch at the Redfish Rocks site is $25,000.

The methods employed in this analysis maximize the stated potential impacts. However, some displacement might result in simple substitution, as other areas are utilized. Thus actual displacement and related economic impacts could be lower than these estimates.

The Economic Contribution from Ocean Research, Planning, and Management Activities at Port Orford

Marine reserves may provide opportunities to generate additional economic benefits related to research, planning and management activities in the affected communities. To assess the economic impact of these activities, this study focused ocean research, planning, and management projects conducted at Port Orford between 2008 and 2012. Modeling results indicated that the average annual local spending from the surveyed projects contributed $0.48 million in total personal income in the region (includes the "multiplier effect"). Based on countywide average earnings, the economic contributions of these projects represent 15 jobs. For perspective, this is about 12 percent of the onshore landings commercial fishing industry economic contributions. The economic contribution of the commercial fishing industry represents a large proportion (24%) of all residential earnings in Port Orford (an equivalent job count of 130).

The economic impacts of these projects are not trivial. The results illustrate the importance of the planning and research projects in relation to traditional ocean uses at Port Orford, useful information related to community economic development. With adaptations in the survey instrument, periodic replications of this study can monitor the regional economic contribution of scientific research, planning, and management activities, and whether any changes in the economic contribution of these activities can be attributed to the Redfish Rocks site.

Marine Reserve Pressure Counts.

A pilot study of visitor monitoring techniques was conducted to profile the Otter Rock reserve site visitors. Data were collected from different viewpoints several times a day for several weeks during the summer of 2011. A total of 148 observation periods occurred over the twenty-five day data collection period.

During the data collection period, 3,019 visitors were observed at the Otter Rock site, an average of 121 visitors per observation day. A total of 1,115 vehicles were observed over the twenty-five day data collection period, an average of twenty-two vehicles per day.

The most visitors were adults (62%), followed by children (22%), seniors and young adults. The majority (70%) of the visitors at the Otter Rock marine reserve site were identified as general beach users. Other visitor activities included surfing (22%), and walking pets.

Survey of Marine Reserve Community Businesses

Implementation of reserve site restrictions could impact businesses in the adjoining coastal communities. A survey of the business communities was developed to gauge owner and employee perceptions of potential marine reserve impacts. Business structure was used to define a matrix of business types within each community. A stratified sample of business owners, managers, and key employees was then selected based on the community business matrices. The purpose was to assure a representative sample of subjects was interviewed across the breadth of all business types in each community.

Otter Rock. A total of 90 interviews were conducted in the communities of Newport, Otter Rock, and Depoe Bay. Interview responses indicated that 77% of community businesses were locally owned with an average of 13 year round employees. The majority (61%) of these businesses did not employ any seasonal staff. The average business age was 25 years, and 54% of respondents considered their customer base to be primarily local residents. More than half of

the respondents were aware of the marine reserve (53%), but not the community involvement process (36%).

A large majority (67%) of the respondents in these business communities considered the natural beauty of the area to be the primary motive for coastal visitation. A substantial portion (38%) of respondents thought the marine reserve site would have a positive impact on visitation, 49% believed there would have no impact on visitation, and 13% stated that there was a potential for an increase in visitation. Similarly, 20% of the respondents believed that marine reserves would have a positive impact on business, 66% believed that they would have no impact on business, and 14% believed that the reserve might have a positive impact on business

Redfish Rocks. Eighteen business owners, managers, or key employees in the business community of Port Orford were interviewed. Respondents indicated that 89% of the businesses were locally owned, with an average of six (6) full time employees, and 61% had no seasonal employees. These businesses had been in Port Orford for an average of 31 years. Of the individuals surveyed, 51% identified their customer base as local residents. The majority of individuals surveyed were aware of the marine reserve (89%) and the community involvement process (67%) focused on the implementation of the reserve.

Seventy-two percent (72%) of respondents considered the natural beauty of the area to be the primary motive for visitation. In addition, 44% of respondents thought that the marine reserve site would have a positive impact on visitation. Responses concerning business impacts were very similar; 33% of respondents believed that the reserve site would have a positive impact on business, 28% believed that it would have no impact on business, and 39% believed that there could be a potential positive impact on business.

IV. Non-Site Specific Marine Reserves Human Dimensions Research

Defining Marine Ecosystem Services and Related Bioindicators

Ecosystem services valuation is a research method to establish the economic value of the human benefits (or services) that ecosystems provide. Examples of these services in a marine context include provision of fish for harvest and environmental control of water quality. In this study, investigators from Oregon State University (OSU) conducted a focus group exercise to identify community perceptions of marine ecosystem services. This project then used an innovative approach to relate bioindicators (measures of biotic attributes) to these marine ecosystem services. Bioindicators are variables generally monitored and measured by ecologists, such attributes as the number of fish harvested or the variety of plants, animals, and habitats within a specific area such as a marine reserve. Bioindicators can be used to identify changes in resource quality or quantity, such that meaningful expressions of change in the related ecosystems services might be quantified.

Subjects who participated in this study were selected based on residence within the marine reserves communities of place (Port Orford, Depoe Bay/Newport), engagement in the reserve planning process, and stakeholder group association. Focus group participants were thus an opportunity sample of knowledgeable insiders.

The two focus groups were asked to identify a range of human benefits they perceived to be provided by the local marine environment. The groups were then asked to relate these perceived benefits to specific types of ecosystem services. After these focus group meetings, the investigators derived a list of relevant bioindicators from a literature review, with further list refinement based on input from scientific experts at OSU and with ODFW.

Finally, researchers conducted a second community focus group exercise to review the selected bioindicators and their relationships to the ecosystem services identified in the earlier exercise. The result should be a set of bioindicators and related ecosystems services of clear relevance to the communities of place surrounding the marine reserves. This process would assure the measures are consistent and reliable when used in related ongoing research.

These items were used in an analysis to investigate the relative importance of the ecosystem services to marine reserve stakeholders. Such an analysis is a requisite step to the development of a procedure for quantifying the relative value of the ecosystems services for utilization in future research. These results can then be used to assign economic values to these ecosystem services, which can be used as one approach to quantify impacts related to marine reserves.

Table 45. Rank Order of Respondent Preferences for Ecosystem Services

Rank Order	Survey item	Mean Rank
1	Number and Size of Fish and Shellfish	8.10
2	Variety of Sealife	7.40
3	Natural Integrity of Marine Ecosystem	7.30
4	Natural Sustainability of Fish and Shellfish Stock	6.63
5	Outdoor Recreation and Leisure	6.33
6	Cleanliness of Ocean Water	5.77
7	Abundance of Seabirds	5.45

7	Availability of Fish and Shellfish for Harvest	5.45
9	Natural Aesthetic of the Seascape	4.92
10	Abundance of Marine Mammals	4.87
11	Coastal Culture and Lifestyle	3.78

Friedman's Q Statistic, Chi-Square = 49.72; N = 30; d.f. = 10

Source: (Freeman 2012)

Coastal Resident Attitudes and Perceptions

Investigators from OSU designed a preliminary study to ascertain coastal residents' perceptions of marine reserves. The study consisted of a mail survey to a representative sample of Oregon coastal residents to understand their knowledge, attitudes, and behavioral intentions with respect to the five marine reserve sites. The objectives of this study were to understand coastal resident:

- Knowledge of the marine reserve sites
- Attitudes toward the reserve sites
- Perceptions of the effectiveness of reserves
- Behavioral intentions in relation to the reserves

A stratified random sample of 2,600 addresses was equally divided into two subpopulations: (a) residents living near the five marine reserve sites (i.e., communities of place), and (b) residents along the rest of the coast (i.e., general coastal sample).

More than two-thirds of respondents had positive attitudes towards the benefits of these areas. A majority of respondents trusted the ODFW to manage these areas and would vote in favor of reserves, should that opportunity arise.

The results indicate respondents do not expect marine reserves and protected areas to significantly change coastal tourism. While nearly 1/3 (29%) of respondents thought they might visit other areas on the coast instead of the reserve area, 22% of respondents thought they would visit reserve areas more often. Their behavior could offset the economic impact of residents who said they would stop visiting the sites (14%) or visit the sites less often (15%). Viewed from this broader perspective, respondents expect minimal change in economic impacts associated with local visits and tourism to the marine reserves.

It is clear that coastal resident knowledge about these reserves is minimal, and more outreach is warranted to inform the public about these areas. Residents would prefer this information to be disseminated through channels such as local newspapers, radio, and television.

There was significantly higher support and more favorable attitudes towards marine reserve sites among residents in the communities of place (82%) compared to the rest of the coast (65%). This is important because these communities are more likely to be affected by reserve implementation and related management decisions. Individuals living along the rest of the coast and elsewhere, however, are still an important constituency that could be impacted by these reserves.

Periodic replications of such research can monitor temporal changes in coastal resident attitudes and perceptions. Additional research to also assess the knowledge and perceptions of

non-coastal Oregon residents could be conducted with the inclusion of residents located state-wide or west of the Coast Range along the I5 corridor.

Economic Impacts of Marine Recreational Fishing: Pilot Study

The Ocean Recreational Boating Survey (ORBS) is an important tool for collecting data on Oregon's coastal fisheries and was used to collect additional socioeconomic data from recreational fishermen. In this study, ORBS field personnel asked recreational fishermen to fill out postcards with their contact information. This contact information was then used to conduct subsequent phone interviews to gather data about angler activities and expenditures associated with recreational fishing trips in Oregon. Collecting such behavioral information in a general context, not associated with a specific marine reserve site, allows creation of a database with broad managerial relevance. These data also enable an assessment of recreational fishing activities around marine reserve sites and estimation of the economic impacts of marine reserve restrictions. One purpose of the phone interviews was to study displacement of these fishing activities.

Postcards were distributed from October 2011 to October 2012, and phone interviews were conducted simultaneously with distribution. Interviews of 58 recreational fishermen were conducted. The data are aggregated for Port Orford, Newport, and Depoe Bay (communities of place associated with the Otter Rock and Redfish Rocks sites).

Recreational fishermen interviewed took a total of 951 trips each year to the port where they were contacted; an average of 19 trips per year and a median of 11 trips per year. The greatest percentage of annual angler spending was for boat fuel (24% of total spending, $1,360 mean per angler per year) and travel. Other spending categories included lodging (14%), buying food (12%), eating at a restaurant (12%), charter or guide fees (9%), and gear and bait, (8%). Actual trip cost includes foregone income while on a fishing trip (opportunity cost). About 12% of all anglers gave up income to go on their fishing trip, and 9% of anglers used vacation days to go on their trip. The majority of anglers interviewed (86%) owned a boat.

Anglers were asked what they would hypothetically do if there was a new closure regulation that prevented them from fishing the area where they fished most during their trip. Only 7% of fishermen responded that they would stop making fishing trips completely if a spot closure was implemented at their favorite fishing site. The responses to this question lead to the prediction that the Oregon coastal economy is unlikely to see major changes in recreational expenditures associated with reserve site implementation.

V. Conclusion and Implications

The first biennium of human dimensions monitoring created a large body of work. The economic impact analyses are noteworthy in the identification of limited potential impacts of implementation of the Otter Rock and Redfish Rocks reserves. However, these economic impact studies were equally important in the work directed toward creation of models which used disaggregating catch data, defined by habitat, to reflect local impacts of change in fisheries. This is pioneering research important to determination of localized economic impacts in the coastal zone. This research will be adapted over the next biennium to utilize newer catch data and more refined procedures for data disaggregation.

The long form social profiles of the coastal communities were useful in identification of both unique and similar characteristics of the affected communities of place. This information is complementary to the efforts of NOAA to compile comprehensive coastal community profiles using secondary data sources. Identification of the fishing occupational communities is an important outcome of these studies. Additional sociological information profiling community adaptability and resilience is needed, and this work will dovetail with the recent development of NOAA indices of community vulnerability and resilience for the Pacific Coast.

The survey research on coastal resident attitudes and perceptions of the reserves and larger marine issues is the most comprehensive recent effort to describe these constructs among this population. Additional analyses of these data should help develop greater insight into the relevance of this information to Oregon near shore management. The study has created baseline data to assess attitudinal change across the coast over time. In addition, this study should be adapted to assess other Oregon residents' perceptions and attitudes toward the reserves and larger coastal zone issues.

The original schedule of the marine reserve human dimensions monitoring activities was created in consultation with a socio-economic science advisory group and affected community members. The purpose was to plan a longitudinal socio-economic research agenda which met the scientific and monitoring mandate for the reserves (Murphy, et. al., 2012). With the completion of this first biennial report, this schedule is under review, as the Human Dimensions program is adapted to reflect knowledge gained during this first round of research. Most studies will be revised to address the following criteria: efficiency of agency and partner resource utilization, nearshore managerial relevance of the information, and longitudinal replicability of the study for comparative monitoring purposes.

I. Introduction

A. Monitoring Report Purpose

In 2008, the state of Oregon began a process to establish a limited system of marine reserve sites within state waters. The state established its first two sites in 2009: (1) Redfish Rocks Marine Reserve and Marine Protected Area, located on the south coast of Oregon near Port Orford, and (2) Otter Rock Marine Reserve, located on the central coast near Depoe Bay.

The Oregon Department of Fish and Wildlife (ODFW) is the designated lead agency responsible for implementing Oregon's system of marine reserve sites. To that effect, in 2009, ODFW established a program comprised of staff responsible for marine reserves implementation. One component of marine reserves implementation is the design and execution of a human dimensions monitoring program, to provide information for marine reserve site evaluation and to support nearshore resource management.

The Human Dimensions Monitoring Program has been developed by ODFW staff, with collaboration and assistance from external scientists and marine reserve community members, and is designed for the long-term monitoring of Oregon's marine reserve system. The *Oregon Marine Reserves Human Dimension Monitoring and Research Plan* (Murphy, et. al., 2012) documents the monitoring program objectives and research design. Detailed analyses and results are to be presented in biennial monitoring reports.

This report serves as the first biennial monitoring report covering baseline data collected for the Redfish Rocks and Otter Rock Marine Reserve sites, prior to the cessation of harvest activities.

B. Oregon's Policy Guidance

State mandates and guidelines for Oregon's marine reserves are provided in Executive Order 08-07 (2008), House Bill 3013 (2009), Senate Bill 1510 (2012), administrative rules adopted by state agencies (OAR 635-012, OAR 141-142, and OAR 736-029), and in the *Oregon Marine Reserve Policy Recommendations* adopted by the Oregon Ocean Policy Advisory Council (OPAC) in 2008.

The OPAC policy recommendations provide the foundation for ODFW's monitoring of marine reserves. This chapter outlines the key definitions, goals, and objectives provided by OPAC that guide ODFW's human dimensions monitoring.

B.1 Marine Reserve Definition

As established in the OPAC policy recommendations, Oregon defines a marine reserve as:

> …an area within Oregon's Territorial Sea or adjacent rocky intertidal area that is protected from all extractive activities, including the removal or disturbance of living and non-living marine resources, except as necessary for monitoring or research to evaluate reserve condition, effectiveness, or impact of stressors. (OPAC, 2008)

B.2 Marine Reserve Goals

The goals of Oregon's marine reserves are to:

> Protect and sustain a system of fewer than ten marine reserves in Oregon's Territorial Sea to conserve marine habitats and biodiversity; provide a framework for scientific research and effectiveness monitoring; and avoid significant adverse social and economic impacts on ocean users and coastal communities.
>
> A system is a collection of individual sites that are representative of marine habitats and that are ecologically significant when taken as a whole (OPAC, 2008).

B.3 Marine Reserve Objectives

Marine reserve objectives, established in the OPAC policy recommendations, provide further guidance in planning and implementation of Oregon's system of marine reserve sites. Marine reserve objectives that direct the design of the human dimensions monitoring program include:

- Site fewer than ten marine reserves and design the system in ways that are compatible with the needs of ocean users and coastal communities. These marine reserves, individually or collectively, are to be large enough to allow scientific evaluation of ecological effects, but small enough to avoid significant adverse social and economic impacts on ocean users and coastal communities.
- Use the research and monitoring information in support of nearshore resource management and adaptive management of marine reserves.

B.4 Marine Protected Areas

Marine Protected Areas (MPAs), which allow certain specified extractive activities, are also included in Oregon's limited system. During monitoring and evaluation of the marine reserve system, ODFW focuses only on those MPAs that are considered complementary to a marine reserve. That is, the MPA must complement the marine reserve in its protection of species and habitats most likely to respond to prohibition of pre-existing extractive activities. This may occur when an MPA:

- Provides protection to fish and invertebrate species that are likely to benefit from, or show a response to, prohibition of the pre-existing extractive activity
- Provides a protective species buffer area to a marine reserve
- Provides an ecological corridor for fish species growth-related or seasonal movement
- Protects habitat forming and long-lived invertebrate species from habitat destructive extractive activities or development

B.5 Marine Reserves Evaluation

An evaluation of Oregon's marine reserve sites was to be conducted when the system of reserve sites has been in place for a minimum of 10-15 years. This comprehensive evaluation will occur in 2023. There is general agreement, however, that this time frame is too brief for substantive ecological changes. This duration will allow time for constructive ecological and

human dimensions research of relevance to near shore management in Oregon. The evaluation will focus on the degree to which each marine reserve, and the system as a whole, is meeting the OPAC marine reserve goals and objectives. The evaluation will provide information so the state can determine whether the marine reserves should continue as a nearshore resource management tool in the future.

To assist the state's evaluation of the marine reserves, long-term human dimensions monitoring is designed to address the following:

- Determine if marine reserves increase our knowledge of Oregon's nearshore environment, resources, and uses. Ascertain if this information is useful to support nearshore resource management.
- Determine if the marine reserves and associated MPAs, and the system as a whole, avoid significant adverse social and economic impacts to ocean users and coastal communities.

II. Monitoring Program Design

The purpose of human dimensions monitoring of Oregon's marine reserve sites is to provide information on the socioeconomic impacts of marine reserve implementation and to support nearshore resource management in general. This chapter provides an overview of the monitoring design that was implemented for baseline characterization of the Redfish Rocks and Otter Rock sites.

A. Human Dimensions Monitoring Scope

Human dimensions monitoring of Oregon's marine reserve sites is designed to determine the direct and indirect social, cultural, and economic impacts which result from reserve site implementation. Study subjects include related ocean users, communities of interest, and communities of place. The information collected through this process should be relevant to other marine and coastal natural resource policy issues in Oregon. Thus, the intention is to design a monitoring program that provides area specific data, but also addresses a sufficiently broad scope of research to assist state-wide coastal resource management.

A.1. Monitoring Framework

This section describes the monitoring framework used to guide research and monitoring strategies for individual sites and the marine reserve system as a whole. The focus of monitoring strategies will evolve as new data are collected and analyzed, and strategies will be adapted to the needs of stakeholders, scientists, and policymakers over time. The activities listed here offer data to address the effects, both direct and indirect, of marine reserve and MPA implementation on stakeholders. The results should also prove useful in broader marine spatial planning and nearshore management in Oregon.

A.1.a. General Social and Economic Characterization of the Area

For each marine reserve site, a socio-cultural and economic characterization of the directly affected coastal communities is developed. This includes information such as historical records, community demographics, social and economic structure, cultural and social events, and residents' related attitudes and values. This characterization of the communities is an attempt to establish both baseline data and procedures for future community monitoring.

A.1.b. Direct Use of the Area

The first step to assess marine reserves use is an analysis of quantitative, qualitative, and spatial data from commercial and recreational fisheries. These data are obtained through logbooks, port sampling, on-board observer programs, and interviews or survey instruments. This analysis will define physical uses of the sites, which fisheries occur in these areas, and stakeholders which may be affected by displacement or disruption of these activities. Data are also gathered on non-consumptive use of the ocean and shores connected to the reserves. These baseline data will define uses which existed prior to implementation of reserve harvest restrictions. Replicating this work will allow identification of new uses which may develop with implementation of the reserve sites. Additional related data collected from these users of the area will be used to further develop social and economic impact analyses during monitoring.

A.1.c. Stakeholder Attitudes toward Reserve Implementation and Management

Knowledge of stakeholder attitudes toward reserve implementation (monitoring, research, management, and enforcement) will help improve reserve management. Understanding these attitudes will also help the agency design education and outreach to enhance public knowledge of marine reserve objectives. The purpose is to convey to the public how stakeholder involvement and attitudes will help improve marine reserves policy and management. Collecting this information will allow ODFW to adapt strategies to better serve the public and to enlist stakeholder engagement in successful reserve implementation and management.

A.1.d. Assessment of the Non-market Values of the Area

A more robust description of the economic and social impacts of the reserves will include identification of the non-market values of the sites. A comprehensive list of reserve recreational users and other non-market stakeholders is required. These constituencies will be the subjects of research to assess the importance of the reserves to these stakeholders, and the importance of their activities to the affected communities.

Additional research will identify other non-market values associated with the reserves, such as ecosystem services (see Chapter VII, Glossary). The purpose is to develop measures of these non-market values and benefits of the reserves. Studies may also address additional dimensions of social perceptions of the reserves, such as connections of communities of interest and place to the landscape.

B. Research Questions

To assist in prioritizing information needed for marine reserve site evaluation and to focus monitoring efforts, the following research questions have been posed:

1. Who are the consumptive users of the site, comparison areas and general vicinity? What are these uses? What is the level of consumptive use? How does this use change over time?
2. What are the social, cultural, and economic characteristics of the communities of place? How are these variables tied to the site? How do these change over time?
3. What are the attitudes and perceptions held by members of the various communities (place and interest) concerning site implementation? What are the motivating variables behind these attitudes and perceptions? How do these attitudes and perceptions change over time?
4. What are the social, cultural and economic impacts on consumptive users from displaced activities? How do these effects change over time?
5. Who are the non-consumptive users of the site, comparison areas, and general vicinity? What are these uses? What is the level of non-consumptive use? How does this use change over time?
6. What are the non-market values associated with the site? Specifically, what are the intrinsic values associated with the site, and how do these values change over time?

III. Monitoring and Research Methods

This chapter provides an overview of the monitoring activities and research methods employed for baseline characterization of the Redfish Rocks and Otter Rock sites. The results of these monitoring activities are then presented in Chapter IV.

A. Communities of Place

The following section describes monitoring methods used to describe each community of place. A community of place is defined as: a social group connected through a specific location in which they spend a large portion of their time, such as a town, a fishing port, a tavern, or vacation spot (Glossary, Chapter VII). The communities of place discussed in this report were defined by their proximity to the marine reserve sites and their connection to the local marine environment. One community, Port Orford, was chosen for study related to the Redfish Rocks Marine Reserve and two communities, Depoe Bay and Newport, were identified for study related to the Otter Rock Marine Reserve.

A.1 Economic, Social, and Cultural Overview of Marine Reserves Communities

An assessment of the impact of marine reserves on communities of place requires background knowledge on the social and economic characteristics of these communities. This information provides a context for the relationship between communities of place and the marine reserves. Social and economic information was gathered from multiple sources, including NOAA Short-Form Fishing Community Profiles (Norman, et. al., 2007), US census data, EDA working waterfronts descriptions (Urban Harbor Institute, 2013), and city planning reports, and then divided into the following sections:

1. *Historical Information* - Describes how prominent industries became established in the area and how the dominance of different industries and aspects of each community have shifted over time.

2. *Community of Place* - Describes how each selected community of place is connected to their local ocean environment.

3. *Geography* - Includes maps of the communities of place and a brief description of each location.

4. *Demographics* - Features graphics, tables, and descriptions that show city population, racial distribution, age distribution, education level, median income, and changes in these statistics over time.

5. *Market Drivers* - Features graphics, tables, and descriptions about the composition of industries, employment categories, and employment rates for each community of place.

6. *Future Challenges* - Highlights potential challenges that communities of place may face in the coming decades, including changes in demographic compositions and declining fishing industries.

A.2 Fishing Community Profiles

Social profiles of the fishing communities connected to the marine reserves were developed through first person interviews with key fishing community members, such as commercial, charter and recreational fishermen (active and retired), fishermen's wives and partners, dock workers, processors, and other key community members (long-time residents and business owners). These 'long form' profiles describe the sociology of these fishing communities and offer an in-depth understanding of the social structure, opinions, history, and culture of fishing communities along the Oregon Coast.

Short form profiles, such as those produced by NOAA or the U.S. Census Bureau, describe the general demographic characteristics of a place. In contrast, 'long form' profiles highlight the interconnectedness of these communities and provide insight into how marine reserve sites may affect their social structure. Existing fishing community profiles developed at Oregon State University proved to be very informative during the marine reserves planning process. ODFW then chose to continue this research with other affected fishing communities along the Oregon Coast.

Each community profile in divided into eight sections which contain a summary of the perspectives and information provided through interviews. Some verbatim comments are included in the final profiles, to give more depth and color to the profile, but no individual identities are revealed. The eight sections are:

- Importance of Fishing to the Community of Place
- Characteristics of Fishing Community Members and their Families
- Boundaries: Connection between the Fishing Community and the Community of Place
- Communication within the Fishing Community and between the Fishing Community and Others
- Perspectives on Management and Effects of Management
- Change in Fishing and Seafood: Economics and Fishing Effort
- Perceptions of the State of the Ocean and its Resources
- Perceptions of the Future

Information about the accessibility of fishing services for each community is also included. Each final profile was reviewed by community participants for accuracy, and then edited in response to the critiques of these community members.

B. Marine Reserve Stakeholder Groups

Potential socioeconomic impacts on the ocean user groups most affected by marine reserve implementation were identified. A series of studies then addressed these potential impacts on the various ocean user groups. The procedures employed in these studies are described in the following section.

B.1 Modeling the Economic Impacts of Marine Reserve Fishing Restrictions Using Spatial Habitat and Fisheries Data

In this study, spatial harvest and habitat data, and economic models were used to estimate the average economic consequences from displacing commercial and recreational harvest activities from within each reserve site. The results give the maximum economic risk to which ocean

fisheries users and coastal communities would be exposed from marine reserve site management (i.e., cessation of harvest activities). This discussion provides an overview of the scope and methods employed in the study. A synopsis of the results pertaining to the cumulative economic impacts from all five of Oregon's marine reserve sites (Redfish Rocks, Cape Perpetua, Otter Rock, Cascade Head, and Cape Falcon) is presented later in this report (see Chapter V). A link to the complete project report is available in Appendix 2.

The modeling was a simulation, cross sectional model[2]. Best available information was used for statistical downscaling known data and data relationships from a reference area level to a discrete MR's level. Such an exercise assumes there is a continuum within the spatial block where the information was known. Yet spatially complex fish resources populating the reference area and MR's likely make such an assumption suspect. There is growing evidence for spatial and temporal fish species hotspots and it is unknown whether Oregon's system of MR's is congruent with this behavior. If any or all of the MR's were (were not) consistent hotspots, then using downscaling would understate (overstate) the economic consequences.

The following methodology was developed and applied to derive the displacement estimate:

1. Definitions were adopted for baseline commercial and recreational fishing activities that took place within MR's and reference areas. Commercial fishing logbook and other spatially defined information about MR's harvest activity was supplemented with interviews with local commercial fisherman, charter service operators, and recreational anglers.
2. The reference areas were chosen because they included the same harvest activity types and habitats as MR's and did not have spatial data limitations.
3. Available economic models with the potential to be useful for economic consequence estimates were researched.
4. Information about the likelihood of different fish species to occupy different habitat types was gathered and compiled for both reserve sites and reference areas.
5. Harvest levels were associated with habitat quantity and quality in the reference areas. It was assumed that the MR's habitat allowed for same harvest levels as reference areas.
6. Average economic consequence estimates for harvest activities at reference areas and MR's were calculated using an existing commercial and recreational fishing economic model.
7. Models were generalized so that it could determine economic consequence estimates for different MR's designs and locations.

At the most basic level, the devised methods were to develop a regional economic impact (REI) spatial ratio estimator that would be applicable to the known physical characteristics of the sites. Those site characteristics, such as area size and habitats, could be determined using surficial geologic habitat (SGH) maps from the Oregon State University Active Tectonics and Seafloor Mapping Laboratory. The ratio estimator's numerator would be the economic effects generated from the fisheries harvests and the denominator would be likely fishing grounds habitat area. The numerator includes the composite effects of fisherman behavior to such influences as weather, knowledge about the fishing grounds, marginal benefits/costs, and other skipper

[2] The model is not suited for predicting biological responses or human behavioral responses to dynamic ecological relationships and economic optimization theory (sometimes referred to as bioeconomic modeling) that might occur due to consideration of marine reserve site design or management alternatives.

factors. The denominator would include the fish propensity to occupy the water column associated with different habitats. A fish exhibiting migratory behavior such as salmon would be assigned habitat area commensurate with wherever they were harvested rather than areas of particular habitat. A fish that prefer certain habitat types, such as rockfish, would be assigned an area only for their proclivities to associate with a certain natural habitat type.

Species level onshore landed catch information was studied for possible inclusion in the model. State and federal required commercial fishing logbook data were reviewed to determine target fisheries that occurred within and nearby the MR's. There were discussions with fishery managers and input from fishermen groups about target fisheries. The discussions resulted in many onshore landed species such as deep water pelagic species being excluded from model development.

Based on information about influences from California Current circulation patterns, two ocean regimes were used for the reference area habitat assignments. Cape Blanco is an approximate boundary for different fish resource behavior patterns. It was assumed fishery performance would be sufficiently dissimilar within the two regimes (north and south of Cape Blanco) to justify the complexity.

B.2 Economic Impact of Marine Commercial and Recreational Fishing in Oregon

Commercial and recreational fishing are two industries that depend heavily on the availability of marine resources, and therefore the effects of marine reserve site exclusions will likely impact them. Consequently, it is essential that economic data for the commercial and recreational fisheries associated with communities of place be examined throughout the implementation process. Monitoring these data over time can help detect any major changes in the industries that may be associated with marine reserve site implementation. The types of data used to monitor the economic status of fishing industries associated with communities of place over time include: commercial ex-vessel revenue, share of harvest by major fisheries, commercial landings by catch and gear type, number of vessels, purchaser and processer information, harvest volume and trends, and recreational trips and landings. Also included are calculations of the economic contributions of both the commercial and recreational fishing industries to local economies. These figures can be used for comparisons between different industries, communities of place, and time periods.

B.3 Pressure Counts of Area Usage by Stakeholders

An important aspect of establishing baseline data on a marine reserve is determining the use of the reserve site. An observation procedure was used at the Otter Rock site to assess the utility of that method for collecting data on visitors' activities and demographics. This method, referred to as pressure counting, produces a description of visitor use of the area for a given time frame. While not a complete description of use, this information does provide a better understanding of the type of visitor activities occurring on the sites.

Observations of activity at the Otter Rock site were taken from late July to late September 2011, for a total of 25 observation days. Observations were made at two locations above the Otter Rock reserve area; The Inn at Otter Crest and the Devil's Punch Bowl State Park viewpoint. These locations were chosen for the best viewing of shore-based and near-shore activity.

Observations were taken three times per day, three days a week, which resulted in a total of 148 observation times over a 25-day duration.

Data were collected during each observation period on the number of visitors using the shore adjacent to the reserve site and on the water of the reserve, the number of cars at each observation point, the number of males and females engaged in specific activities, and the gender and estimated age of each individual. The estimated age of each individual was recording as a category (range of ages) since observations were made from a distance.

Physical observations for pressure counts were not conducted at the Redfish Rocks site, due to the relative isolation of the reserve location. The Human Dimensions Monitoring Program has worked with the Redfish Rocks Community Team in a pilot study of the use of time-lapse cameras to obtain pressure counts. The results of this pilot project will be available in future monitoring reports.

B.4 Survey of Marine Reserve Community Businesses

Attitudes and perceptions of local business communities were assessed in those fishing communities with the potential to be most directly affected by marine reserve implementation. This study used a brief interview procedure designed to obtain a baseline description of the business communities near the reserve sites. The purpose was to determine the local business community knowledge, awareness, and concerns surrounding new marine reserve sites. Data collection consisted of structured interviews (see Appendix 4) with owners, managers, and key employees of local businesses that fell within a matrix of business types. The sampling matrix was different for each location due to the different economic structure of the various communities. The matrix was used to design a stratified opportunity sample generally representative of the population of all members of the business communities at these locations (communities of place).

Each interview consisted of 11 questions pertaining to the subjects' businesses and the relevant marine reserve site. The goal of the survey was to determine:

- The types, ownership, ages and other characteristics of businesses in the communities
- The residence of customers patronizing those businesses
- Perceived motivations for area visitation
- Subjects' awareness of marine reserve site planning and designation
- Subjects' opinions of possible reserve effects on area visitation and business
- Whether subjects would want more information about the reserves

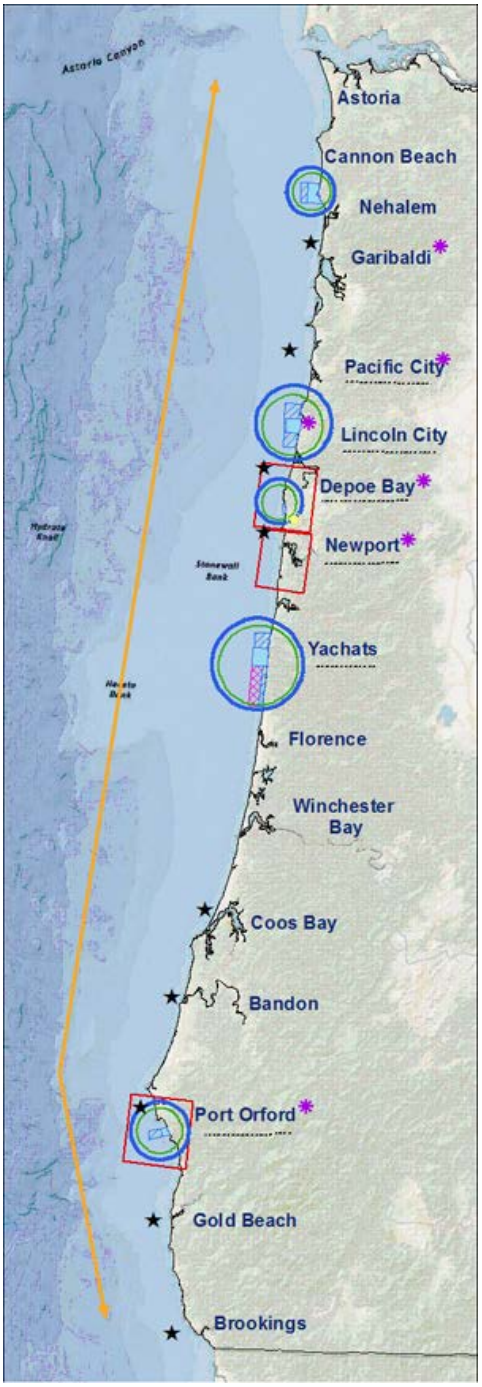
The results of this research will help improve communication and collaboration between the ODFW marine reserves program, local community teams (e.g., Redfish Rocks Community Team and Depoe Bay Near Shore Action Team), and these business communities.

B.5 Economic Contribution from Ocean Research, Planning, and Management Activities at Port Orford

Marine reserve sites create planning activities and research opportunities; therefore, scientists conducting local research and community planners become new ocean resource stakeholder groups. These stakeholder groups bring "new" money (funds derived from sources outside the local community) into the local economy to conduct planning or research projects. To quantify

the economic impact of these planning and research activities, ODFW commissioned The Research Group, LLC to conduct a regional economic impact analysis of ocean resource research, management, and planning in Port Orford, Oregon. A census was conducted of key participants in all related projects conducted at Port Orford from 2008 through 2012. An interview was completed for 29 project contacts, which was a 100 percent response rate. The interview results provided data inputs for economic modeling. The interviews also elicited information about project purposes and any experienced hindrances that local entities should address to facilitate similar future projects at Port Orford. Although the interviews weren't limited to subjects conducting research specifically at the Redfish Rocks Marine Reserve site, the data can still be used to identify the economic contributions of research, planning, and management activities to the marine reserve community of place. This information can be used to assess tradeoffs associated with reserve implementation and for longitudinal analysis of the regional impacts of these types of economic inputs. A summary of this research is provided in the Redfish Rocks section of the following chapter. A link to the full report is provided in Appendix 2.

C. Human Dimensions Monitoring Map



Data Collected by Site:

1. ★ Recreational fishing use survey
2. ● General use survey
3. ✱ Sociocultural profiles
4. ····· Business survey
5. ↔ Attitudes & perceptions survey
6. ▭ Commercial & charter use analysis
7. ▭ Spatial economic modeling & impact analysis
8. ▭ Ecosystem services indicator list

IV. Baseline Characterization by Site

A. Redfish Rocks

A.1 General Economic, Social, and Cultural Overview of the Port Orford Community

A.1.a. History

Port Orford was originally home to the Tututni and Coquille Indian tribes, who had a subsistence lifestyle and relied on local ocean resources (Norman, et. al., 2007). The township of Port Orford was officially established in 1856, when it was primarily known as a receiving port for market and fishing products. The port was initially supported by the timber, mining, and commercial fishing industries, due to its abundant natural resources and deep-water cove, which allowed protected access to the Pacific Ocean (Kirby and Kellner, 2010). The port facility was founded in 1911, which aided in transport of resources from the mining and timber industries. These industries have since declined in recent decades, but commercial fishing continues to be a mainstay for Port Orford's economy (City of Port Orford, 2013).

In the 1930's, the lack of a jetty or breakwater and rough ocean conditions in the area caused the port to switch to a system where boats were hoisted out of the water with a crane and moored on the dock. In 1968, a jetty was constructed to give the port some protection. However, this jetty caused shoaling around the dock and regular dredging activity is required to prevent sand inundation (Kirby and Kellner, 2010).

A.1.b. Port Orford as a Community of Place

Port Orford residents are culturally connected to the local ocean through the fishing and tourism industries that help to support the community. Many Port Orford residents are dependent on fishing for their livelihoods, and several residents have expressed the sentiment that "Port Orford is fishing" (Package and Conway, 2010). Many residents have a continued interest in maintaining Port Orford as a working commercial fishing town. In addition, tourists are often drawn to Port Orford for the fishing community feel, scenic value, and the popular annual arts and seafood festival held every Labor Day (Norman, et. al., 2007).

The Port Orford Ocean Resource Team (POORT) originally proposed the Redfish Rocks site in 2008 for consideration by OPAC as part of the public marine reserve proposal process (Don, et. al., 2012). POORT is a non-profit organization directed by a board of five Port Orford commercial fishermen. The mission of POORT is: "To ensure the long-term sustainability of Port Orford's ocean resources and our community that depends on them by uniting science, education, local expertise and conservation" (POORT, 2013). In 2010, POORT formed a separate official Redfish Rocks marine reserve community team that could more broadly represent the local community. The community team was composed of members representing multiple interests, including the city government, commercial and recreational fishing, local business, conservation, recreation, science and others. The team worked in collaboration with the ODFW marine reserves program to provide a local perspective for facilitating implementation of the Redfish Rocks site, identifying priorities of the Port Orford community, and implementing related community-based projects.

A.1.c. Geography

Port Orford is located in Curry County on the southern Oregon Coast between Bandon and Gold Beach, 70 miles from the California Border. Coos Bay is the closest major city to Port Orford, located 44 miles to the north. Portland is located 266 miles to the northeast. Distinguishing geographical features in the area include Cape Blanco, a large headland, Battle Rock, a point of historical interest, and Humbug Mountain, the largest mountain in the state of Oregon to rise from the bottom of the ocean. The town spans 1.6 square miles (Figure 1).

Geographic Coordinates: Lat 42°44′59″N, Long 124°29′53″W (Norman, et. al., 2007).

A.1.d. Demographic Information[3]

- *Total Population*: 1,133
- *Population Growth*
  Port Orford's population size has stayed relatively constant since 1960 (Figure 2).
- *Median Age*: 54.7
- *Age Distribution*
  In 2010, the 0-4 year old age group accounted for 4% of the population, the 5-17 age group accounted for 8%, the 17-65 age group accounted for 59%, and 29% of the population was age 65 or older (Table 1).
- *Education Categories*
  The distribution of education levels of Port Orford residents over the age of 25 is: less than 9th grade (5%), 9th to 12th grade, no diploma (10%), high school graduate (26%), some college, no degree (34%), Associate's degree (3%), Bachelor's Degree (14%), and Master's or Professional Degree (8%) (Table 2).
- *Race*
  In 2010, 4% of Port Orford's population was of Hispanic origin, and 96% of Port Orford's population was of non-Hispanic origin. In terms of racial distribution, 93% of the population identified as white, 1% identified as Black or African American, 1% identified as Native American, 3% identified as two or more races, and 1% identified as some other race (Table 3).
- *Median Household Income*
  The median income in Port Orford was $46,563 in 2010 (US inflation-adjusted dollars) (Table 4). In addition, Port Orford's per capita income was $27,352, and 15.1% percent of all people were living below the poverty level.

A.1.e. Market Drivers

- *Industries and Employment* (Table 5)
  Industries that provide significant employment to the area include:

[3] All Demographic information is from the 2010 U.S. Census unless otherwise noted.

- Agriculture, forestry, fishing and hunting, and mining (27%)
- Construction (6%)
- Manufacturing (4%)
- Retail trade (10%)
- Transportation and warehousing, and utilities (5% total)
- Information (2%)
- Finance and insurance, and real estate and rental leasing (7% total)
- Professional, scientific, and management, and administrative and waste management services (8% total)
- Educational services, and health care and social assistance (5% total)
- Arts, entertainment and recreation, and accommodation and food services at (11% total)
- Other services, except public administration (5%)
- Public administration (11%)

- *Employment Categories* (Table 6)
  Major employment categories in Port Orford include:
  - Natural resources, construction and maintenance occupations (29%)
  - Service occupations (24%)
  - Management, business, science, and arts occupations (21%),
  - Sales and office occupations (18%)
  - Production, transportation, and material moving occupations (9%)

- *Employment Statistics* (Table 7)
  In 2010, 53% of the Port Orford population were not considered part of the labor force, 45% of Port Orford's population 16 years and older were employed, 3% were unemployed, and the overall unemployment rate was 5%.

- *Future Opportunities*
  Multiple sectors of the ocean resource community could benefit from future plans to replace the old port cannery building with a mixed-use building. Plans for this collaborative research center include a processing facility, port office, research station (with office/meeting space, wet lab and dorms), and interpretive center to provide information about the Redfish Rocks site (Kirby and Kellner, 2010).

A.1.f. Future Challenges

In the future, Port Orford must determine how to provide the services necessary to care for an aging population. This may include developing necessary care facilities, such as nursing homes and emergency rooms, and adapting public infrastructure to support a less mobile population. There are also concerns that the inmigration of more affluent people into the area could affect the affordability of housing. Less affluent families may no longer be able to afford to live in the area, as has occurred in the nearby coastal town of Bandon.

Many residents have expressed concern that the limited number of businesses in Port Orford has created economic stress. Some residents feel that the town is stuck in the past, in need of revitalization before it can become a destination, rather than just a place tourists pass through (Shoji, 2006).

Shoaling around the dock has caused reductions in the number of hours that boats can utilize the hoist services. In the past decade, sand inundation has become severe enough to have a significant economic impact on the Port Orford fishing community (Kirby and Kellner, 2010). Port Orford is considered a low-use port, and the U.S. Army Corps of Engineers considers dredging the area a low priority (USACOE, 2012). Port Orford had not been dredged by Corps contractors for several years. In response, the Oregon State Legislature's coastal caucus worked with Governor Kitzhaber and the Oregon Regional Solutions Program to provide the Corps with $3 million in state funding to dredge several smaller ports.[4] The Corps plans to start dredging the South Coast ports first, and dredging was expected to begin at Port Orford in February 2014 (Oregon.gov, 2013). The appropriations are an interim measure that the port hopes will not be necessary in the future, as federal funds may offer a better long-term solution. More information about the Port Orford dredging situation is available in an appendix of the full report (see link, Appendix 2).

4. These appropriations were designated in House Bill 5028 Package 817, signed into law in July 2013, which increased lottery funds allocations to the support dredging of Southern Oregon coastal ports (Oregon State Legislature, 2013).

Figure 1. Map of Port Orford as a Community of Place

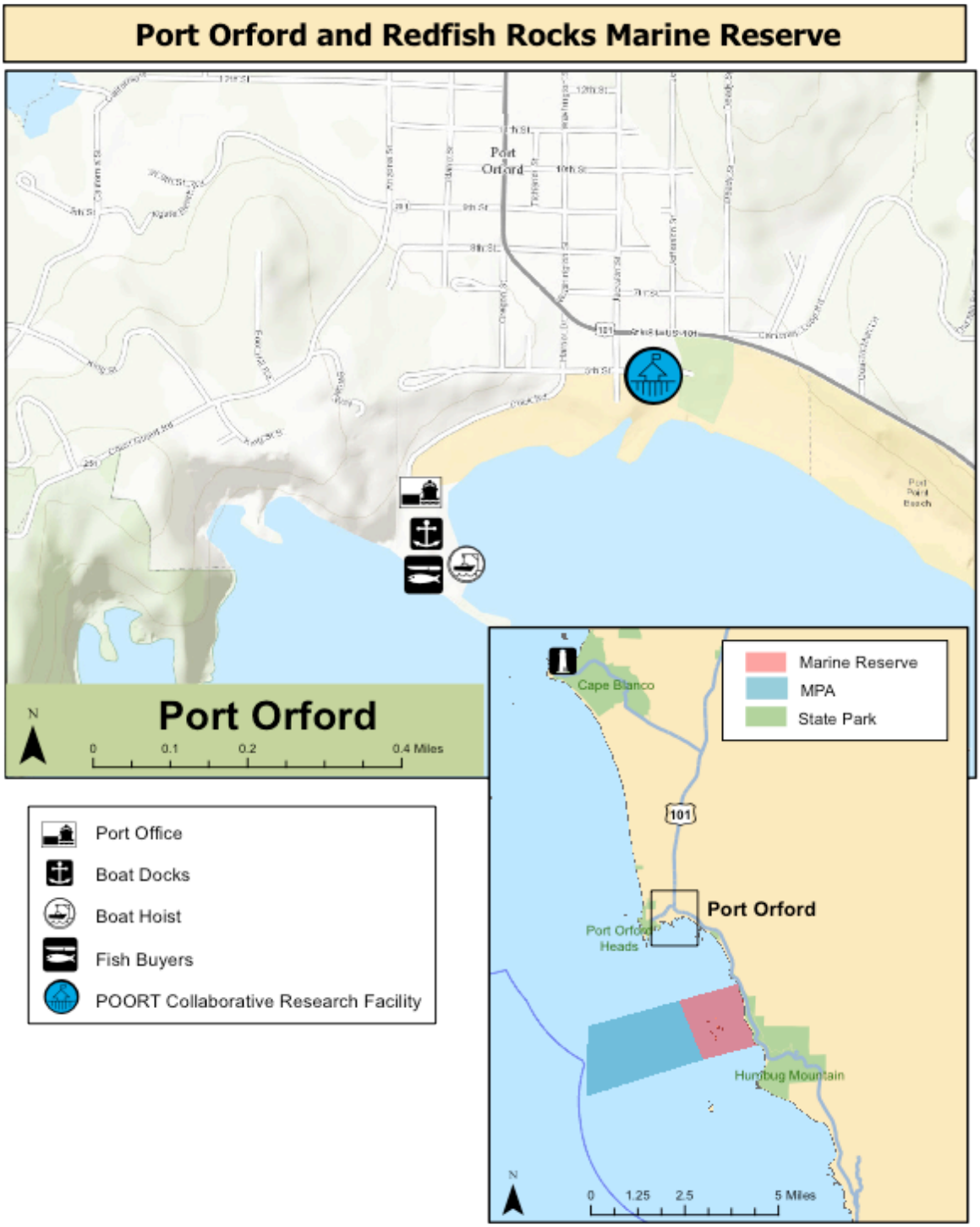
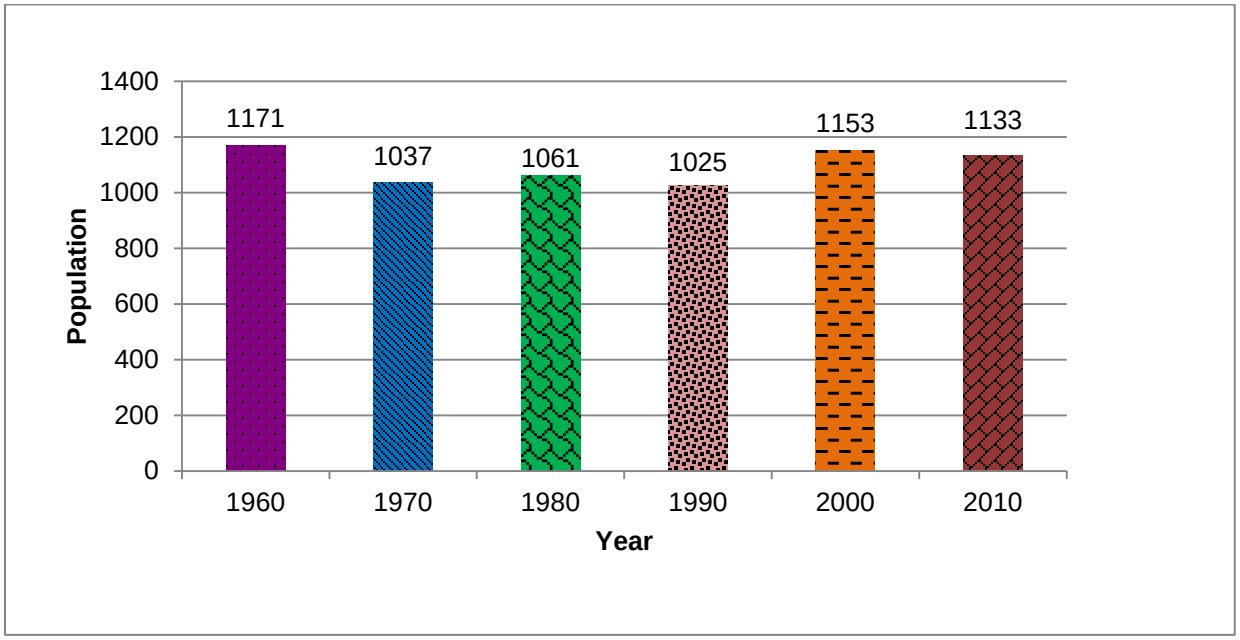


Figure 2. Port Orford Population Growth by Year



Source: US Census 2010

Table 1. Population Distribution by Age for Port Orford

	Port Orford	
	2000	**2010**
0 to 4 years	4%	4%
5 to 17 years	15%	8%
18 to 64 years	54%	59%
65 years and over	27%	29%

Source: US Census 2010

Table 2. Education Levels for Port Orford

	Port Orford Population
Less than 9th grade	5%
9th-12th grade, no diploma	10%
High school graduate	26%
Some college, no degree	34%
Associate's degree	3%
Bachelor's degree	14%
Graduate or professional degree	8%

Source: US Census 2010

Table 3. Racial Distribution for Port Orford

	Port Orford
White	93%
African American	1%
Native American	1%
Asian/Pacific Islander	1%
Two or More Races	3%
Some Other Race	1%

Source: US Census 2010

Table 4. Income Distribution for Port Orford

Income and Benefits (in 2011 Inflation-Adjusted Dollars)	Port Orford	
	Estimate	Percent
Total households	574	574
Less than $10,000	91	16%
$10,000 to $14,999	38	7%
$15,000 to $24,999	47	8%
$25,000 to $34,999	72	13%
$35,000 to $49,999	48	8%
$50,000 to $74,999	102	18%
$75,000 to $99,999	113	20%
$100,000 to $149,999	40	7%
$150,000 to $199,999	21	4%
$200,000 or more	2	<1%
Median household income (dollars)	46,563	(x)
Mean household income (dollars)	54,429	(x)

Source: US Census 2010

Table 5. Industry Distribution for Port Orford

Industry	Port Orford
Agriculture, forestry, fishing and hunting, and mining	27%
Construction	6%
Manufacturing	4%
Wholesale trade	<1%
Retail trade	10%
Transportation and warehousing, and utilities	5%
Information	2%
Finance and insurance, and real estate and rental leasing	7%
Professional, scientific, and management, and administrative and waste management services	8%
Educational services, and health care and social assistance	5%
Arts, entertainment and recreation, and accommodation and food services	11%
Other services, except public administration	5%
Public Administration	11%

Source: US Census 2010

Table 6. Employment Categories for Port Orford

Occupation	Port Orford
Management, business, science, and arts occupations	21%
Service occupations	24%
Sales and office occupations	18%
Natural resources, construction, and maintenance occupations	29%
Production, transportation, and material moving occupations	9%

Source: US Census 2010

Table 7. Employment Status for Port Orford

	Port Orford	
	Estimate	**Percent**
Population 16 years+	**1,069**	
In labor force	**505**	**47%**
Civilian labor force	**505**	**47%**
Employed	**478**	**45%**
Unemployed	**27**	**3%**
Armed forces	**0**	**<1%**
Not in labor force	**564**	**53%**
Overall unemployment rate		**5%**

Source: US Census 2010

A.2 Fishing Community Profile

The following tables provide a summary of the Port Orford fishing community profile. A link to the full report (Package and Conway, 2007) can be found in Appendix 2.

Table 8. Port Orford Long Form Fishing Community Profile Summary

Section Title	Summary
Importance of Fishing to the Community of Place	Fishing is very important and has a long history in the community of Port Orford. Fishing is also the major employer in the area, as it provides about 25% of jobs and draws tourists to the community.
Characteristics of Fishing Community Members and their Families	Fishermen in Port Orford love their work. Most fishermen are older males, who value their independent lifestyles. There is a high turnover rate among crewmembers and deckhands. The only way to access the ocean at Port Orford is through a crane that hoists vessels out of the water, this means that most Port Orford fishermen only go on day trips. The role of the Port Orford fishing family has changed in recent years. Children are less likely to be involved in family fishing operations and wives are more likely to hold outside jobs than in the past. The increasing unpredictability of fish stocks and the shortening and changing of seasons has caused fishing families to experience less stability than they did ten years ago.
Connection Between the Fishing Community and Community of Place	Port Orford fishermen depend on larger communities, like Newport, Coos Bay, or Charleston, for larger services. These services include fish processing/live fish selling, boat repair, and purchasing commercial gear. Generally smaller support services are available within the community of Port Orford. (See Table 9, services and accessibility).
Communication Within and Between Fishing Communities	Port Orford is a small community, so most interactions between fishermen occur at local businesses or on the dock. The Port Orford Ocean Resources Team (POORT) has been vital to improving the lines of communication about fisheries to the fishing community. Many fishermen struggle to communicate with the Pacific Fisheries Management Council, because the meetings are held long distances from Port Orford.

Perspectives on Management and the Effects of Management	Fishermen widely believe that the number of fish in the Port Orford area is greater than what is reflected by stock assessments. The town struggled through salmon disasters in recent decades and many residents were frustrated with the way that relief checks were distributed during this difficult time. Community members reflected positively on the buyback of groundfish trawlers in 2003. However, the program ultimately had unintended consequences when effort was redirected to other fisheries, such as crab. In addition, fishermen were frustrated that they ultimately had to help fund the program and the total allowable catch was not increased.
Change in Fishing and Seafood: Economics and Fishing Effort	Fishermen in Port Orford were significantly impacted by regulations on salmon in the 1980's. These regulations caused a vast majority of vessels to exit the fishery and the remaining fishermen to diversify their catches to black cod (sablefish), groundfish, and crab. Regulations were eventually put in place on these other fisheries as well. Fishermen have also been significantly affected by other factors, such as rising fuel costs, changes in rockfish regulations, and variable salmon seasons.
Perceptions of the State of The Ocean and its Resources	Most residents believe that ocean health in the Port Orford area is very good and even superior to other areas on the west coast. The fishing fleet is composed of mostly small boats, which allows fishermen to self-regulate and fish more sustainably. Residents are weary of issues that could have significant effects on fish stocks in the future, such as new ocean development and changing climate patterns like El Niño.
Perceptions of the Future	Residents believe that the future of their fishing community lies in decisions regarding dredging of the port. Funding for dredging has been limited in recent years, which creates constraints for fishermen. There has been a recent influx of wealthy people to the area, which will likely continue in the future. There were mixed opinions about how this change in demographics will affect the area. Many Port Orford residents hope to see dredging of the port and enforcement of the Port Orford Stewardship Area continued in the future.

Table 9. Fishing Services and Accessibility in Port Orford

Service	Accessibility
Gear	Recreational gear used primarily for sport fishing is available in Port Orford. For commercial gear one must travel outside the community. At one time commercial gear was available locally, but not anymore.
Fuel	The Port of Port Orford supplies fuel.
Ice	The Port of Port Orford has ice, but fishermen also purchase it from the processor (Hallmark) buying station in town.
Boat Repair	The fishermen do boat repair themselves because the boats are taken out of the water every day. There are mobile mechanics from other communities. There are electricians and radio repairmen in Coos Bay. Need to go to Charleston to find parts and electronics. There's a local individual who occasionally does some repair on electronics. There's a local person who does some welding and fabrication. There's no local engine repair.
Processors	No fish processors are located in Port Orford - everything is shipped out for processing. There are two satellite buying stations: Hallmark (processes Port Orford fish at their Charleston plant) and Nor-Cal (buys live fish), and a public hoist for fishermen and transient buyers to use. There used to be a company that processed crab, fish, and salmon in Port Orford (Blanco Fisheries) but that closed in 1984 or 1985.
Bookkeeping	Have bookkeeping services in Port Orford (one bookkeeper and one CPA); however some people go outside the community for this service.
Legal Services	Some lawyers in town; no one with specific knowledge of maritime law and fishing industry rules/regulations. POORT provides information to fishermen or guidance on where to acquire such knowledge.
Social Contacts	Churches, schools, fishermen's wives organization, a strong marketing association, etc. exist in the community of Port Orford. Fishermen are not as actively involved socially in the community as they work long and irregular hours; however their families are involved in social activities.

A.3 The Economic Impacts of Marine Reserve Restrictions

This section is a summary of the results from the modeling of the regional economic impacts (REI) of the Redfish Rocks marine reserve and MPA restrictions using spatial habitat and fisheries data. A link to the full report is provided in Appendix 2.

The economic impacts associated with the displacement of fishing effort at the Redfish Rocks site were calculated using year 2009 catch and economic conditions. Most likely, the actual economic impact would be lower as some displaced commercial fishermen would chose to fish in other areas along the coast, rather than completely stop fishing.

Economic modeling was used to estimate the displaced potential catch and resulting upper estimate of regional economic impact. Many fisheries statistics are only expressed in terms of totals for combined ports. As used here, the Brookings port group refers to the combined ports of Port Orford, Gold Beach, and Brookings.

The preliminary estimate for total annual personal income (REI) from the displaced potential commercial catch at the Redfish Rocks site is estimated to be $42,000 (Table 10). The Brookings port group commercial regional economic impact (REI) was estimated at approximately $12 million. This means displaced commercial harvest at Redfish Rocks was about 0.35% of Brookings port group landings. The Oregon Territorial Sea commercial REI was estimated at approximately $17.7 million in 2009. Thus the displaced commercial harvest was about 0.2% of 2009 Oregon Territorial Sea landings. The total REI from commercial onshore landings in Oregon in 2009 was $175 million, which means that displaced commercial harvest was about 0.02% of 2009 commercial onshore landings (Table 10).

The preliminary estimate for total annual personal income (REI) from the displaced potential recreational catch at the Redfish Rocks site is $25,000 (Table 11). The Brookings port group recreational REI was estimated at approximately $1.5 million annually. This means displaced recreational harvest at Redfish Rocks was about 1.72% of the Brookings port group recreational landings in 2009. The Oregon Territorial Sea recreational REI was estimated at approximately $4.3 million in 2009. Thus the displaced recreational harvest was about 0.6% of 2009 Oregon Territorial Sea landings. The total REI from recreational onshore landings in Oregon in 2009 was $10.5 million, which means that displaced recreational harvest was about 0.2% of 2009 recreational onshore landings (Table 11).

Table 10. Regional Economic Impacts from Commercial Harvests at Marine Reserve Sites, Territorial Sea, and All Onshore Landings in 2009

Harvest Area	Assessed Fisheries REI	Potential Displaced Fisheries REI			
			Share		
		Amount	Territorial Sea	Onshore Landed Fisheries	Port Group
Marine Reserve Sites					
Cape Falcon	509	182			0.25% AST
Cascade Head	466	154			4.58% TIL
Cape Perpetua	801	217			0.44% NPT
Subtotal	1,777	554	3.12%	0.32%	
Otter Rock	17	16			0.03% NPT
Redfish Rocks	114	42			0.35% BRK
Subtotal	130	59	0.33%	0.03%	
Total	1,907	612	3.45%	0.35%	
Comparison Areas					
Territorial Sea	17,725				
Onshore Landed Fisheries	174,591				
Astoria group (AST)	74,019				
Tillamook group (TIL)	3,361				
Newport group (NPT)	49,010				
Coos Bay group (CSB)	36,231				
Brookings group (BRK)	11,971				

Notes:
1. Regional economic impacts (REI) measured in personal income thousand dollars at the coastwide economic level. It includes the "multiplier" effect.
2. The REI estimates are based on 2009 harvests and economic model for coastal communities. The REI for the state level economy would be higher because of where processing occurs and due to trade leakages at the coastal community level.
3. Only target fisheries within marine reserve sites (MR) and Territorial Sea are assessed. The target fisheries applicable species assemblages are salmon, D. crab, sardine, sea urchin, halibut, and certain groundfish species caught nearshore. The list of target fisheries for each site is not the same.
4. Estimated harvest REI is the assessed fisheries economic contribution from both the marine reserve and marine protected area portions of the MR. The estimates are from multiplying the fishery and habitat dependent ratio estimator times the amount of corresponding habitat in the MR and summing over the fisheries.
5. The displaced harvest REI excludes salmon and D. crab as they are allowed target fisheries in the marine protected area portion of MR. Sea urchin in Redfish Rocks is included as a displaced harvest in the marine protected area portions.
6. REI for displaced fisheries are likely to be less than shown as fishers will adjust to the restrictions and adopt new fishing grounds, albeit fishing costs may increase from increased transit distances and changed catch per effort. Also not included in the REI estimates are spillover effects from possible changed stock abundances that might increase catch per effort.
7. All fisheries use 2009 harvests for development of the habitat ratio estimator except salmon fisheries which uses 2010 harvests. Year 2009 salmon fishery is a data aberration because the fishery was essentially closed south of Cape Falcon. Year 2010 harvests were moderate, but representative of decade 2000's averages when salmon disaster years 2006 and 2008 as well as 2009 harvests are omitted.

Source: (TRG and GMC 2012).

Table 11. Regional Economic Impacts from Recreational Harvests at Marine Reserve Sites, Territorial Sea, and All Onshore Landings in 2009

Harvest Area	Assessed Fisheries REI	Potential Displaced Fisheries REI			
			Share		
		Amount	Territorial Sea	Onshore Landed Fisheries	Port Group
Marine Reserve Sites					
Cape Falcon	38	29			3.40% AST
Cascade Head	394	94			6.17% TIL
Cape Perpetua	94	35			0.68% NPT
Subtotal	526	157	3.67%	1.49%	
Otter Rock	21	21			0.42% NPT
Redfish Rocks	28	25			1.72% BRK
Subtotal	49	47	1.09%	0.44%	
Total	575	204	4.76%	1.93%	
Comparison Areas					
Territorial Sea	4,275				
Coastwide Angling	10,529				
Astoria group (AST)	849				
Tillamook group (TIL)	1,516				
Newport group (NPT)	5,133				
Coos Bay group (CSB)	1,568				
Brookings group (BRK)	1,463				

Notes:
1. Regional economic impacts (REI) measured in personal income thousand dollars at the coastwide economic level. It includes the "multiplier" effect.
2. Table G.3 notes apply to this table.
3. REI for salmon is based on Year 2010 instead of Year 2009. Year 2009 was closed south of Cape Falcon. Year 2010 had a good number of open days and landings were about average in the middle to late 2000's if the closure years of 2006, 2008, and 2009 are omitted.
4. Estimates do not include bank and dive fishing modes for finfish fishing. Recreational crabbing is not included in the estimates.
5. Recreational coastwide landings comparison area REI is based on trips for Oregon ocean recreational salmon, bottomfish, halibut, tuna, and dive fisheries.

Source: (TRG and GMC 2012).

A.4. Economic Impact of Commercial and Recreational Fishing[5]

This section provides an economic characterization of the commercial and recreational fishing industries associated with the community of Port Orford, Oregon.

A.4.a. Commercial Landings

- In 2010, a total of 80 vessels delivered landings to Port Orford. The total harvest in 2010 was 1,485.7 thousand round pounds and the total ex-vessel revenue was $3,387.2 thousand. The 2010 annual harvest by fishery, in thousands of round pounds and thousands of dollars of revenue, was: Dungeness crab (351.2/$783.9), groundfish (303.8/$620.5), sablefish (581.6/ $1,696.1), salmon (28.1/$154.7), albacore tuna (14.4/$18.3), and other (206.6/$113.8) (Table 12).

- In 2010, the share of harvest value by major commercial fishery for Port Orford was: sablefish (50%) Dungeness crab (23%) groundfish (18%), salmon (5%), albacore tuna (1%), and other (3%) (Figure 3).

- There is also a significant live-fish fishery in Port Orford. The commercial live fish harvest in 2010 was 180 thousand round pounds and $530.3 thousand in ex-vessel revenue (Table 13). A detailed breakdown of the fishing strategies used in the Port Orford non-whiting groundfish fishery is presented in Table 13.

A.4.b. Recreational Fishing

Port Orford allocates space for a charter fishing business on the pier, but the charter company for which the space was provided is no longer in business (Norman, et. al., 2007). In 2011[6], the sum of the estimated recreational catch in Port Orford was 4,543 fish and the total number of recreational angler days was 1,305. The 2011 annual recreational catch by fishery in sum of estimated number of fish and angler days was: bottomfish (3,690/959), combination salmon and bottomfish (194/0), dive (201/75), halibut (30/251) salmon (428/20) and tuna (0/53) (Table 14).

A.4.c. Seafood Buyers and Processors

There are no longer processing facilities located in Port Orford, so fish are shipped out for processing (Kirby and Kellner, 2010). In 2010, 12 buyers purchased fish from Port Orford. In this same year, a total of three buyers purchased more than $50,000 worth of catch from Port Orford, three buyers purchased between $5,000 and $50,000, and six buyers purchased less than $5,000 (Table 14). Major species groups purchased at the port included: crab/lobster, salmon, highly migratory species, halibut, sea urchin, and other (Table 15).

[5] Except when noted, data in this section are from 2010, which provides an overview two-years before the harvest restrictions for the Redfish Rocks site went into effect.

[6] Recreational anglers at Port Orford were not sampled by Oregon Recreational Boaters Survey samplers in 2009 or 2010, so data from year 2011 was used as a baseline instead.

A.4.d. Marine Infrastructure and Services

Port Orford vessels are launched by a hoist system, and this limits the port's capacity and makes it impossible to house trawl vessels. The dock at the Port has a dry moorage capacity of 35 vessels, up to 42 feet in length, and less than 50,000 pounds, for use of the vessel hoist/crane to raise/lower the craft in/out of the harbor. Commercial lifts average approximately 3,300 per year, and recreational lifts total about 500 (one-way only). Given the small size of the community, the low capacity of dry moorage on the high dock, and the absence of a boat basin/marina, many fishermen choose not to maintain their boats at the dock (Kirby and Kellner, 2010).

A.4.e. Port Infrastructure and Services Available

- High Dock—for fishing vessel dry storage (for 35 vessels, up to 42 feet in length)
- 210 x 220-foot dock used for fishing and private boats
- Vessel hoisting services includes 2 large hydraulic cranes (with 30,000 and 50,000 pound capacities)
- Floating dock for use by sport fishermen (in summer/fall)
- Gear/product hoist
- Commercial leases (for seafood buyers, a restaurant/retail outlet)
- Fueling facility (diesel and gasoline)
- Air for diving tanks
- Marine supply: Dock Tackle
- Public restroom
- Restaurant

Source: (Norman, et al., 2007; Port of Port Orford, 2008)

A.4.f. Vessels

The type of vessels that delivered landings to Port Orford in 2010 were: sablefish fixed gear (24), other groundfish fixed gear (14), crabber (9), other <=$15,000 (24), diver vessel (<=3), and salmon troller (<=3) (Table 16).

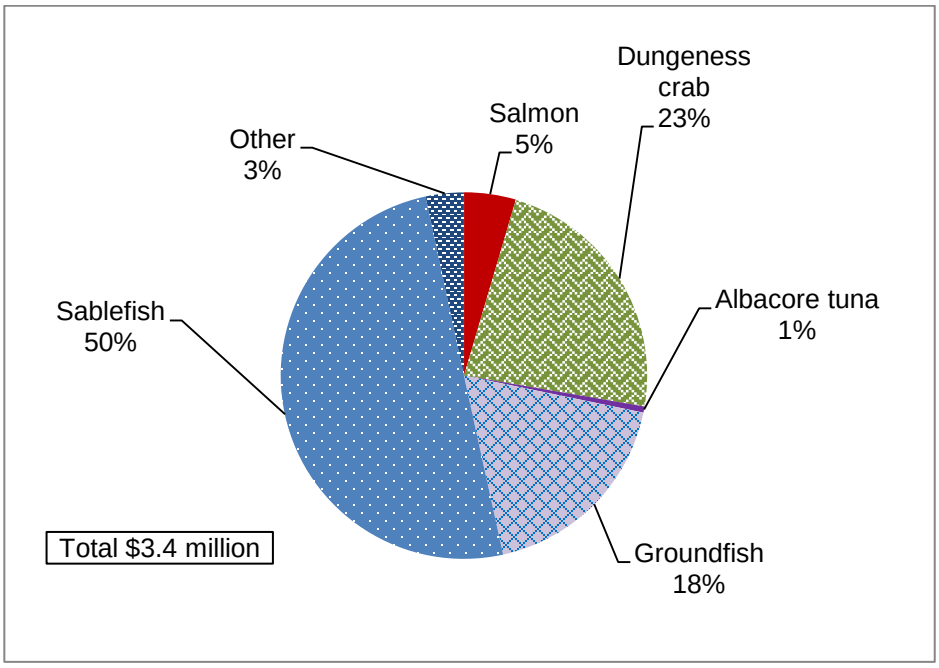
A.4.g. Economic Contribution

The average annual commercial fishing industry economic contributions between 2008 and 2011 were $12.1 million in total personal income to the Port Orford economy. Commercial fishing represented the equivalent annual average of 379 jobs for the Port Orford economy between 2008 and 2011. The data for this analysis are for the general Port Orford area. Disaggregated data specific to the town of Port Orford are not available (Table 17).

The annual economic contribution of recreational fishing to the Port Orford port group economy totaled $133,482 in 2011[7]. The greatest percentage of the recreational economic contribution came from ocean non-crab private and charter trips ($104,281), followed by freshwater private and guided trips (18,265) and ocean crab trips ($10,936) (Table 18).

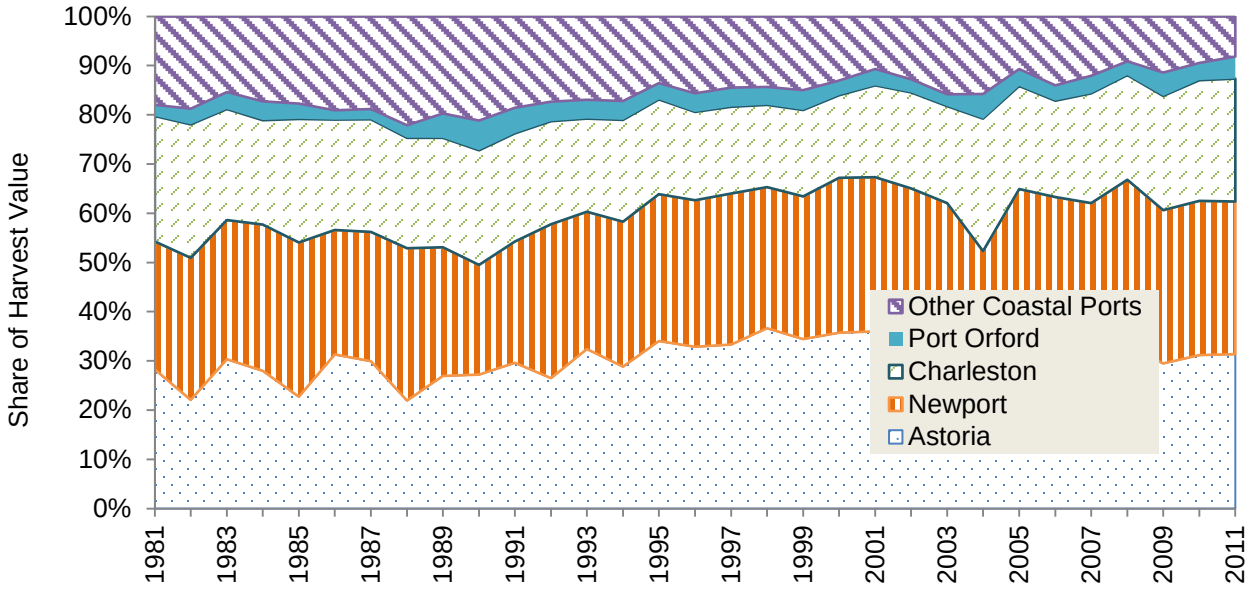
[7] Recreational anglers at Port Orford were not sampled by Oregon Recreational Boaters Survey samplers in 2009 or 2010, so data from year 2011 was used as a baseline instead.

Figure 3. Port Orford Share of Harvest by Major Fisheries in 2010



Notes: 1. "Other" includes Pacific sardines, Pacific halibut, hagfish, mackerel, white sturgeon, shellfish, sea cucumbers, octopus, and other species.
Source: PacFIN annual vessel summary, July 2011.

Figure 4. Historical Proportion of Ocean Fisheries Harvest Value Landed at Regional Fishing Centers, Port Orford, and Other Coastal Ports



Note: Harvest value is ex-vessel revenue from ocean catch (excludes Columbia River catch).
Source: PacFIN annual vessel summary, March 2008, April 2009, March 2010, July 2011, and Feb. 2012 extractions.

Table 12. Commercial Landings by Fishery Port Orford (2010-2011)

Fishery	2010		2011	
	Round lbs.	Revenue	Round lbs.	Revenue
Salmon	28.1	154.7	46.1	263.7
D. crab	351.2	783.9	1,178.5	3,119.7
Tuna	14.4	18.3	37.3	56.3
Groundfish	303.8	620.5	307.4	747.1
Sablefish	581.6	1,696.1	498.7	1,894.8
Pacific Whiting	0.0	0.0	0.0	0.0
Other	206.6	113.8	327.5	250.9
Total	**1,485.7**	**3,387.2**	**2,395.5**	**6,332.5**

Notes: 1. Landings are reported in thousands of round pounds
2. Revenue is ex-vessel revenue in thousands of dollars
Source: PacFIN annual vessel summary, July 2011 and April 2013 extractions

Table 13. Port Orford Vessel Counts and Landings by Fishery in 2010

Fishery	Vessels	Volume	Value
Salmon	28	28.1	154.7
Dungeness crab	27	351.2	783.9
Pink shrimp	0	0	0
Albacore tuna	4	14.4	18.3
Groundfish non-whiting	62	885.5	2,316.6
Trawl gear	0	0	0
Fixed gear LE	16	569.6	1,479.2
Non-sablefish	16	125.6	172.2
Longline or setline	16	121.7	160.5
Live	9	31.7	99.4
Non-live	16	90.0	61.0
Other hook and line	6	3.9	11.7
Live	6	3.6	11.5
Non-live	3	3	3.0
Sablefish	16	443.9	1,307.0
Longline or setline, non-live	16	443.9	1,307.0
Fixed gear OA	50	315.8	837.3
Non-sablefish	50	178.1	448.2
Longline or setline	23	39.6	68.2
Live	16	16.7	52.0
Non-live	23	22.9	16.2
Other hook and line	44	138.5	380.0
Live	43	127.6	367.5
Non-live	43	10.9	12.6
Sablefish	21	137.7	389.1
Longline or setline, non-live	21	137.3	388.0
Other hook and line, non-live	c	3.0	1.0
Non-trawl gear and non-fixed gear LE	c	0	0
Non-sablefish	c	0	0
Non-trawl gear and non-fixed gear OA	3	1.0	1.0
Non-sablefish	3	1.0	1.0
Pacific whiting	0	0	0
Pacific sardine	0	0	0
Sea urchin	c	204.1	107.1
Halibut	7	1.7	6.3
Hagfish	0	0	0
Other	8	8.0	4.0
Total	**80**	**1,485.7**	**3,387.2**

Notes: 1. Volume is in thousands of round pounds and value is in thousands of dollars
2. There are no landings without a unique vessel id. Vessel counts shown as "c" are not displayed to avoid disclosing confidential information.
3. No other type of fixed gear besides hook and line is used for groundfish landed at Port Orford in 2010. Hook and line type gear includes "longline or setline" and "other hook and line." A small amount of groundfish is caught with gear other than trawl or fixed gear, and at Port Orford in 2010 that other gear is all troll. The groundfish caught with troll gear was not landed live. Sablefish landings at Port Orford in 2010 used mostly "longline or setline" gear, and were not landed live.
4. Units of volume are shown in thousands of round pounds and units of value are shown in thousands of dollars.
5. All fisheries accounting is the calendar year. The Dungeness crab ocean season closes on August 14 and usually re-opens on December 1.

Source: PacFIN annual vessel summary, July 2011 extraction.

Table 14. 2011 Port Orford Recreational Catch per year by Trip Type

	Bottomfish		Combination		Dive		Halibut		Salmon		Tuna		Total	
Year	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days
2011	3,690	959	194	0	201	75	30	251	428	20	0	53	4,543	1,305

Notes: 1. Sum is sum of estimated catch in number of fish
2. Days is the number of angler days Source: ORBS

Table 15. 2010 Port Orford Distribution of Purchasers by Purchase Size Categories and Species Group

Processor Category	Ownership/ Count	Port Group Purchase Share	State	Ground-fish	Salmon	Crab/ Lobster	Highly Migratory	Halibut	Sea Urchin	Other
>$50K	3	98%	14,628,579	2,276,463	141,390	782,126	13,649	6,334	107,104	541
$5K-$50K	3	1%	3,011,776	38,840	11,930	0	0	0	0	0
<$5K	6	0%	330,726	1,094	1,379	1,736	4,663	0	0	0
Subtotal	**12**	**100%**	**17,971,081**	**2,316,397**	**154,699**	**783,862**	**18,312**	**6,334**	**107,104**	**541**

Notes: State and port group purchases are in dollars of ex-vessel value
Source: PacFIN annual vessel summary data July 2011 extraction

Table 16. 2010 Port Orford Vessels by Type

Vessel Type	Count
Sablefish Fixed Gear	24
Other Groundfish Fixed Gear	14
Crabber	9
Salmon Troller	C
Diver Vessel	C
Other <= $15 Thousand	24

Source: PacFIN annual vessel summary, July 2011 and April 2013 extractions

Table 17. The Commercial Fishing Industry in the Port Orford Area Economy 2008-2011

Area	2008		2009		2010		2011		2008-2011 Average	
	Amount	Percent	Amount	Amount	Amount	Percent	Amount	Percent	Amount	Percent
All income sources	764.3	1.2%	716.1	2.0%	710.9	1.5%	728.3	1.9%	729.9	1.7%
Earned income	305.3	3.1%	281.0	5.0%	278.6	3.8%	288.6	4.9%	288.4	4.2%
Fishing income	9.5	100.0%	14.2	100.0%	10.5	100.0%	14.1	100.0%	12.1	100%
Equivalent Jobs	303		448		328		438		379.3	

Notes:
1. Economic contributions are measured as total personal income in millions of 2012 dollars.
2. Earned income is the sum of wages and salaries, proprietors' income. All income sources include transfer payments, or dividends, interest, and rent.
3. County average annual earnings per job are computed by dividing the economies all industry earnings estimates by total full-time and part-time jobs estimates. Average earnings per job within industries involving more part-time work is lower than industries involving more full-time work, although there could be little difference in the underlying wage of full-time workers. Since average earnings per job are just a simple average, it does not account for variations in the distribution of earnings among high-pay vs. low-pay jobs. Equivalent jobs at the statewide level include jobs within all coastal communities plus jobs in the rest of the state computed using the difference in fishing income at the state level and fishing income within coastal communities.
4. Personal income and average wage data is from U.S. Department of Commerce, Bureau of Economic Analysis. The most recent year personal income at the county level is a forecast using linear regression over the shown years. The share of earned personal income for the most recent year is the same as the preceding year. The personal income for all coastal communities are for the counties of Clatsop, Tillamook, Lincoln, Coos, Curry, and the coastal areas of Lane and Douglas counties. The methodology used to calculate the amount of personal income for portions of counties is explained in TRG (March 2006). The 1990 and 2000 decennial census information is used with the methodology to calculate the partial county estimates.

Source: The Research Group. Oregon's Commercial Fishing Industry, Year 2011 and 2012 Review. Prepared for Oregon Department of Fish and Wildlife, and Oregon Coastal Zone Management Association. September 2013

Table 18. Port Orford Recreational Trips and Economic Contribution in 2011

Fishery	Trips	Economic Contribution
Ocean non-crab private and charter	1,358	104,281
Salmon	20	752
Combination	0	0
Bottomfish	959	75,725
Halibut	251	18,067
Dive	75	5,922
Tuna	53	3,815
Ocean crab	277	10,936
Private	204	8,054
Charter	73	2,882
Salmon	9,698	15,757
Steelhead	1,700	2,508
Sturgeon	0	0
Resident finfish	n/a	n/a
Non-fishing trip purpose ocean and bay	n/a	n/a
Touring trips	n/a	n/a
Total		**133,482**

Notes: 1. Economic contribution expressed as personal income adjusted to 2011 dollars using the GDP implicit price deflator developed by the U.S. Bureau of Economic Analysis. Economic contribution includes the "multiplier" effect.

2. Estimates for the number of crabbing trips is for boat mode and do not include trips when land or pier based. Half of the ocean crabbing trips are assumed to be in combination with other target species fishing trips or touring trips, and the economic contributions are already accounted for those other primary purpose trips.
3. The freshwater and private guided trip is composed of trips to Elks River and Sixes River in the Port Orford Vicinity.

Sources:

Bay and ocean crab trips: Ainsworth, Justin C., Mitch Vance, Matthew V. Hunter, and Eric Schindler. 2012. The Oregon Recreational Dungeness Crab Fishery, 2007-2011. Information Reports No. 2012-04. Oregon Department of Fish and Wildlife, Marine Resources Program.

Ocean non-crab trips: ODFW Ocean Recreational Boat Survey (ORBS) data, Apr. 2012 extraction.

Freshwater anadromous catch: ODFW SSHSTRP. http://www.dfw.state.or.us/resources/fishing/sportcatch.asp. Accessed Jan. 2013.

Economic contribution per day and anadromous success rates: The Research Group. Oregon Marine Recreational Fisheries Economic Contributions in 2009 and 2010. Prepared for ODFW and OCZMA. September 2011, and personal communication with The Research Group, December 2012.

A.5 Survey of Marine Reserve Community Businesses

For the Redfish Rocks site, only one coastal community, Port Orford, was considered to have potential impacts, either positive or negative, from the implementation of the reserve. As noted in the methods section, it was important to survey the existing businesses to gauge the attitudes and perceptions about the potential effects the reserve may have on visitation to Port Orford and its business community.

The matrix in Table 19 shows the number, size and type of businesses from which the sample was selected in Port Orford for this survey. Eighteen business owners, managers, or key employees were interviewed in categories that most represented the business community of Port Orford. These individuals were asked eleven questions, nine of which are summarized in the graphics and tables below. The level of response to the final two questions was inadequate to be presented in this report. The survey instrument is presented in Appendix 4.

Table 19. Subjects Interviewed by Business Type in Port Orford

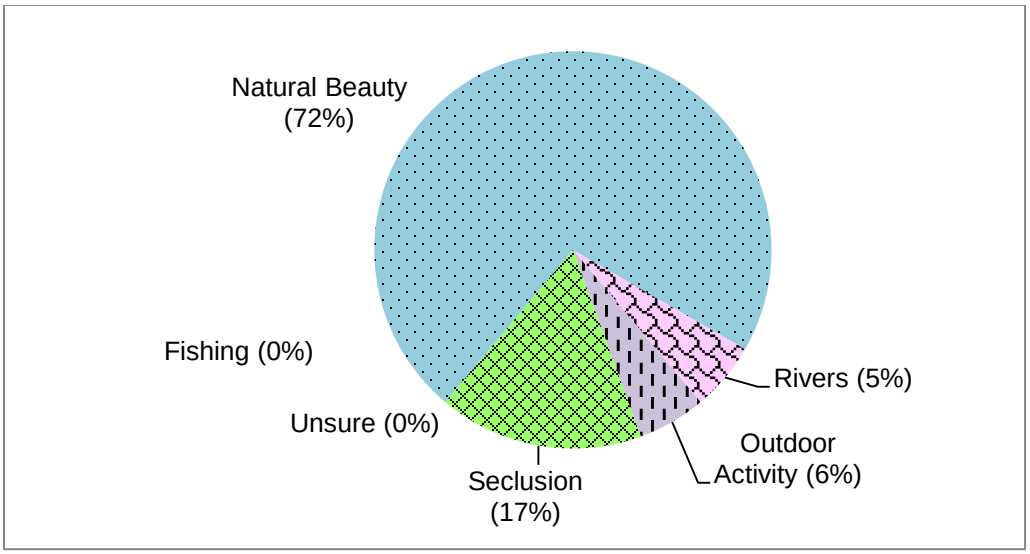
		Interviews by Size of Business		
Business Type	**Subjects Interviewed**	**Small**	**Medium**	**Large**
Retail	9	3	5	1
Restaurant	3	2		1
Lodging	3		1	2
Construction				
Education				
*F.I.RE	1	1		
Other Services				
Health				
Government	2		1	1
Manufacturing				
TOTAL	**18**	**6**	**7**	**5**

Notes: F.I.RE = Fire, Insurance, and Real Estate

Respondents indicated that 89% of the businesses were locally owned, had an average of six (6) full time employees, and 61% had no seasonal employees. These businesses had been in Port Orford for an average of 31 years. Although the data included responses from employees from the Port of Port Orford, removing these individuals from the analysis did not affect this result. Of the individuals surveyed, 51% identified their customer base as local residents. The majority of individuals surveyed were aware of the marine reserve (89%) and the community team projects (67%) focused on the implementation of the reserve (Davis and Polis, 2013).

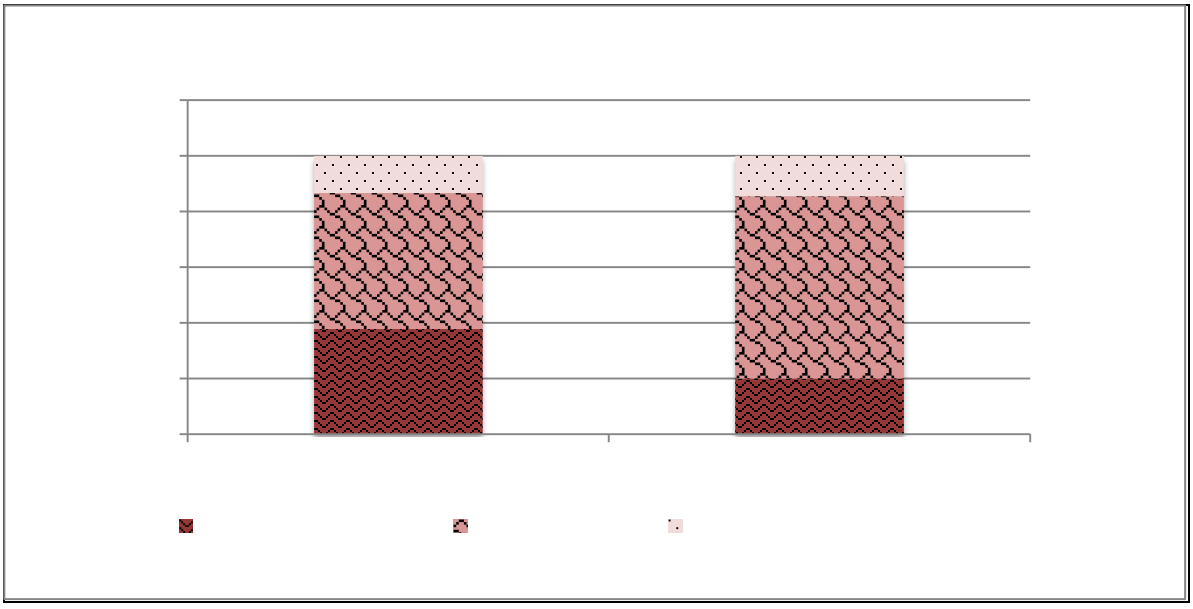
Three survey questions focused on reasons for visitation to the area and the opinions of the business community about potential reserve impacts on visitation. Seventy-two percent (72%) of respondents considered the natural beauty of the area to be the primary motive for visitation. Seventeen percent (17%) of respondents believed seclusion was a motive for visitation (Figure 5). In addition, 44% of respondents thought that the marine reserve site would have a positive impact on visitation, 28% believed that it would have no impact on visitation, and 28% believed that there was a potential positive impact on visitation. Similarly, 33% of respondents believed that the reserve site would have a positive impact on business, 28% believed that it would have no impact on business, and 39% believed that there was a potential positive impact on business (Figure 6).

Figure 5. Port Orford Business Survey: Purpose of Visitation



Notes: 1. Percentages calculated as average of total questions answered by businesses surveyed in Port Orford, Oregon. Total surveys conducted equaled 18 and total answered for these questions totaled 18.

Figure 6. Port Orford Business Survey: Impact of Reserve on Visitation and Local Business



Notes: 1. Respondents were asked the question, “Do you think a marine reserve would have an impact on the number of visitors to this area? How? Do you think a marine reserve would affect your business? How?
2. Results calculated as the average of all answers for this question answered by the businesses surveyed for Port Orford.

A.6 The Economic Contribution From Ocean Research, Planning, and Management Activities at Port Orford, Oregon

This study focused ocean research, planning, and management projects conducted at Port Orford between 2008 and 2012. Modeling results showed that the average annual local spending from the surveyed projects contributed $0.48 million in total personal income in the region (includes the "multiplier effect") (Table 20). Based on countywide average earnings, the economic contributions of these projects represent 15 jobs. For perspective, this is about 12 percent of the onshore landings commercial fishing industry economic contributions. The economic contribution of the commercial fishing industry represents a large proportion (24%) of all residential earnings. The commercial fishing industry economic contributions represent an equivalent job count of 130.

Table 20. Average Annual Project Expenditures and Economic Contributions in the Port Orford Region

Category	Annual Expenditures ($000)	Economic Contributions ($000)
Organizations based in Port Orford		
Labor payments	$324	$433
Non labor payments	$104	
Construction	$183	$19
Projects not based in Port Orford		
Trip related expenses	$49	
Vessel charters and other contracts	$30	$19
Other project expenditures outside of Port Orford	$21	$8
Spending for contracts based outside of Port Orford	$32	
Total spending in Port Orford	$507	
Total spending away from Port Orford	$53	$479
Other spending (construction)	$183	
Total spending	$743	

Notes:
1. The average annual expenditures for project trips were calculated by summing trip expenditure data from 2008-2012 and dividing by five.
2. The average annual expenditures for contract payments were calculated by summing over years 2008-2012 and dividing by five.
3. Other project expenditures not in Port Orford refer to expenditures for equipment, supplies, and labor etc. outside of the Port Orford area.

Ocean access in the area is somewhat restricted to the Port of Port Orford's land and facilities. The study assessed whether respondents considered the Port access inconvenient or if there were other project hindrances. The responses describing hindrances were diverse, citing a number of factors which limited their research or planning projects: poor weather (17 percent), inability to launch vessels due to sand inundation (17 percent), political and social problems (uncooperative fishermen, conflicting management scales, and political polarization, 14 percent), expensive lift fees for research vessels (10 percent), and lack of infrastructure and other problems associated with being a small town (seven percent). The results highlighting project purposes and needs will assist local government in determining appropriate strategies or facility improvements to support additional projects. The economic impacts of these projects are not trivial. The results also illustrate the importance of the planning and research projects in relation to traditional ocean uses at Port Orford, useful information for as community leaders to make decisions related to economic development (The Research Group, 2013a).

With some improvements in the survey instrument, periodic replications of this study can monitor changes in the regional economic contribution of scientific research, planning, and management activities in Port Orford associated with implementation of the Redfish Rocks Marine Reserve. This type of study should be relevant to all communities of place associated with marine reserve sites.

A link to the full report is provided in Appendix 2.

B. Otter Rock

B.1 General Economic, Social, and Cultural Overview of Marine Reserves Communities

B.1.a. History

Newport

The original inhabitants of the Newport area were the Siletz Indians. Other settlers started visiting Newport in the mid-19th century as they stopped at Yaquina Bay on their way to a local military garrison. An oyster industry was developed in Yaquina Bay in 1860, and in 1882 Newport became incorporated. Hotels and resorts were constructed in the area, and Newport became a popular vacation destination for visitors from the Willamette Valley (Norman, et. al., 2007).

The Port of Newport was incorporated in 1910, and jetties and a lighthouse were constructed to assist ship traffic. Newport's Bayfront became the center of economic activity with facilities to support large commercial fishing, shipping, and wood products industries. In the early 1900's, the Nye Beach area of Newport became the most popular tourist destination on the Oregon Coast and was known for its resorts, sea baths, taffy shops, and "sanatorium" wellness center (Norman, et. al., 2007).

The Yaquina Bay Bridge and the Newport section of Highway 101 (Oregon Coastal Highway) were constructed between 1919 and 1936. After the bridge construction, the Bayfront was no longer the travel hub for the city since residents no longer needed to take a ferry to reach South Beach and points further south along the coast. In order to attract business from travelers, businesses started to move away from the Bayfront and Nye Beach to locations on the coast highway (Norman, et. al., 2007).

In the 1980's, Newport's business and government leaders initiated a revitalization plan to shift the economy from dependence on natural resources and fishing to a research and tourism oriented economy. This was accomplished through an expansion of the Oregon State University Hatfield Marine Science Center (HMSC) and the Oregon Coast Aquarium (Norman, et. al., 2007).

In September 2013, HMSC director, Bob Cowen, revealed plans to build a new $50 million classroom and research facility at the marine science center by 2016 in partnership with the Oregon Coast Community College. Oregon State University hopes to bring an additional 500 students and 25 faculty members to Hatfield in the next 5 to 10 years through this expansion (Suryan, et. al., 2013). This expansion is likely to advance Newport's status as a center for ocean research and education. It is also expected to create job opportunities and economic development in the area, both through the need to build new supporting infrastructure and through the relocation of educated professionals to the area.

Depoe Bay

The Confederated Tribes of the Siletz Indians originally occupied an area from southern Washington to northern California until 1853, when the government forced them on to a reservation. In 1956, the Western Termination Act was passed, which reduced the Siletz reservation size to 36 acres directly to the east of what is now Depoe Bay. Subsequently in

1977, the Siletz tribe was one of the first in Oregon to be federally recognized, and the tribe was eventually allowed to self-govern (Norman, et. al., 2007).

In 1920, the Sunset Investment Company bought the land at what is now Depoe Bay, with the hopes of creating a new resort destination. Soon after this purchase, two bridges, a post office, and an aquarium were constructed in the town. Construction to make Depoe Bay more hospitable to boat traffic began in 1937, and Depoe Bay is currently known as the world's smallest navigable harbor (Norman, et. al., 2007).

B.1.b. Communities of Place

Newport as a Community of Place

The people of Newport are connected to the Otter Rock marine reserve site through the community's strong involvement in local marine research and fishing activities. Newport has grown to be a hub for marine science on the Oregon Coast. Newport's Hatfield Marine Science Center is home to a number of Oregon State University marine research labs and several government agencies, including the National Oceanic and Atmospheric Administration (NOAA), the Oregon Department of Fish and Wildlife (ODFW), the U.S. Fish and Wildlife Service (USFWS), and the Environmental Protection Agency (EPA) (Norman, et. al., 2007). The Otter Rock site is located in an accessible location for research vessels launching from Yaquina Bay.

The fishing industry plays a key role in shaping the community of Newport. The city is home to one of the biggest local fleets on the West Coast and a distant water fleet that fishes in Alaska. The city also has a strong working waterfront with fish processing, ship maintenance and other fishing support service facilities. The value placed on the fishing industry by the community is illustrated by the fact that the town has reserved parking spaces along the bayfront for fishermen, despite heavy demand for tourist parking. There are an estimated 450 to 500 fishermen in the town of Newport. As a result, most people have a family member or friend who works in the fishing industry. This has created an occupational community of interest for those involved in Newport's fishing industry, which enhances the cultural value of fishing to the area (Package and Conway, 2010).

Newport residents also commonly participate in events that celebrate ocean resources. These events include the annual Seafood and Wine Festival, the Microbrew Festival (originally called the Fishermen's Harvest), the Tuna Canning Festival, and the Newport Loyalty Days and Seafair Festival, Lighthouse Week, Stories by the Sea, Oyster Cloyster on the Oregon Coast, the Newport Clambake and Seafood BBQ, the Blessing of the Fleet, and the Lighted Boat Parade (Kirby and Kellner, 2010).

Depoe Bay as a Community of Place

Depoe Bay has cultural and economic connections to the Otter Rock marine reserve site through its fishing and tourism industries. In recent decades, Depoe Bay has shifted from a prosperous fishing village with a few tourist attractions to primarily a tourism destination with the feel of an historic fishing village. The importance of marine-based tourism is illustrated by the fact that the town has been marketed as the "whale-watching capital of the world" (Depoe Bay Chamber of Commerce, 2013).

Depoe Bay citizens have the opportunity to contribute opinions and advice about the management of the Otter Rock site through the Depoe Bay Nearshore Action Team (NSAT).

The NSAT, composed of local fishermen, businesspeople, and involved community members, was originally responsible for proposing the marine reserve site for Otter Rock. Members of the action team wanted to place a marine reserve in an area that had high ecological diversity, easy enforcement capabilities, and low impacts on local fisheries. They eventually selected the site at Otter Rock, because the entire site is visible from several popular locations and the site has large rocks, which serve as clear natural boundaries. In addition, the reserve is small in size, yet is still ecologically important, because it is an area where people have been harvesting seafood for generations (OCZMA, 2009).

Depoe Bay's cultural connection to fishing and the local ocean is illustrated by the numerous festivals and events that the city hosts throughout the year. These festivals include a Classic Wooden Boat Show, Crab Feed, Ducky Derby, and the Fleet of Flowers. The annual Salmon Bake has been celebrated every year since the first fish fry festival in 1930 (Murphy and Hall, 2013).

B.1.c. Geography

Newport

Newport is located on the central Oregon Coast in Lincoln County. It is an hour's drive from the city of Corvallis and 136 miles southwest of Portland. Newport spans 8.9 square miles of land (Norman, et. al., 2007). Geographic coordinates: Lat 44º38′13″N, long 124º03′08″W (Figure 7).

Depoe Bay

Depoe Bay is located in Lincoln County on the central Oregon Coast, about 13 miles north of Newport and 117 miles southwest of Portland. Depoe Bay spans 1.8 square miles (Norman, et. al., 2007). Geographic Coordinates: Lat 44°48′31″N, long 124°03′43″W (Figure 8).

B.1.d. Demographic Information[8]

Newport

- *Total Population*: 9,989

- *Population Growth*
  Newport's population increased by almost 1700 residents (more than 20%) from 1990 to 2000, and the population had increased to nearly 10,000 residents by 2010 (Figure 9).

- *Median Age:* 43.1

- *Age Distribution*
  In 2010, the 0-4 year age cohort accounted for 6% of the population, the 5-17 year age cohort accounted for 17%, the 18-64 year age cohort accounted for 61%, and the age cohort 65+ accounted for 17% (Table 21).

- *Education*
  The frequency of education levels for those Newport residents over the age of 25 is: less than 9th grade (5%), 9th to 12th grade, no diploma (7%), high school graduate (21%),

[8] All demographic information is from the 2010 US Census unless otherwise noted

some college, no degree (26%), associate's degree (10%), bachelor's degree (20%), and master's or professional degree (11%) (Table 22).

- *Race*
  In 2010, 15% of Newport's population was of Hispanic origin, and 85% of Newport's population was of non-Hispanic origin. In terms of racial distribution, 84% of the population identified as white, 1% identified as Black or African American, 2% identified as Native American, 2% identified as Asian/Pacific Islander, 4% identified as two or more races, and 8% identified as some other race (Table 23).

- *Median Household Income*
  The median household income in Newport was $43,973 and per capita income was $26,677 in 2010 (US inflation-adjusted dollars) (Table 24). Approximately 21% of the population and 15% of families were living below the poverty level.

- *Age Trends*
  The fastest growing age cohorts in Newport are the 45 to 64 age cohort, and the 65 and older age cohort. From 2005-2009, the percentage of Newport's population under age 44 decreased. According to the Office of Economic Analysis (OEA), the proportion of the population over the age of 60 in Lincoln County is expected in increase by 12% by 2030, and the percentage of the population in younger than age 29 is expected to decrease by 6% in the same time frame. In addition, the Hispanic population is growing faster in Lincoln County relative to the rest of the state (City of Newport, 2013).

Depoe Bay

- *Total Population*: 1,398

- *Age Distribution*
  In 2010, the 0-4 year-old age cohort accounted for 3% of the population, the 5-17 year-old age cohort accounted for 11%, the 18-64 year-old age cohort accounted for 62%, and individuals over age 65 accounted for 24% of the population (Table 21).

- *Median Age*: 56.6

- *Education*
  The distribution of education levels for those Depoe Bay residents over the age of 25 is: less than 9th grade (2%), 9th to 12th grade, no diploma (22%), high school graduate (15%), some college, no degree (13%), associate's degree (28%), bachelor's degree (17%), and master's or professional degree (2%) (Table 22).

- *Race*
  In 2010, 5% of Depoe Bay's population was Hispanic in ethnicity, while 95% of the population was non-Hispanic. Ninety-three percent (93%) of Depoe Bay's population identified as white, 0% identified as Black or African American, 2% identified as Native American, 1.4% identified as Asian/Pacific Islander, 3% identify as two or more races, and 2% identify as some other race (Table 23).

- *Median Household Income*
  The median household income in Depoe Bay in 2010 was $37,969 (Table 24). The average per capita income for Depoe Bay residents was $24,994, and 20% of all Depoe Bay residents lived below the poverty line.

B.1.e. Market Drivers

Newport

- *Industry and Employment* (Table 25)
  Industries that provide significant employment to the area include:
  - Agriculture, forestry, fishing and hunting, and mining (5% total)
  - Construction (3%)
  - Manufacturing (6%)
  - Wholesale trade (1%)
  - Retail trade (15%)
  - Transportation and warehousing, and utilities (2% total)
  - Information (3%)
  - Finance and insurance, and real estate and rental leasing (4% total)
  - Professional, scientific, and management, and administrative and waste management services (7% total)
  - Educational services, and health care and social assistance (22% total)
  - Arts, entertainment and recreation, and accommodation and food services at (15% total)
  - Other services, except public administration (7%)
  - Public administration (9%)

- *Employment Categories* (Table 26)
  Major employment categories in Newport include:
  - Management, business, science, and arts occupations (36%)
  - Service occupations (22%),
  - Sales and office occupations (26%)
  - Natural resources, construction and maintenance occupations (7%)
  - Production, transportation, and material moving occupations (10%)

- Newport's tourism industry annually generates $116.8 million of direct spending, and supports about 1,600 jobs, with annual lodging tax revenues of approximately $2.2 million. Direct spending and lodging tax revenues have increased since 2000, but employment in the tourism sector has remained constant over the last 10 years (City of Newport, 2013).

- The National Oceanic and Atmospheric Association (NOAA) Marine Pacific Operations

Center relocated to Newport from Seattle in June 2010. The relocation of the NOAA facility is expected to generate significant economic impact with inputs from construction, maintenance and repair, NOAA employees, vendors to NOAA for operations and maintenance, and visiting research vessels (Table 27). The Economic Development Alliance of Lincoln County estimated the regional economic impact of the NOAA relocation could be $32 million annually within 10 years, potentially creating an additional 800 full-time jobs in Lincoln County (Bauman, 2010).

- Economic sectors impacted by growth in marine research and education will include research vessel maintenance and operation, and development of research and education support facilities and services (City of Newport, 2013). Newport is also a deep draft port accessible by large cargo ships. The city is currently renovating the international terminal of the port to enhance international shipping opportunities. Additional growth is anticipated in existing fishing, seafood processing, and tourism industries (City of Newport, 2013).

- *Employment Statistics*
  In 2010, 42% of the Newport population were not considered part of the labor force, 51% of Newport's population 16 years and older were employed, 6% were unemployed, and the overall unemployment rate was 11% (Table 28).

Depoe Bay

- *Industry and Employment* (Table 25)
  Industries that provide significant employment to the area include:
  - Agriculture, forestry, fishing and hunting, and mining (1%)
  - Construction (5%)
  - Manufacturing (4%)
  - Wholesale trade (1%)
  - Retail trade at (23%)
  - Transportation, warehousing, and utilities at (7%)
  - Information (1%)
  - Finance and insurance, and real estate and rental leasing (1%)
  - Professional, scientific, and management, and administrative and waste management services (9%)
  - Educational services, and healthcare and social assistance at (17%)
  - Arts, entertainment and recreation, and accommodation and food services (26%)
  - Other services, except public administration (1%)
  - Public administration (5%)

- *Employment Categories* (Table 26)
  Major employment categories in Depoe Bay include:
  - Management, business, science, and arts occupations (24%)
  - Service occupations (30%)
  - Sales and office occupations (34%)
  - Natural resources, construction and maintenance occupations (4%)
  - Production, transportation, and material moving occupations (8%)
- *Employment Statistics* (Table 28)
  In 2010, 48% of the Depoe Bay population were not considered part of the labor force, 46% of Depoe Bay's population 16 years and older were employed, 5% were unemployed, and the overall unemployment rate was 9%.

B.1.f. Future Challenges

Newport

The uncertainty surrounding the future of Newport's fishing industry creates challenges for the planning of the city. In addition to the current rockfish conservation areas (RCAs) implemented by the Pacific Fishery Management Council and the state's marine reserves restrictions, fishermen are concerned more restrictions on their fishing grounds may occur with wave energy development. Competition for space, combined with rising prices for fuel, insurance, and other overhead costs, could result in financial pressures on the Newport fishing industry, particularly if fish prices remain constant (Package and Conway, 2010).

During the 1980's, the economic development emphasis placed on tourism and research increased tensions between the tourism and seafood industries. Competing agendas for Yaquina Bay port and harbor development persists (Norman, et. al., 2007).

Depoe Bay

Depoe Bay fishermen have faced many of the same challenges as those at Newport and Port Orford; increasing fuel and vessel-related costs, more fishing regulations, and economic downturns. These difficulties have caused a decrease in the number of commercial and charter fishermen and an increase in the number of recreational fishing slips in the town. Depoe Bay doesn't have the infrastructure necessary to support these changes, so the city will need to adapt in order to support the growing population of recreational fishermen.

Lincoln County

As do many Oregon coastal communities, Depoe Bay and Newport have a disproportionate number of low income residential households (Sweeden, et al., 2008). The proportion of the population living below the poverty level is 21% in Newport and 20% in Depoe Bay, compared to 15.8% for the state of Oregon (Bishaw, 2011).

Low income residents in Lincoln County face a challenge finding affordable housing, because demand for vacation homes has increased housing costs. From 2006 to 2011, 61% of households in the workforce in Lincoln County were burdened by housing costs[9], compared to 57% for the state of Oregon and 54% for the entire US (OHCS, 2011). According to the federal Department of Housing and Urban Development, this cost burden occurs when households spend more than 30% of household income on total housing expenses. In this circumstance, other necessities such as food and healthcare become unaffordable. This issue then impacts the local business community as it makes it difficult to recruit employees for trade and service jobs such as the tourism sector. The large shift in the last four decades in regional employment from natural resources and manufacturing to service sector employment only exacerbates this issue (Sweeden, et al., 2008).

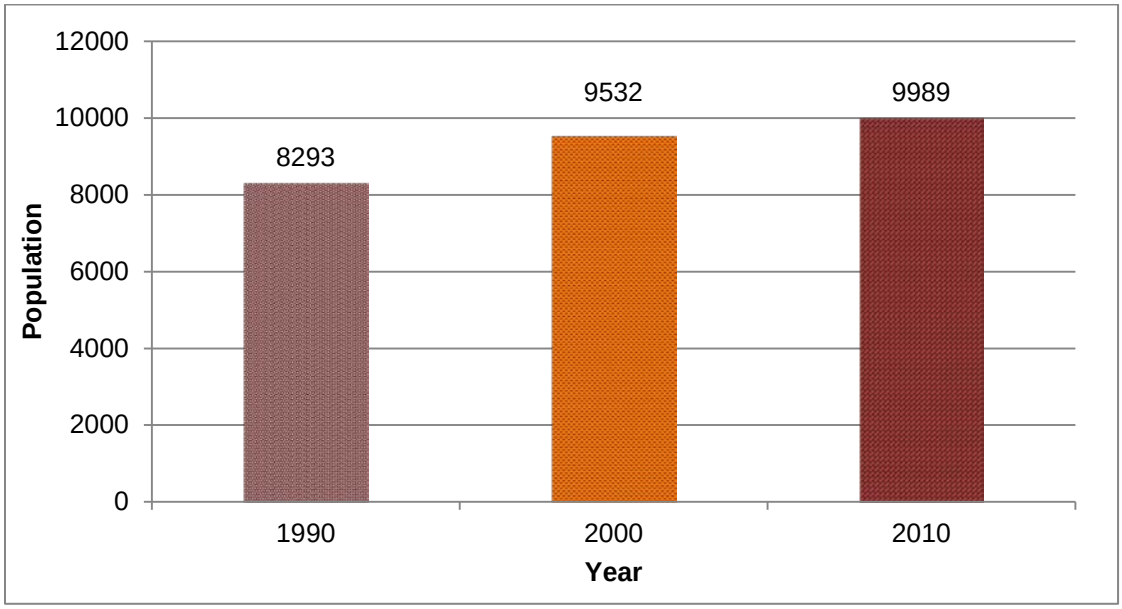
Figure 7. Map of Newport as a Community of Place

[9] Defined as having a household income under 120% of median household income.


Newport and Otter Rock Marine Reserve
Fish Processors & Buyers
Boat Docks
Boat Ramps
Coast Guard
Hatfield Marine Science Center
Port Office
Marine Supply Stores
NOAA
Oregon Coast Aquarium
Marine Reserve
State Park
Otter Rock
Devil's Punch Bowl
Beverly Beach
Yaquina Head
Agate Beach
Newport
Yaquina Bay
South Beach
101
20
Newport
South Beach
N
0 0.25 0.5 1 Miles
0 0.5 1 2 Miles

Figure 8. Map of Depoe Bay as a Community of Place

Figure 9. Newport Population by Year



Source: US Census 2000

Table 21. Population Distribution by Age for Communities of Place

	Newport		Depoe Bay	
	2000	2010	2000	2010
0 to 4 years	6%	6%	4%	3%
5 to 17 years	14%	17%	6%	11%
18 to 64 years	61%	61%	61%	62%
65 years and over	19%	17%	30%	24%

Source: US Census 2010

Table 22. Education Levels for Communities of Place

	Newport Population	Depoe Bay Population
Less than 9th grade	5%	2%
9th-12th grade, no diploma	7%	22%
High school graduate	21%	15%
Some college, no degree	26%	13%
Associate's degree	10%	28%
Bachelor's degree	20%	17%
Graduate or professional degree	11%	2%

Source: US Census 2010

Table 23. Racial Distribution for Communities of Place

Racial Category	Newport	Depoe Bay
White	84%	93%
African American	1%	0
Native American	2%	2%
Asian/Pacific Islander	2%	1%
Two or More Races	4%	3%
Some Other Race	8%	2%

Source: US Census 2010

Table 24. Income Distribution for Communities of Place

Income and Benefits (in 2011 Inflation-Adjusted Dollars)	Newport		Depoe Bay	
	Estimate	Percent	Estimate	Percent
Total households	4421	100%	666	100%
Less than $10,000	542	12%	32	5%
$10,000 to $14,999	305	7%	57	9%
$15,000 to $24,999	603	14%	142	21%
$25,000 to $34,999	422	10%	90	14%
$35,000 to $49,999	523	12%	94	14%
$50,000 to $74,999	753	17%	123	19%
$75,000 to $99,999	434	10%	62	9%
$100,000 to $149,999	589	13%	43	7%
$150,000 to $199,999	161	4%	15	2%
$200,000 or more	89	2%	8	1%
Median household income (dollars)	43,973	(x)	37,969	(x)
Mean household income (dollars)	58,125	(x)	51,093	(x)

Source: US Census 2010

Table 25. Industry Distribution by Community of Place

Industry	Newport	Depoe Bay
Agriculture, forestry, fishing and hunting, and mining	5%	1%
Construction	3%	5%
Manufacturing	6%	4%
Wholesale trade	1%	1%
Retail trade	15%	23%
Transportation and warehousing, and utilities	2%	7%
Information	3%	1%
Finance and insurance, and real estate and rental leasing	4%	1%
Professional, scientific, and management, and administrative and waste management services	7%	9%
Educational services, and health care and social assistance	22%	17%
Arts, entertainment and recreation, and accommodation and food services	15%	26%
Other services, except public administration	7%	1%
Public Administration	9%	5%

Source: US Census 2010

Table 26. Employment Categories for Communities of Place

Occupation	Newport	Depoe Bay
Management, business, science, and arts occupations	36%	24%
Service occupations	22%	30%
Sales and office occupations	26%	34%
Natural resources, construction, and maintenance occupations	7%	4%
Production, transportation, and material moving occupations	10%	8%

Source: US Census 2010

Table 27. Total Annual Personal Income Impacts of the NOAA Fleet in the Newport Area by Period

Years After Relocation	1-2	3-5	5-10	10-20	30+
Construction Phase	19.21				
Maintenance/Repair		1.28	1.28	1.28	1.28
NOAA Employees		7.8	10.92	14.04	14.04
NOAA Vendors		2.7	2.9	3.2	3.2
Additional Research		7	10	13.6	13.6
Total Personal Income of NOAA Fleet	19.21	18.78	25.1	32.12	32.12

Notes: 1. Units are in millions of dollars
2. The full time equivalent annual salary in Lincoln County is about $40,000 payroll income per year. Total personal income of $32,120,000 is equivalent to over 800 full time jobs in the Newport area.

Source: (Bauman 2010)

Table 28. Employment Status for Communities of Place

Employment Status	Newport		Depoe Bay	
	Estimate	Percent	Estimate	Percent
Population 16 years+	8043		1,186	1,186
In labor force	4,632	58%	614	52%
Civilian labor force	4,594	57%	596	50%
Employed	4,072	51%	541	46%
Unemployed	522	7%	55	5%
Armed forces	38	1%	18	2%
Not in labor force	3,411	42%	572	48%
Overall unemployment rate		11%		9%

Source: US Census 2010

B.2 Long Form Fishing Community Profiles

The following sections provide summaries of the fishing community profiles developed for Newport (Package and Conway, 2010) and Depoe Bay (Murphy and Hall, 2013). Links to the complete community profiles are found in Appendix 2.

Table 29. Newport Long-form Fishing Community Profile Summary

Section Title	Summary
Importance of Fishing to the Community of Place	Newport has one of the largest commercial fleets on the coast, which is comprised of a local fleet as well as a distant water fleet that fishes in Alaska. Commercial fishing helps to support the economy in Newport in the form of direct income through the landings delivered to the community, through the businesses that support fishing, and through the tourists that frequent its unique working waterfront. It was estimated that there are 450-500 local fishermen in the community.
Characteristics of Fishing Community Members and their Families	There is a wide spectrum of characteristics of fishermen in Newport. There are variations between fishermen in terms of age, background, work ethic, and education level. There is also diversity between fishing operations in terms of gear type, vessel size, and target species, which help contribute to differences in efficiency and success of the operations. It has been difficult for new fishermen to gain entry to the fishery, due to the high cost of permits and high boat prices. Families are very much a part of fishing operations in Newport. Fishermen's wives generally help with managing the fishing business and many sons go on to be fishermen themselves. However, there are currently fewer fishing families in than in the past, due to the fact that there are limited opportunities for advancement and less high-paying jobs. Wives often take on a second job to help support the family during tough times.
Connection Between the Fishing Community and Community of Place	Most fishing-related services are available locally. (See table of services and accessibility).
Communication within and Between Fishing Communities	Most communication within the Newport community is informal in nature. Information is also disseminated through organizations such as the Fisherman's Marketing Association, the West Coast Crab Commission, the Oregon Sea Grant Extension, and Newport Fishermen's Wives. There have been efforts to improve the relationship between the fishing community and the general Newport Community. Fishermen have been frustrated with the fisheries management process in Newport. Community members often feel that managers ignore their opinions and these residents usually can't afford the time to attend meetings. The location of Hatfield Marine Science Center and ODFW offices in Newport helps to facilitate communication between fisheries managers, scientists, and fishermen. The Newport community also currently has a good standing relationship with the Coast Guard.

Section Title	Summary

Perspectives on Management and Effects of Management	Newport fishing community members were especially concerned with management decisions regarding salmon disasters, groundfish buyback, and permit stacking. Some residents were frustrated with how relief money was distributed after the salmon fishery was closed in the mid-1990s and years 2006 and 2008. Residents were generally in agreement with the intention of the 2003 groundfish vessel buyback program. However, they were concerned that the actual implementation of the buyback program allowed fishermen to sell their boats and return to the same fishery. There was frustration with the fact that fishermen had to help fund the buyback program. Opinions on permit stacking were mixed. Some fishermen appreciated that permit stacking allowed them to catch the same fish continuously, while others were concerned that it could put people out of business.
Change in Fishing and Seafood: Economics and Fishing Effort	The mid 1970's marked a shift in Newport's fishing fleet to larger and more technically advanced boats. The capital construction fund also encouraged fishermen to invest more in their boats. These changes allowed the fishing industry to thrive in the 1980's. The 1990's brought significantly less success, as the effects of overfishing became evident and market prices stayed constant while fuel costs increased. Strong El Niño years in the 1990's especially affected salmon stocks, forcing fishermen to diversify catches or leave the fishery.
Perceptions of the State of the Ocean and its Resources	In general, the perception is that the overall health of the ocean around Newport is good or at least ok. Stocks of species such as shrimp, tuna, and rockfish are perceived to be doing well or rebounding, whereas salmon is perceived to be declining. Many residents believe that the dead-zone around Newport has been blown out of proportion by the media.
Perceptions of the Future	When participants were asked what they imagine the fishing community of Newport will be like in five years, there were a variety of answers related to fishing decreasing or increasing. The future was said to depend on several variables, including the development of wave energy and marine reserves. Most community members mentioned they would like fishing to stay at a sustainable level in the future.

Table 30. Newport Services and Accessibility

Service	Community Where Available
Gear	Gear is widely available in the community of Newport with at least three main gear/marine supply stores. However some fishermen do purchase gear from other communities (Bellingham and Seattle were mentioned) and even as far away as Europe. There are net repair services available in the community. There are also gear sheds (for the

	storage of gear) available at the port and terminal.
Fuel	Fuel is available in Newport (with two fuel sellers on the Bay). Some fishermen bring in fuel from the Willamette Valley in tankers (for larger fishing vessels).
Ice	Ice is available in Newport, but more ice facilities would be beneficial. Sometimes it's difficult for the smaller vessels to acquire ice quickly.
Boat Repair	Some boat repair is available in Newport (especially electric maintenance and diesel repair) and some is done dockside; however a lot of the boat repair facilities are located up the river in the neighboring community of Toledo (which is a hub for shipyards and vessel repair) or in the community of Reedsport. Some of the larger vessels are too big for the facilities in Newport and have to be taken elsewhere to do their haul-out work (such as Reedsport and Portland). Some fishermen do their own boat repair.
Processors	There are various fish processors in the community such as: Pacific Choice, Bornstein's, Hallmark, and Trident; however there has been consolidation in recent years with one large processor, Pacific Choice, purchasing what used to be many different companies. There are also smaller, independent buyers and sellers. Companies such as Ocean Beauty, Newport Seafood (became Pac. Choice), Pacific Shrimp, Jerry Bates, Regatta (became Hallmark), and New England Seafood are not in operation in the community anymore. The port offers a hoist for offloading and public docks for fishermen to sell their product (for smaller catches).
Bookkeeping	There are bookkeeping services in Newport (and some that specialize in fishing); however some people do their own bookkeeping.
Legal Services	Legal services are available in Newport with some attorneys that specialize in maritime law. Some people still go to larger cities such as Seattle and Portland for major legal troubles (such as the loss of life on a vessel).
Social Contacts	Churches, schools, and an active fishermen's wives organization, exist in the community of Newport as well as Oregon State University facilities (including Hatfield Marine Science Center) and Extension offices.

Table 31. Depoe Bay Long Form Fishing Community Profile Summary

Section Title	Summary
Importance of Fishing to the Community of Place	Depoe Bay has become less dependent on fishing activities and more dependent on tourism activities in recent decades. Fishing is still at the heart of the personality of the town and fishing-based activities draw tourists and families to the area.
Characteristics of Community Fishing Members and Families	The typical Depoe Bay fisherman is a male charter boat operator around fifty years of age. Due to the seasonality and unpredictability of their work, charter fishermen generally rely on second incomes. These incomes usually come from wives working outside the industry. The few commercial fishermen left in Depoe Bay generally live outside of town or spend most of their time fishing in Alaska. Changes in regulations, costs, and species abundance over the last 50 years has caused Depoe Bay to go from a predominantly commercial fishing port to a port supported by recreational fishing. Fishing is also becoming less of a family business as children increasingly look for jobs outside the industry. This creates challenges for captains trying to find reliable crewmembers. It is difficult for new fishermen to gain entry to the Depoe Bay fishery due to financial expectations and the unwillingness of older fishermen to exit the industry.
Connections Between the Fishing Community and Community of Place	Depoe Bay is a small port and has limited services available to charter and private sport fishermen in regards to provisions such as ice, repairs, supplies, and processing. Fishermen generally travel to Newport to access most services. (See table of services and accessibility)
Communication within and Between Fishing Communities	Communication within the fishing community primarily takes place at charter offices, harbor parking lots, and docks. There is generally a lack of communication between charter operators. It is also common for interactions to take place in local coffee shops, taverns, and on the street. The most common mode communication between fishermen is vessel radios. Fishermen felt comfortable communicating with local port samplers, but they were generally dissatisfied with overall communications with the ODFW. They perceived a lack of stakeholder involvement in fishing regulation decisions and a general lack of clarity surrounding these regulations. Overall, the sentiment concerning communication with the local government was positive.
Perspectives on Management and Effects of Management	Many Depoe Bay community members expressed an understanding and even support for regulating fisheries for conservation, but were often skeptical of the data these management decisions are based on. Residents commonly believed that ODFW needs better science and more timely stock assessments.

Change in Fishing and Seafood: Economics and Fishing Effort	The loss of salmon stocks in Depoe Bay led to the loss of needed resources and facilities to support commercial fishing, such as fueling stations, processing plants, and fish buyers. Many fishermen left to fish from other ports like Newport or Astoria and some moved their families to Alaska to become large-scale commercial fishermen. Economic downturns in the national and state economy coupled with the increasing costs of operating a vessel has led to a change in composition of the fishing community. There are now fewer charter trips and more private recreational fishing boat moorages. Depoe Bay has not been able to adapt quickly enough to this change and the town lacks sufficient parking, moorage space, and facilities to accommodate the number of private boats wanting to use the port.
Perceptions of the State of the Ocean and its Resources	When talking about the state of the ocean and the health of fish stocks, the community overall had supportive comments on management. These same fishermen expressed a common understanding of the need to regulate groundfish and the number of boats on the water, but they didn't always agree with the techniques or science used to do this.
Perceptions of the Future	Most community members would like to see Depoe Bay become a working waterfront with fish markets, processors, a crane, and more facilities for tourists and recreational fishermen. They hope that this would draw tourists to the harbor and increase charter business. Community members would also like to see commercial fishermen return to the port. They expressed an underlying desire to preserve the fishing culture within Depoe Bay and increase tourism to keep the town going as viable fishing village. However, the fishing community did not expect to see any major changes in regards to the fishing industry in Depoe Bay in the next 5 years.

Table 32. Depoe Bay Services and Accessibility

Service	Community Where Available
Gear	No gear or supplies stores exist presently in Depoe Bay. The last hardware store that catered to fishermen shut down and now it is necessary to go to Newport for any gear or supplies.
Fuel	There is one remaining fuel facility that is managed by the city of Depoe Bay. The hours are restrictive for commercial fishermen and cause some congestion among the different types of fishermen (charter, private sport, and commercial).
Ice	There is currently no ice facility available. With the lack of commercial fishing in Depoe Bay an ice facility is not a major priority but it makes it necessary for charter and private sport fishermen to utilize Newport and Lincoln City facilities and stores.
Boat Repair	There is one boat repair shop in Depoe Bay, which has a long family connection to the town and the fishing community. There is also a mobile repair option that comes through town every once in a while. Both of these options only cater to smaller, or not as major, boat repair and maintenance. For major repairs or maintenance, it is necessary to go to Newport or Astoria.
Processors	There are currently no processors or operating fish plants in Depoe Bay. The only processing that takes place occurs on the docks by filleters that work with the charter operators. There is an empty fish plant that is used mostly for storage.
Bookkeeping	No known professional bookkeeping is available. Most people either go to Newport or do their own bookkeeping (wives are involved in this aspect of the business).
Legal Services	No known legal services are available. Most people use legal services out of Newport or another major city.
Social Contacts	The church provides support to the community through a food bank, preschool, counseling, and involvement in community events such as the blessing of the fleet. There are no schools but a “Kid-zone” activity place is available for parents and children. The community center and charter offices provide space for fishermen to meet. There are also several restaurants, cafes, and coffee shops where socializing occurs.

B.3 The Economic Impacts of Marine Reserve Restrictions

This section is a summary of the results based on modeling of the regional economic impacts (REI) of the Otter Rock Marine Reserve restrictions using spatial habitat and fisheries data. A link to the full report provided in Appendix 2.

The economic impacts associated with the displacement of fishing effort at Otter Rock were estimated using 2009 catch and economic information. The actual economic impact would probably be lower than this estimate, as some displaced commercial fishermen would choose to fish in other areas along the coast, rather than choose to stop fishing.

Economic modeling was used to estimate the displaced potential catch and resulting upper estimate of regional economic impact. Many fisheries statistics are only expressed in terms of totals for combined ports. In this discussion, the aggregated Newport port group data are utilized.

The preliminary estimate for the total decrease in annual personal income (REI) from the displaced potential commercial catch at the Otter Rock site is $16,000 (Table 10). The 2009 Newport port group commercial fisheries regional economic impact (REI) was estimated at approximately $49.0 million. The displaced commercial harvest at Otter Rock was thus about .03% of the total port group landings. Since the 2009 Oregon Territorial Sea commercial REI was estimated at approximately $17.7 million. Thus the commercial harvest displaced by the Otter Rock Marine Reserve restrictions was about 0.1% of the 2009 Oregon Territorial Sea landings. The total REI from commercial onshore landings in Oregon in 2009 was $175 million. Thus the displaced commercial harvest at Otter Rock was about 0.01% of the total 2009 state-wide commercial onshore landings (Table 10).

The preliminary estimate for the total decrease in annual personal income (REI) from the displaced potential recreational catch at the Otter Rock site is $21,000 (Table 11). The REI of the 2009 Newport port group recreational harvest was estimated at approximately $5.1 million. The REI of the displaced recreational harvest at Otter Rock was thus about 0.42% of the REI of the 2009 Newport recreational landings. The Oregon Territorial Sea recreational REI in 2009 was estimated at approximately $4.3 million. Therefore the recreational harvest displaced by the Otter Rock Marine Reserve restrictions was about 0.5% of the total Oregon Territorial Sea recreational landings in 2009. The total REI from recreational onshore landings in Oregon in 2009 was $10.5 million. Thus the REI of the recreational harvest displaced by the Otter Rock Marine Reserve was about 0.2% of the state-wide REI of recreational onshore landings (Table 11).

B.4 Economic Impact of Commercial and Recreational Fishing

This section provides an economic characterization of the commercial and recreational fishing industries associated with the communities of Newport and Depoe Bay. Data are divided into Newport and Depoe Bay when possible. However, many statistics are only expressed in terms of totals for the combined ports. Harbors in the Newport port group are: Newport, Depoe Bay, Siletz Bay, and Waldport.

B.4.a. Commercial Landings

- In 2010, a total of 349 vessels delivered landings to Newport. The total catch in 2010 was 62.6 million round pounds, and the total ex-vessel revenue was $30.6 million. Landings in Newport were from the following fisheries (data shown is in millions of round pounds and ex-vessel revenue in millions of dollars): Dungeness crab (5.7/$11.8), sablefish (2.0/$5.3), tuna (4.1/$4.5), Pacific whiting (38.1/$3.3), pink shrimp (5.7 /$2.0), groundfish (5.5/$1.9), salmon (0.2/$1.0) and other (1.1/$0.8) (Table 33).

- In 2010, a total of 12 vessels, delivered landings to Depoe Bay. The total catch in 2010 was 35.8 thousand round pounds, and the total ex-vessel revenue was $72.3 thousand. Landings in Depoe Bay were from the following fisheries (data shown is in thousands of round pounds and ex-vessel revenue in thousands of dollars): groundfish (11.6/$22.1), Dungeness crab (8.9/$29.1), tuna (14.5/$17.6), and other (0.0/1.0) (Table 34).

- In 2010, the share of harvest value by major fishery for Newport was: Dungeness crab (38%), sablefish trawl (17%), albacore tuna (15%), Pacific whiting (11%), pink shrimp (7%), salmon (3%), and groundfish (except sablefish and pacific whiting) (6%) and other (3%) (Figure 10). Table 35 includes a list of catch data and gear types used by the Newport groundfish fishery.

- In the past 20 years, Newport port group harvest volumes peaked at over 100 million round pounds from 1996 to 2001. At this time, harvest values also dipped to a low of less than $28 million. Harvest values increased in 2006, then both harvest value and volume declined steadily from 2007 to 2010, rebounding in 2011 (Figure 11).

B.4.b. Recreational Fishing

An internet analysis of fishing guide resources indicated that four recreational fishing businesses currently operate out of Newport including Yaquina Bay Charters, Newport Marina Store and Charters, Captain's Reel Deep Sea Fishing, and Newport Tradewinds Charters. In 2010, the total estimated recreational catch in Newport was 110,316 fish, and the total number of recreational angler days was 43,467. The Newport 2010 recreational landings categorized by type of fishing excursion (est. # of fish caught/angler days) were: bottomfish (79,031/18,683), combination salmon and bottomfish (5,257/2,144), dive (618/197), halibut (7,330/9,643), salmon (6,482/8,871), and tuna (11,598/3,929) (Table 36).

According to the Depoe Bay Chamber of Commerce, the sport fishing and whale watching businesses currently operating out of Depoe Bay include Dockside Charters, Amigo Charters, Eco Excursion Whale Watching, Mariner Charters LLC, Tacklebuster Sportfishing, The Whale's Tale LLC, and Tradewinds Charters. In 2010, the total estimated recreational catch in Depoe Bay was 120,004 fish, and the total number of recreational angler days was 18,708. The Depoe Bay 2010 recreational landings categorized by type of fishing excursion (est. # of fish caught/angler days) were: bottomfish (57,095/12,716), combination salmon and

bottomfish (57,095/818), dive (46/34), halibut (380/397), salmon (380/3,082) and tuna (5,008/1,661) (Table 37).

B.4.c. Seafood Buyers and Processors

In 2010, the Newport port group had four major seafood-processing facilities with over $2.5 million in purchases; these facilities were responsible for 75% of total purchases. An additional three buyers purchased over $1 million, 15% of total purchases. In addition, eleven buyers purchased between $100,000 and $1 million (seven percent of the purchase), five buyers purchased between $50,000 and $100,000 (1 percent of the purchase) and 16 buyers purchased between $10,000 and $50,000 (one percent of the purchase) (Table 38). The major species or group of species purchased at the port included groundfish, whiting, salmon, crab/lobster, shrimp, pelagic species, highly migratory species, halibut, and other (Table 39).

B.4.d. Marine Infrastructure and Services

Newport is also a regional commercial fisheries center, and many vessels which fish only in distant locations use Newport for moorage, provisioning, and repairs, but are not represented in homeport vessel statistics because they do not make their onshore landings in Oregon (The Research Group, 2011).

The Newport recreational and commercial fishing facilities occupy separate sides of the bay, with Bay Boulevard Commercial Harbor on the north shore and South Beach Recreational Marina to the south. Separate facilities were created when overcrowding created conflicts between recreational and commercial fishermen at the boat ramp and other facilities during 1970s. Development of the recreational facilities on the south side of Yaquina Bay reduced the potential for conflicts (Kirby and Kellner, 2010).

Infrastructure at the Port is mixed, including a cargo shipping terminal, commercial fishing facilities, a recreational marina, and vehicle parks. The Bayfront, Newport's working waterfront, is a popular locale that supports a mix of uses including fish processors, tourist amenities, retail shops, and restaurants. The limited air draft under the Yaquina Bay Bridge prevents large cruise vessels from visiting the Port. The Port is currently focused on prioritizing the maintenance and repair of essential infrastructure for the commercial fleet (Kirby and Kellner, 2010).

B.4.e. Vessels

The type of vessels that delivered landings to Newport in 2010 were: crabber (116), salmon troller (47), sablefish fixed gear (19), migratory liner (19), large groundfish trawler (14), shrimper (14), Alaska fisheries vessel (13), pacific whiting onshore and offshore trawler (6), Other > $15 thousand (46), Other <=$15 thousand (40), other groundfish fixed gear (<=3), pelagic netter (<=3), and diver vessel (<=3) (Table 40).

The type of vessels that delivered landings to Depoe Bay in 2010 were crabber and other <= $15 thousand. Vessel information was confidential for each of these vessel types, which indicates that there are <=3 vessels for each category (Table 41).

B.4.f. Economic Contributions

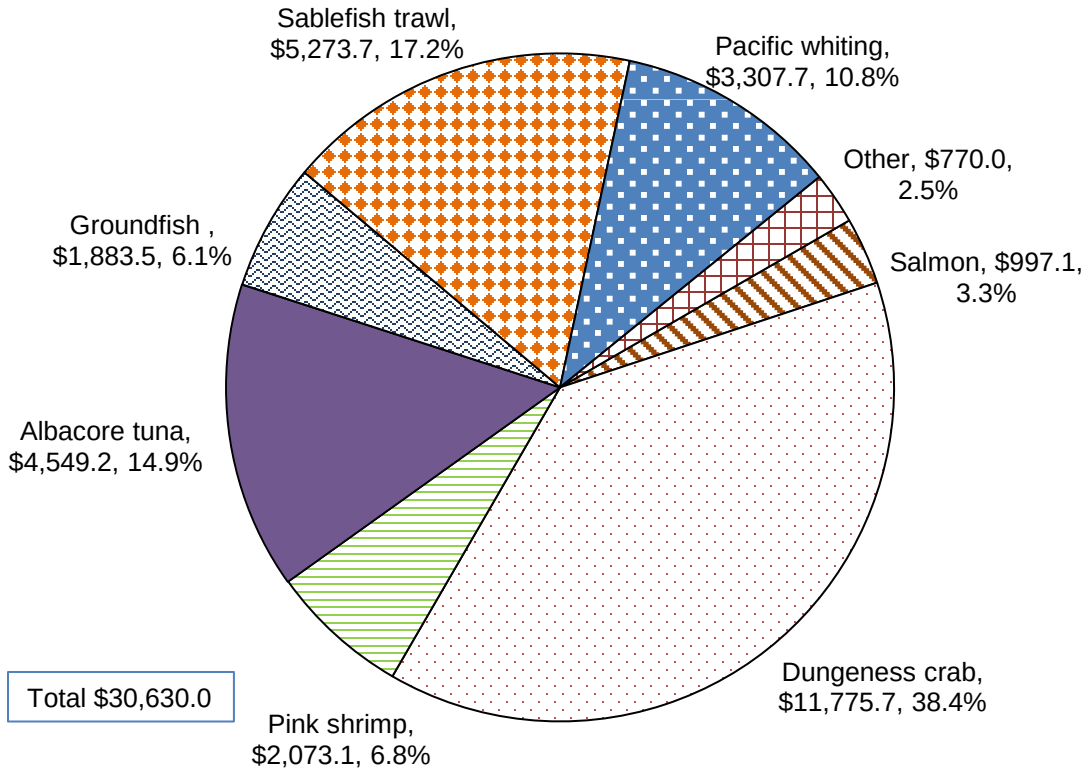
The economic contribution of commercial fishing to the Newport port group economy has slightly increased over the past 25 years (Figure 12). The average annual economic contributions from the commercial fishing industry between 2008 and 2011 were $807.7 million in earned income, $156.9 million in fishing income, and $1,596.3 million in total income. Fishing income represented 19% of all earned income and 10% of all income

sources for the Newport port group. Commercial fishing represented the equivalent of 4,865 jobs for Newport port group economies between 2008 and 2011 (Table 42).

The annual economic contribution of recreational fishing to the Newport economy (in thousands of dollars) totaled $5,823.7 in 2011. The greatest percentage of the recreational economic contribution came from ocean non-crab private and charter trips ($2,932), followed by ocean crab trips ($673), Yaquina Bay trips ($1,196.7), freshwater private and guided trips ($477.3), and non-fishing trip purpose ocean and bay trips ($544.8) (Table 43).

The economic contribution of recreational fishing to the Depoe Bay economy (in thousands of dollars) totaled $1,782.0 in 2011[10]. The greatest percentage of the recreational economic contribution came from ocean non-crab private and charter trips ($1,474.4), followed by ocean crab trips ($307.6) (Table 44).

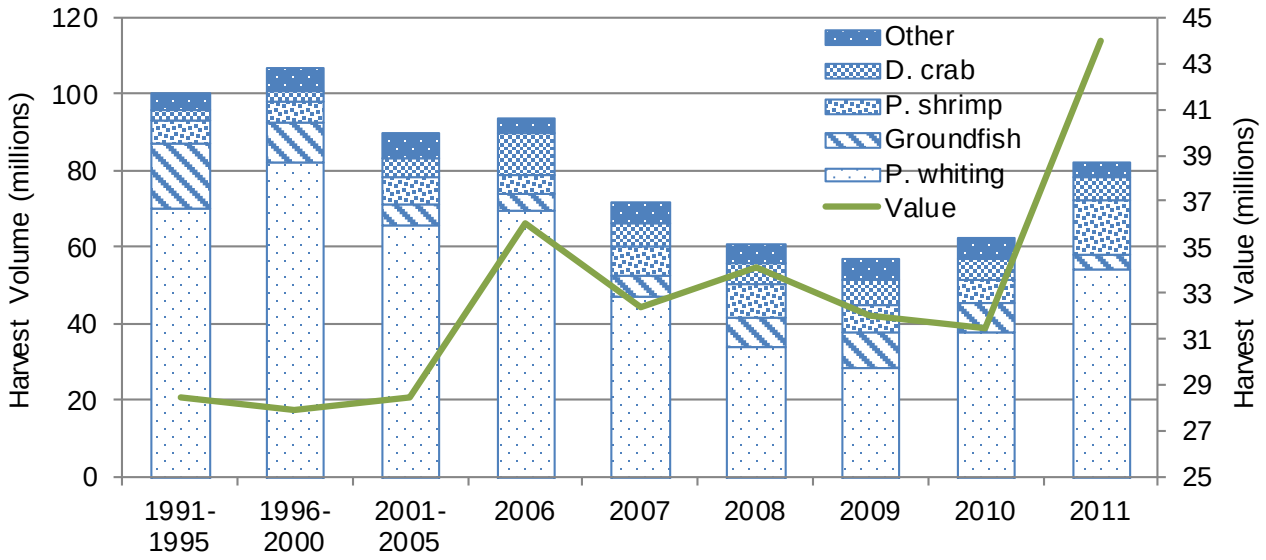
Figure 10. Newport Port Group Harvest Value by Fishery in 2010



Note: Landings are reported in thousands of round pounds; revenue is ex-vessel revenue in thousands of dollars. Source: PacFIN annual vessel summary, July 2011 extraction

Figure 11. Newport Port Group Harvest Volume and Value Trends in 1991 to 2011

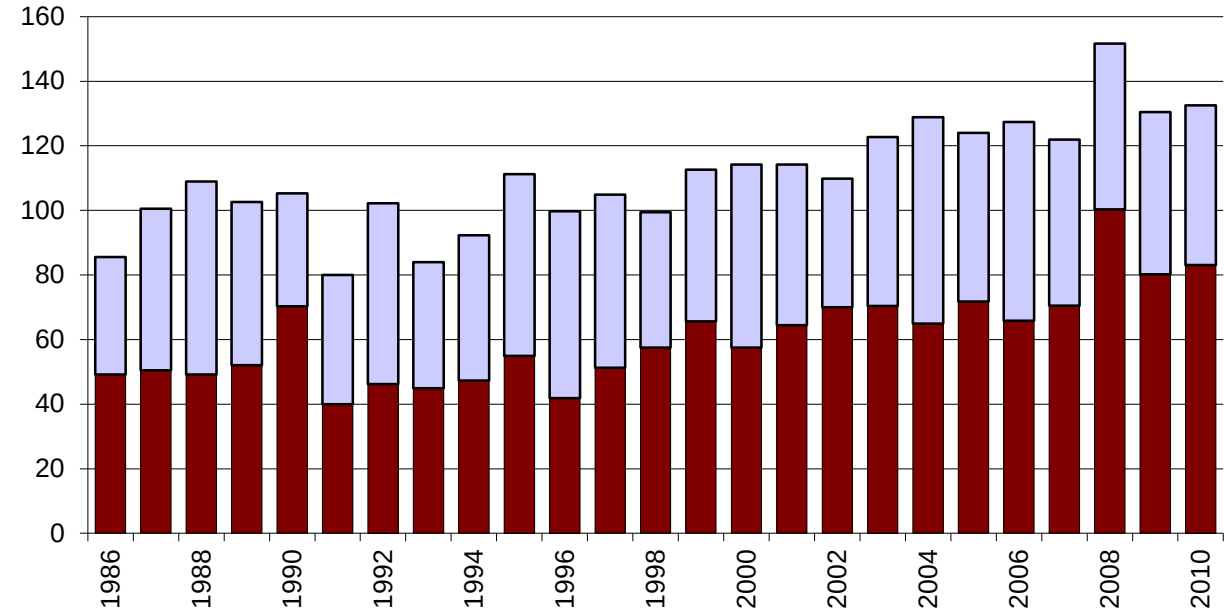
[10] Year 2011 was chosen for reporting recreational fishing economic contributions for the purpose of maintaining consistency with reported Port Orford recreational economic contribution data.



Notes: 1. Value is adjusted to 2011 dollars using the GDP implicit price deflator developed by the U.S. Bureau of Economic Analysis.
2. Years are shown by five-year averages for 1991 to 2005.
3. Stacked bars are showing harvest volume in round pounds by species groups. "Other" includes tuna, salmon, and other species.

Source: PacFIN annual vessel summary data, March 2008, April 2009, March 2010, July 2011, and June 2012 extractions.

Figure 12. Newport Group Commercial Fishing Contributions 1986 to 2010



See Table 36 for source and notes.

Table 33. Newport Commercial Landings by Fishery (2010-2011)

Fishery	2010		2011	
	Round lbs.	Revenue	Round lbs.	Revenue
Salmon	213.1	997.1	82.8	410.6
D. crab	5,717.7	11,775.7	5,702.0	14,485.8
Pink Shrimp	5,752.1	2,073.1	14,237.4	7,585.9
Tuna	4,136.6	4,549.2	3,648.0	6,623.8
Groundfish	5,488.5	1,883.5	2,098.7	1,000.6
Sablefish	2,042.3	5,273.7	1,730.2	6,977.7
Pacific Whiting	38,148.6	3,307.7	54,501.7	5,987.6
Other	1,090.3	770.3	282.0	733.5
Total	**62,589.1**	**30,630.4**	**82,282.7**	**43,805.5**

Notes: 1. Landings are reported in thousands of round pounds
2. Revenue is ex-vessel revenue in thousands of dollars
Source: PacFIN annual vessel summary, July 2011 and April 2013 extractions

Table 34. Depoe Bay Commercial Landings by Fishery (2010-2012)

Fishery	2010		2011	
	Round lbs.	Revenue	Round lbs.	Revenue
Salmon	0.7	3.5	0.1	0.2
D. crab	8.9	29.1	12.7	41.8
Tuna	14.5	17.6	5.8	8.4
Groundfish	11.6	22.1	10.4	21.4
Other	0.0	1.0	2.0	3.0
Total	**35.8**	**72.3**	**44.4**	**80.7**

Notes: 1. Landings are reported in thousands of round pounds
2. Revenue is ex-vessel revenue in thousands of dollars
Source: PacFIN annual vessel summary, July 2011 and April 2013 extractions

Table 35. Newport and Depoe Bay Vessel Counts and Landings by Fishery in 2010

Fishery	Vessels	Volume	Value
Salmon	155	213.9	1,000.6
Dungeness crab	115	5,726.6	11,804.9
Pink shrimp	12	5,752.1	2,073.1
Albacore tuna	200	4,151.1	4,566.8
Groundfish non-whiting	92	7,542.4	7,179.3
Trawl gear	27	6,401.2	3,761.3
Fixed gear LE	18	1,054.7	3,209.7
Non-sablefish	17	49.3	43.5
Longline or setline	13	46.7	41.9
Other hook and line	0	0	0
Fish pot	5	2.6	1.5
Sablefish	18	1,005.4	3,166.3
Longline or setline	13	545.4	1,777.2
Other hook and line	c	0.7	2.3
Fish pot	6	459.3	1,386.8
Fixed gear OA	40	84.5	205.6
Non-sablefish	30	38.9	68.4
Longline or setline	11	2.6	1.6
Other hook and line	20	36.3	66.8
Sablefish	20	45.6	137.2
Longline or setline	16	36.9	112.4
Other hook and line	c	1.5	4.6
Fish pot	6	7.2	20.3
Non-trawl gear and non-fixed gear LE	c	0	0
Non-sablefish	c	0	0
Sablefish	0	0	0
Non-trawl gear and non-fixed gear OA	22	2.0	2.6
Non-sablefish	22	2.0	2.6
Sablefish	0	0	0
Pacific whiting	14	38,148.6	3,307.7
Pacific sardine	0	0	0
Sea urchin	0	0	0
Halibut	57	104.8	387.6
Hagfish	7	807.8	364.6
Other	29	177.6	18.2
Total	**344**	**62,624.9**	**30,702.7**

Notes:
1. Volume is in thousands of round pounds and value is in thousands of dollars.
2. Landings without a unique vessel id are excluded for vessel counts, and included for volume and value. Vessel counts shown as "c" are not displayed to avoid disclosing confidential information.
3. The number of deliveries to Newport is 4,497, and to Depoe Bay is 145 in 2010. Unique vessel count for Newport is 338 and Depoe Bay is nine.
4. Units of volume are shown in thousands of round pounds and units of value are shown in thousands of dollars.

Source: PacFIN annual vessel summary, July 2011 extraction.

Table 36. 2010-2011 Newport Recreational Catch by Trip Type

Year	Bottomfish		Combination		Dive		Halibut		Salmon		Tuna		Total	
	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days
2010	79,031	18,683	5,257	2,144	618	197	7,330	9643	6,482	8,871	11,598	3,929	110,316	43,467
2011	55,278	17,473	3,145	1,548	600	172	7,026	10,125	3,554	6,353	8,091	3,734	77,694	39,405

Notes: 1. Sum is sum of estimated catch in number of fish
2. Days is the number of angler days
Source: ORBS

Table 37. 2010-2011 Depoe Bay Recreational Catch by Trip Type

Year	Bottomfish		Combination		Dive		Halibut		Salmon		Tuna		Total	
	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days	Sum	Days
2010	57,095	12,716	57,095	818	46	34	380	397	380	3,082	5,008	1,661	120,004	18,708
2011	49,850	13,289	49,850	564	10	20	556	657	556	3,475	3,172	1,431	103,994	19,436

Notes: 1. Sum is sum of estimated catch in number of fish
2. Days is the number of angler days
Source: ORBS

Table 38. 2010 Total Purchases at Newport Port Group

Processor Category	Ship Count	Purchase Share	State	Port Group
>2.5M	4	75%	37,254,921	23,115,688
$1M-$2.5M	3	15%	16,339,001	4,684,979
$100K-$1M	11	7%	6,022,984	2,201,141
$50K-$100K	5	1%	1,708,972	356,018
$10K-$50K	16	1%	694,961	365,514
<$10K	42	0%	10,316,313	135,783
Subtotal	**81**	**100%**	**72,337,152**	**30,859,123**

Notes: State and port group purchases are in dollars of ex-vessel value
Source: PacFIN annual vessel summary data July 2011 extraction, and ownership information from interviews with company representatives used in TRG (September 2006).

Table 39. 2010 Species Group Purchases at Newport Port Group

Processor Category	Groundfish	Whiting	Salmon	Crab/ Lobster	Shrimp	Pelagic	Highly Migratory	Halibut	Other
>2.5M	6,700,690	3,043,621	297,974	9,360,108	1,666,670	4,458	1,653,393	321,549	67,225
$1M-$2.5M	166,690	0	164,243	1,618,171	406,429	451	2,326,107	2,888	0
$100K-$1M	271,578	264,096	426,980	632,496	0	110	278,814	29,424	297,643
$50K-$100K	2,106	0	47,474	163,541	69,066	0	65,048	8,783	0
$10K-$50K	25,485	0	40,766	51,344	42,891	0	181,251	20,250	3,527
<$10K	12,768	0	23,158	32,993	0	0	62,160	4,704	0
Subtotal	**7,179,317**	**3,307,717**	**1,000,595**	**11,858,653**	**2,185,056**	**5,019**	**4,566,773**	**387,598**	**368,395**

Notes: State and port group purchases are in dollars of ex-vessel value
Source: PacFIN annual vessel summary data July 2011 extraction, and ownership information from interviews with company representatives used in TRG (September 2006).

Table 40. 2010 Newport Vessels by Type

Vessel Type	Count
Alaska Fisheries Vessel	13
Pacific Whiting Onshore and Offshore Trawler	6
Large Groundfish Trawler	14
Sablefish Fixed Gear	19
Other Groundfish Fixed Gear	c
Pelagic Netter	c
Migratory Liner	19
Shrimper	14
Crabber	116
Salmon Troller	47
Diver Vessel	c
Other > $15 Thousand	46
Other <= $15 Thousand	40

Notes: Vessel counts shown as "c" are not displayed to avoid disclosing confidential information.
Source: PacFIN annual vessel summary, July 2011 and April 2013 extractions

Table 41. 2010 Depoe Bay Vessels by Type

Vessel Type	Count
Crabber	c
Other <= $15 Thousand	c

Notes: Vessel counts shown as "c" are not displayed to avoid disclosing confidential information.
Source: PacFIN annual vessel summary, July 2011 and April 2013 extractions

Table 42. Representation of the Commercial Fishing Industry in the Newport Area Economy 2008-2011

Area	2008		2009		2010		2011		2008-2011 Average	
	Amount	Percent	Amount	Amount	Amount	Percent	Amount	Percent	Amount	Percent
All income sources	1,655.3	10.0%	1569.7	8.9%	1,560.0	8.9%	1,600.2	11.5%	1596.3	9.9%
Earned income	842.1	19.7%	792.7	17.5%	783.5	17.6%	812.4	22.7%	807.7	19.4%
Fishing income	166.1	100.0%	139.0	100.0%	138.1	100.0%	184.2	100.0%	156.9	100%
Equivalent Jobs	5,157		4,324		4,298		5,679		4,865	

Notes:
1. Economic contributions are measured as total personal income in millions of 2012 dollars.
2. Earned income is the sum of wages and salaries, proprietors' income. Earned income does not include transfer payments, or dividends, interest, and rent.
3. County average annual earnings per job are computed by dividing the economies all industry earnings estimates by total full-time and part-time jobs estimates. Average earnings per job within industries involving more part-time work is lower than industries involving more full-time work, although there could be little difference in the underlying wage of full-time workers. Since average earnings per job are just a simple average, it does not account for variations in the distribution of earnings among high-pay vs. low-pay jobs. Equivalent jobs at the statewide level include jobs within all coastal communities plus jobs in the rest of the state computed using the difference in fishing income at the state level and fishing income within coastal communities.
4. Personal income and average wage data is from U.S. Department of Commerce, Bureau of Economic Analysis. The most recent year personal income at the county level is a forecast using linear regression over the shown years. The share of earned personal income for the most recent year is the same as the preceding year. The personal income for all coastal communities are for the counties of Clatsop, Tillamook, Lincoln, Coos, Curry, and the coastal areas of Lane and Douglas counties. The methodology used to calculate the amount of personal income for portions of counties is explained in TRG (March 2006). The 1990 and 2000 decennial census information is used with the methodology to calculate the partial county estimates.

Source: The Research Group. Oregon's Commercial Fishing Industry, Year 2011 and 2012 Review. Prepared for Oregon Department of Fish and Wildlife, and Oregon Coastal Zone Management Association. September 2013.

Table 43. Newport Ocean, Bay, and Freshwater Recreational Trips and Economic Contribution in 2009 and 2011

Fishery	2009 Economic Contribution	2011	
		Trips	Economic Contribution
Ocean non-crab private and charter	3,094.9	39,495	2,932.0
Salmon	751.6	6,353	430.0
Combination	157.1	1,548	104.7
Bottomfish	1,337.0	17,473	1,379.7
Halibut	490.0	10,215	735.3
Dive	8.8	172	13.6
Tuna	350.5	3,734	268.8
Ocean crab		17,046	673.0
Private	n/a	6,546	258.5
Charter	n/a	10,500	414.6
Yaquina Bay	n/a		
Crab	n/a	13,716	848.9
Clams	n/a	n/a	--
Marine finfish	n/a	14,311	347.9
Freshwater private and guided	n/a		
Anadromous	n/a		
Salmon	n/a	10,656	467.2
Steelhead	n/a	20	0.9
Sturgeon	n/a	212	9.3
Resident finfish	n/a	n/a	--
Non-fishing trip purpose ocean and bay	n/a		
Touring trips	n/a	6,899	544.8
Total			**5,823.8**

Notes:
1. Economic contributions for 2009 and 2011 are expressed as personal income in thousands of dollars adjusted to 2011 dollars using the GDP implicit price deflator developed by the U.S. Bureau of Economic Analysis. Economic contribution includes the "multiplier" effect and is calculated at the local level.
2. There are also angler trips taken when clams and bait shrimp are the target species.
3. Estimates for the number of crabbing trips is for boat mode and do not include trips when land or pier based. Half of the ocean crabbing trips are assumed to be in combination with other target species fishing trips or touring trips, and finfish uses non-salmon 2003 Lincoln County trips, estimated using Lincoln County to statewide ratio of 2003 anglers, times 2003 statewide trips. Non-salmon portion of trips is estimated using sampled anglers for Lincoln County by primary target. It is assumed that Yaquina Bay trips are 20% of Lincoln County total. Other streams associated with the communities do not have angler trips.
5. Freshwater trips include only the Yaquina River or Bay. Fishing trips in tributaries to Yaquina Pier are not included.
6. Figures for Ocean Crab, Yaquina Bay, Freshwater private and guided trips, and Non-fishing trip purpose ocean and bay categories were not available for year 2009.

Sources:

Bay and ocean crab trips: Ainsworth, Justin C., Mitch Vance, Matthew V. Hunter, and Eric Schindler. The Oregon Recreational Dungeness Crab Fishery, 2007-2011. Information Reports No. 2012-04. ODFW, Marine Resources Program. Jul 2012.

Ocean non-crab trips: ODFW Ocean Recreational Boat Survey (ORBS) data, Jun. 2011 and Apr. 2012 extractions.

Bay finfish trips: RecFIN. Internet web form queries: http://www.recfin.org/. Accessed Jan. 2013.

Freshwater anadromous catch: ODFW SSHSTRP. http://www.dfw.state.or.us/resources/fishing/sportcatch.asp.

Non-fishing: Oregon State Marine Board. "Triennial Survey Results for 2010." Internet searchable data: http://www.oregon.gov/osmb/Pages/admin/TriennialSurveyResultsPage2010.aspx. Accessed Jan. 2013.

Economic contribution per day and anadromous success rates: The Research Group. Oregon Marine Recreational Fisheries Economic Contributions in 2009 and 2010. Prepared for ODFW and OCZMA. Sep. 2011. And personal communication with The Research Group, Dec. 2012.

Shellfish expenditures per trip: Dean Runyan Associates. Fishing, Hunting, Wildlife Viewing, and Shellfishing in Oregon, 2008. Oregon Department of Fish and Wildlife and Travel Oregon. May 2009

Table 44. Depoe Bay Ocean and Bay Recreational Trips and Economic Contribution in 2009 and 2011

Fishery	2009 Economic Contribution	2011	
		Trips	Economic Contribution
Ocean non-crab private and charter	2,059.3	19,436	1,474.4
Salmon	638.7	3,475	235.0
Combination	157.0	564	38.0
Bottomfish	1,098.3	13,289	1,049.4
Halibut	44.0	657	47.3
Dive	718	20	1.6
Tuna	120.6	1,431	103.0
Ocean crab	N/A	7,791	307.6
Private	N/A	763	30.1
Charter	N/A	7,028	277.5
Total			**1,782.0**

Notes: 1. Economic contribution expressed as personal income adjusted to 2011 dollars using the GDP implicit price deflator developed by the U.S. Bureau of Economic Analysis. Economic contribution includes the "multiplier" effect and was calculated at the local level.
2. No freshwater or bay trips were included for Depoe Bay.
3. Figures for the Ocean Crab category were not available for 2009.

Sources:
Bay and ocean crab trips: Ainsworth, Justin C., Mitch Vance, Matthew V. Hunter, and Eric Schindler. The Oregon Recreational Dungeness Crab Fishery, 2007-2011. Information Reports No. 2012-04. ODFW, Marine Resources Program. Jul 2012.
Ocean non-crab trips: ODFW Ocean Recreational Boat Survey (ORBS) data, Jun. 2011 and Apr. 2012 extractions. Bay finfish trips: RecFIN. Internet web form queries: http://www.recfin.org/. Accessed Jan. 2013.
Economic contribution per day and anadromous success rates: The Research Group. Oregon Marine Recreational Fisheries Economic Contributions in 2009 and 2010. Prepared for ODFW and OCZMA. September 2011. And personal communication with The Research Group, Dec. 2012.

B.5 Pressure Counts of Otter Rock Visitors

A visitor observation procedure was employed to obtain a descriptive profile of reserve site visitors. As previously mentioned, observations were conducted at different viewpoints, several times a week and several times per day. Observations occurred at Otter Rock three days a week, three times per day, from the Inn at Otter Crest and the Devil's Punchbowl State Park. From late July to late September 2011, data were collected a total of 148 observation times over a twenty-five day observation period.

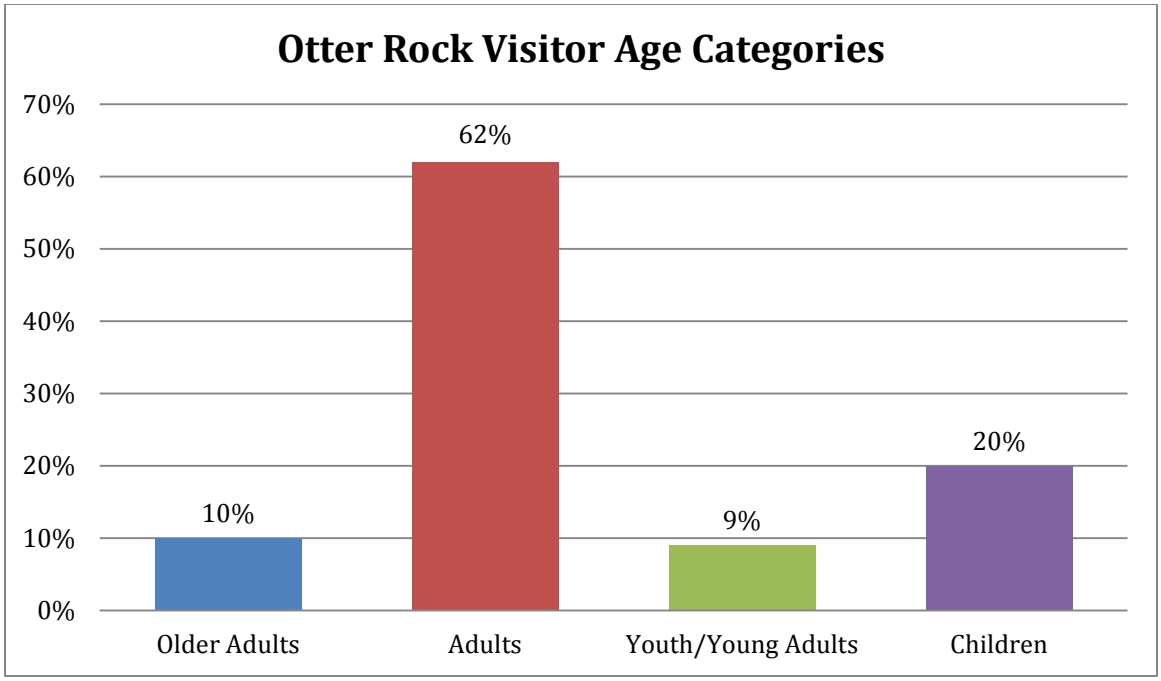
During the observation period, 3,019 visitors were observed at the Otter Rock site, either on the beach or in the water, an average of 121 visitors per observation day. Some double counting might have occurred due to the observation distance. No visitor contacts occurred during the observation period. A total of 1,115 vehicles were observed over the twenty-five day observation period, an average of twenty-two vehicles per observation day.

Figure 13 depicts the estimated age categories of visitors observed during data collection. Estimated age categories were defined as:

- Older Adults: 51 and older
- Adults: 25 to 50
- Youth/Young Adults: 13 to 24
- Children: 0 to 12

Most visitors were adults (62%), followed by children (20%), older adults (10%), and youth/young adults (9%).

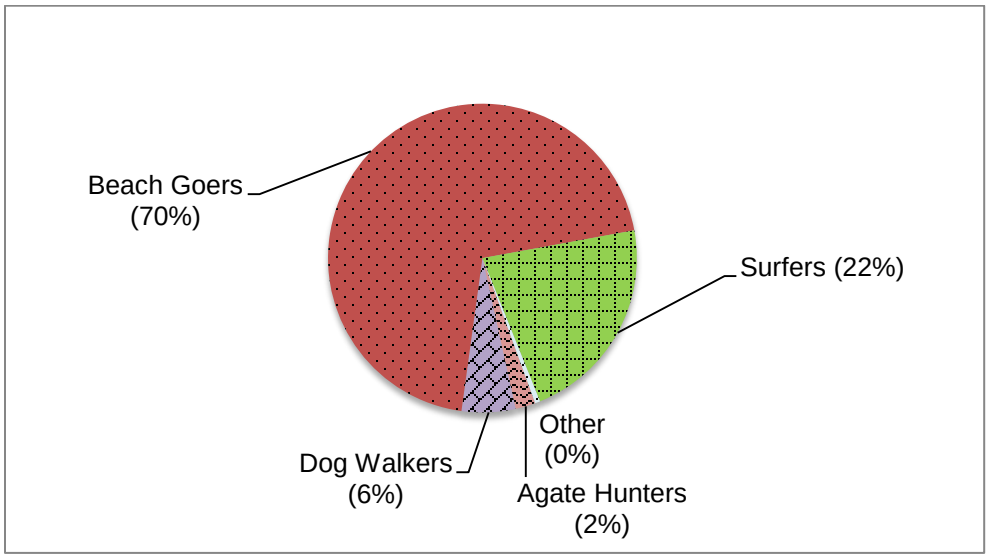
Figure 13. Estimated Age of Visitors at Otter Rock Marine Reserve



Note: The estimated age categories are: children (0-12), youth/young adults (13-24), adults (25-50), and older adults(51 and older).

Figure 14 depicts the types of visitor recreational activities which were observed. The vast majority (70%) of the visitors at the Otter Rock marine reserve area were categorized as general beach users. Other visitor recreational activities which were observed included surfing (22%), and walking with dogs (6%).

Figure 14. Recreational Activities of Otter Rock Marine Reserve Visitors



Detailed accurate demographic data cannot be collected without personal interviews. Some random on-site interviews (visitor intercept interviews) were subsequently conducted but were not analyzed prior to this report. These interviews will provide data on visitor knowledge, attitudes, and opinions of the reserve areas.

B.6 Survey of Marine Reserve Community Businesses

Implementation of the Otter Rock reserve site restrictions could impact businesses in the coastal communities of Depoe Bay, Otter Rock, and Newport. A survey of these business communities was developed to gauge their attitudes concerning the potential reserve impacts on these communities and businesses.

The matrix in Table 45 depicts the number, size and type of businesses selected for this study, categories considered most representative of the business communities of the three towns. Subjects selected for the survey consisted of 90 business owners, managers, or key employees. The structured interviews consisted of eleven questions, nine of which are summarized in the following graphics and tables. Two questions did not receive adequate response for analysis. The actual survey instrument appears in Appendix 4.

Table 45. Subjects Interviewed by Business Type in Depoe Bay, Otter Rock, Newport

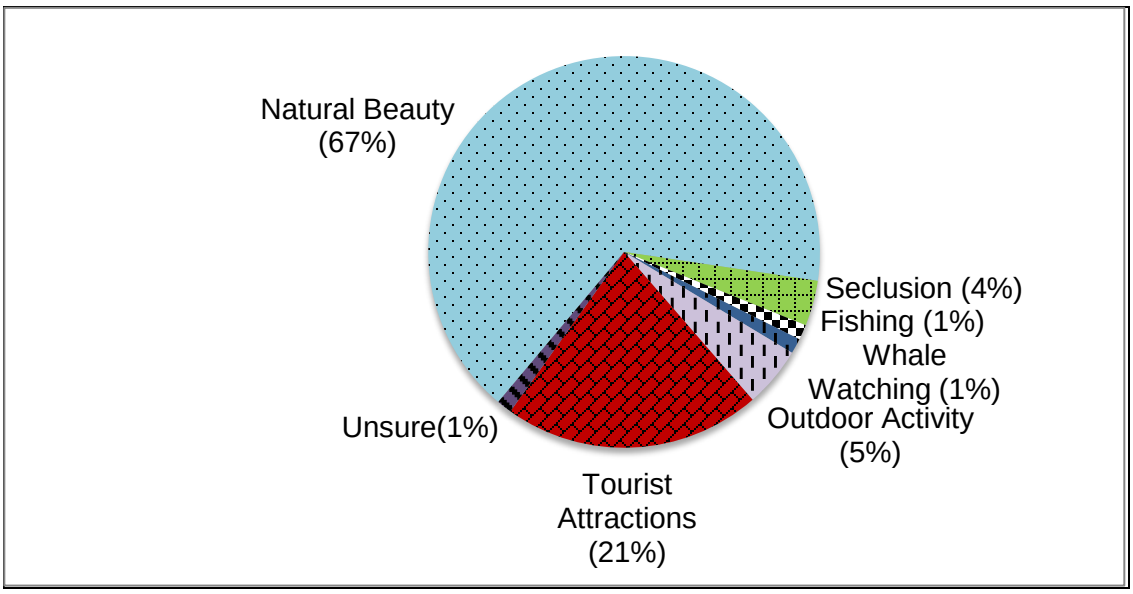
		Interviews by Size of Business		
Business Type	**Subjects Interviewed**	**Small**	**Medium**	**Large**
Retail	27	14	9	4
Restaurant	17	7	7	3
Lodging	13	4	4	5
Construction	3		3	
Education	2			2
*F.I.RE	10	3	5	2
Other Services	5	2	2	1
Health	7	1	4	2
Government	5	2	1	2
Manufacturing	1	1		
TOTAL	**90**	**34**	**35**	**21**

Notes: F.I.RE = Fire, Insurance, and Real Estate

Interview responses indicated that 77% of community businesses were locally owned with an average of 13 year round employees. Respondents indicated that 61% of these businesses did not employ any seasonal staff. The average business age was 25 years, and 54% of respondents considered their customer base to be primarily local residents. Slightly more than half of the respondents were aware of the marine reserve (53%), but only 36% of them were aware of the community involvement process in the implementation of the reserve (Davis and Polis, 2013).

Three survey questions focused on the reasons people visit the area and the opinions of the business community concerning potential reserve site impacts on area visitation. A large majority (67%) of the business community considered the natural beauty of the area to be the primary motive for coastal visitation. Another 21% of respondents thought tourist attractions were a motive for visitation. Outdoor activity (5%), whale watching (1%), and fishing (1%) were also cited as reasons for visitation (Figure 15).

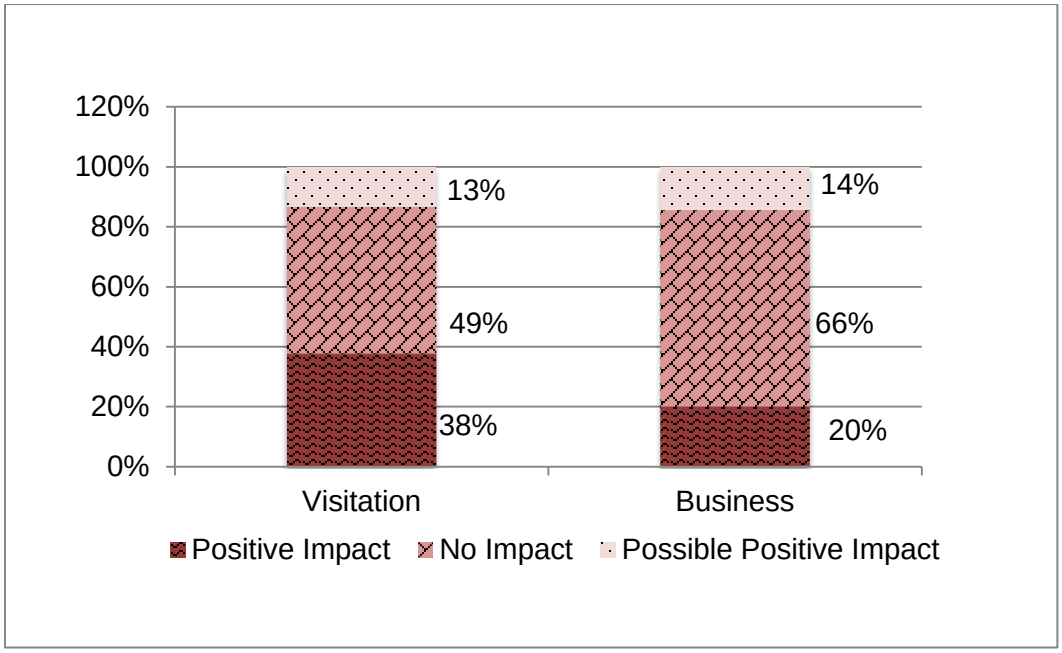
Figure 15. Otter Rock Business Survey: Perceived Purpose of Visitation



Note: N = 90, respondents were members of the business communities of Depoe Bay, Otter Rock, and Newport.

A substantial portion (38%) of respondents thought the marine reserve site would have a positive impact on visitation, 49% believed there would have no impact on visitation, and 13% stated that there was a potential for an increase in visitation. Similarly, 20% of the respondents believed that marine reserves would have a positive impact on business, 66% believed that they would have no impact on business, and 14% believed that the reserve might have a positive impact on business (Figure 16).

Figure 16. Otter Rock Business Survey: Anticipated Impact of Reserve on Visitation and Local Business Activity



Note: N = 90, respondents were members of the business communities of Depoe Bay, Otter Rock, and Newport.

V. Projects with Applicability to All Sites

This chapter presents the results of several studies, or portions of studies, focused on more general research questions, rather than reserve site-specific research. Two studies were conducted under ODFW contract by researchers from Oregon State University. ODFW collaborated with The Research Group in an analysis of the regional economic impact of combined harvest closure of all marine reserve sites. The Research Group conducted an additional pilot project to collect data on the state-wide economic impact of marine recreational fishing in Oregon. A summary of each of these research projects appears herein. A link to the full reports for each project is provided in Appendix 2.

A. Modeling the Economic Impacts of Marine Reserve Fishing Restrictions Using Spatial Habitat and Fisheries Data

In this study, harvest and habitat data were used to create economic models to estimate the economic impact from displacing commercial and recreational harvest activities from within each reserve site and collectively across all five marine reserve sites. Disaggregated data from this study for the Otter Rock and Redfish Rocks sites were discussed earlier in this report. This section of the discussion will focus on the collective economic impacts of the five marine reserve sites.

The target fishery specific ratio estimator was applied to the measured habitat areas within all five of the MR's to determine the estimated assessed (includes all target fisheries in a site's marine reserve and marine protected area (MPA) portion) and displaced (includes only the restricted target fisheries in the portions) fisheries REI for commercial and recreational fisheries in 2009. The cumulative sum of commercial and recreational fishing estimated assessed fisheries REI was $2.5 million and displaced fisheries REI was $816 thousand total personal income (includes the "multiplier" effect) (Table 46). Most likely, the actual impact would be lower as some displaced commercial fishing effort would be switched to other local areas or vessels would pursue substitute fisheries. A perspective of the REI calculation was provided using estimated REI from target fisheries in marine reserves that are harvested anywhere in the Territorial Sea and REI from all fisheries landed onshore statewide. The commercial fishing displaced REI is about 3.5 percent of Territorial Sea fishing grounds total REI and about one-tenth of that amount for all onshore landed fisheries REI. The recreational fishing displaced REI was 4.8 percent and 1.9 percent for the same two fishing grounds comparison areas.

Oregon's marine reserve system is relatively small patches among large ocean areas with similar fishing conditions. Since the system is less than 10 percent of the Territorial Sea (three nautical miles seaward of shoreline), it would seem likely that the 90 percent commercial harvesting and recreation angling area opportunities would provide satisfactory substitute fishing grounds. However, some individual fishermen may have experience with the bottom features and water conditions at these sites, and decide not to fish elsewhere given site management closures. If a commercial fishing operator or sport angler has previously fished in a designated area, economic theories would suggest that the fisher or angler believes that the area will give the highest catch rate or highest value catch for the costs of fishing. A closure of that familiar area could cause fishing costs to increase, creating a longer commute to fishing grounds. Displacement might create congestion in alternative locations, causing catch per unit effort (CPUE) to decrease. This may have some impact on the net returns earned by commercial fishers or on recreational angler satisfaction.

Table 46. Regional Economic Impacts from Assessed and Displaced Commercial and Recreational Fisheries at Marine Reserve Sites Using 2009 Catch and Economic Conditions

Harvest Area	Area Share of Terr. Sea	Assessed Fisheries REI			Displaced Fisheries REI		
		Commercial	Recreational	Total	Commercial	Recreational	Total
Marine Reserve Sites							
Cape Falcon	1.6%	509	38	547	182	29	211
Cascade Head	2.7%	466	394	860	154	94	248
Otter Rock	0.1%	17	21	38	16	21	38
Cape Perpetua	4.5%	801	94	895	217	35	252
Redfish Rocks	0.6%	114	28	141	42	25	67
Total	9.4%	1,907	575	2,482	612	204	816

Notes:
1. Regional economic impacts (REI) measured in personal income thousand dollars at the coastwide economic level. It includes the "multiplier" effect. The REI for the state level economy would be higher because of where processing occurs and due to trade leakages at the coastal community level.
2. Only target fisheries within marine reserve sites (MR's) and Territorial Sea are assessed. The target fisheries applicable species assemblages are salmon, D. crab, sardine, sea urchin, halibut, and certain groundfish species caught nearshore. The list of target fisheries for each site is not the same.
3. Estimated harvest REI is the assessed fisheries economic contribution from both the marine reserve and marine protected area (MPA) portions of the MR. The estimates are from multiplying the fishery and habitat dependent ratio estimator times the amount of corresponding habitat in the MR and summing over the fisheries.
4. The displaced harvest REI excludes salmon and D. crab as they are allowed target fisheries in the MPA portion of MR. Sea urchin in Redfish Rocks is included as a displaced harvest in the MPA portions.
5. REI for displaced fisheries are likely to be less than shown as fishers will adjust to the restrictions and adopt new fishing grounds, albeit fishing costs may increase from increased transit distances and changed catch per effort. Also not included in the REI estimates are spillover effects from possible changed stock abundances that might increase catch per effort.
6. All fisheries use 2009 harvests for development of the habitat ratio estimator except salmon fisheries which uses 2010 harvests. Year 2009 salmon fishery is a data aberration because the fishery was essentially closed south of Cape Falcon. Year 2010 harvests were moderate, but representative of decade 2000's averages when salmon disaster years 2006 and 2008 as well as 2009 harvests are omitted.
7. Recreational crabbing is not included in the REI estimates. Recreational bank and dive fishing modes for finfish are not included in the REI estimates.
8. Recreational coastwide landings comparison area REI is based on trips for Oregon ocean recreational salmon, bottomfish, halibut, tuna, and dive fisheries.

Source: Study.

Marine reserve harvest closures may impact local government and economic sector revenues derived from extractive ocean uses. Fishing operations utilizing the sites would be expected to adapt by substituting fishing in alternative areas. Such substitution may reduce any adverse economic impact of reserve site closure. If adaptation does not occur, there may be reductions or redistribution of local government revenues derived from the displaced fishing industry.

There are potential positive economic impacts of reserves. Increased or different uses of a marine reserve, such as research, could result in spending that would increase local economic activity. Marine reserves could attract additional visitors to the area. Increases in visitation to these sites could stem from the visitors' knowledge that they will be able to enjoy views of the reserve site from the shore, boat, or driving past the reserve while knowing that they will not be interrupted by fishing, crabbing, or other take activities. Additional economic activity would come directly from increased visitor spending at public owned marinas, RV parks, parking facilities, etc. Businesses that lease land and buildings or rely on local governments in other ways could be aided by increased visitor spending. Marine reserves might have a positive impact on both the commercial and sport fisheries by helping to support fish populations. There have been assessment projects and model development for estimating this spillover effect from marine reserves around the world.

One way to portray marine reserve simulation model development is to look at it as a process that evolves depending on the information available and modeling results needed. The first stage is the deterministic model described in this report. Deterministic models are useful in providing some of the sideboards on expected economic responses – they can provide assurance that there will likely be limited impacts from restricting harvests, especially if the system is already overused. They can also characterize the buffering effects against uncertainty in environmental understandings of ecological functions, even if the system is not overexploited. Stochastic simulation based on fish recruitment variability would be a next advanced modeling stage. Multi-species ecosystems modeling with exogenous inputs for environmental drivers would be a penultimate stage. This project's model design incorporates habitat data, species/habitat associations, fisheries effort and catch, and economic effects data into the development of a static base model. A suggested future research project is a study of potential spillover effects and associated economic consequences using a more advanced stage of dynamic modeling.

B. Defining Marine Ecosystem Services and Related Bioindicators

Ecosystem services valuation is a research method to establish the economic value of the human benefits (or services) that ecosystems provide. Examples of these services in a marine context include provision of fish for harvest and environmental control of water quality. The major challenge associated with this approach is that many ecosystem services are non-market goods and are thus undervalued (Heal, et al., 2005; McLeod, et al., 2005). Nevertheless, their hypothetical valuation is a constructive method to more broadly assess the impact of marine reserve designation (Heal, et al., 2005; Barbier, 2009; McLeod, et al., 2005).

In this study, investigators from Oregon State University (OSU)[11] conducted a focus group exercise to identify community perceptions of marine ecosystem services. This project then used an innovative approach to relate bioindicators (measures of biotic attributes) to these

[11] Authors were Peter Freeman, Randall Rosenberger, Gil Sylvia, Selina Heppell, and Michael Harte.

marine ecosystem services. Bioindicators are variables generally monitored and measured by ecologists, such attributes as the number of fish harvested or the variety of plants, animals, and habitats within a specific area such as a marine reserve. Bioindicators can be used to identify changes in resource quality or quantity, such that meaningful expressions of change in the related ecosystem's services might be quantified. The following discussion is a brief synopsis of that research. A detailed description of the study results is presented in Appendix 5.

B.1 Research Objectives

The research objectives of this investigation were:

1) Identify ecosystem services valued by coastal resource stakeholders in Oregon.
2) Identify bioindicators that relate to these ecosystem services.
3) Assess the reliability of the measures developed through the above process with a second focus group exercise.

B.2 Focus Group Research Methods

Subjects who participated in this study were selected based on residence within the communities of place associated with each marine reserve (Port Orford and Newport/Depoe Bay). Members of the focus groups were also selected based on engagement in the reserve planning process and association with stakeholder groups identified in the marine reserve enabling legislation (Oregon House Bill 3013, 2009 Legislature). Thus the focus group participants were an opportunity sample of knowledgeable insiders.

The two focus groups were asked to identify a range of human benefits they perceived to be provided by the local marine environment. The groups were then asked to relate these perceived benefits to specific types of ecosystem services. Participants were also asked to identify whether they expected changes (increase, decrease, no change, unsure) in the perceived benefits and ecosystem services that might result from marine reserve implementation (Table 47).

After these focus group meetings, the investigators derived a set of ecological indicators (i.e., bioindicators) of ecosystem health, structure, and function, which can demonstrate the current or preferred environmental quality of the marine reserve area. The list of bioindicators was derived from a literature review, and further refined with additional input from scientific experts at OSU and with ODFW (Table 48).

Finally, researchers conducted a second community focus group exercise to review the selected bioindicators and their relationships to the ecosystem services identified in the earlier exercise. The result should be a set of bioindicators and related ecosystems services of clear relevance to the communities of place surrounding the marine reserves. This process would assure the measures are consistent and reliable when used in related ongoing research (Table 49).

B.3 Research Results

Investigators conducted the two community focus groups at separate meetings. Each focus group derived a list of human benefits (ecosystems services) which the subjects perceived to be related to the marine reserves. The two lists were synthesized following these exercises; these results are presented in Table 47. The benefits are not specifically related to the ecosystem services on each line of the table.

Table 47. Perceived benefits and ecosystem services derived from marine environments and expected changes with implementation of the marine reserves

Benefits	Change	Ecosystem Services	Change
Physical activity	(+)	Provision of non-harvested fish	(?)
Human health: avoidance of pollution	(0)	Provision of harvested fish	(?)
Psychological and emotional health	(+/-)	Environmental control of harvested fish populations	(?)
Viewing of scenery	(+)	Provision of non-harvested invertebrates	(?)
Viewing of wildlife	(+)	Provision of harvested invertebrates	(?)
Using the beach	(+)	Environmental control of harvested invertebrate populations	(?)
Marketing and consumption of seafood	(0)	Provision of non-harvested plants and algae	(0)
Catching fish and invertebrates	(-)	Provision of harvested plants and algae	(0)
Harvesting plants and algae	(-)	Environmental control of harvested plant and alga populations	(?)
Food security and sustainability	(+)	Provision of marine mammals	(+)
Cultural identity	(+)	Provision of sea birds	(+)
Ecological knowledge	(+)	Provision of geologically mediated habitat and beaches	(0)
Opportunity for stewardship and conservation	(+)	Provision of cognitive value	(+)
		Provision of a socially-valued seascape	(+)
		Provision of cultural identity	(+)
		Provision of water and waves	(+)
		Environmental control of air quality	(+)
		Environmental control of water quality	(+)
		Environmental control of species richness	(+)
		Environmental control of ecosystem integrity and resilience	(+)
		Environmental control of overall ecosystem condition	(+)

(-) Denotes a decrease
(+/-) Denotes stakeholder group-specific change
(0) Denotes no change
(?) Denotes uncertainty in direction of change. Participants noted that while they do not expect provision of this ecosystem service to change as a result of their marine reserves, they thought it possible it could improve as a result of additional marine reserves.

The above ecosystem services derived from the focus group exercises were then associated with specific bioindicators. The procedure to accomplish this was a literature review followed by interviews with experts from ODFW and OSU. The results of this exercise are presented the table below.

Table 48. Bioindicators by ecosystem service

Ecosystem Service	Biophysical Indicator
Provision of non-harvested fish	Extracted organism density[1]
	Fish presence[1]
	Fish abundance[1]
	Fish density[1]
Provision of harvested fish	Extracted organism individual size[1]
	Trophic level of landings[5]
	CPUE per species[6]
Environmental control of harvested fish populations	Extracted organism biomass[5]
	Extracted organism individual size[1]
	Mean individual fish length[4]
	Mean individual fish weight[4]
	Rockfish length distribution[2]
	Rockfish age distribution[3]
	Post-settlement juvenile abundance[2]
Provision of non-harvested invertebrates	Extracted organism density[1]
	Benthic cover[6]
	Invertebrate presence[1]
	Invertebrate relative abundance[1]
	Invertebrate abundance[1]
	Invertebrate density[1]
Environmental control of harvested invertebrate populations	Extracted organism biomass[6]
	Extracted organism individual size[1]
Provision of non-harvested plants and algae	Benthic cover[6]
	Bull Kelp percent cover (subsurface)[1]
	Bull Kelp biomass[1]
	Understory kelps and algal presence[1]
	Understory kelps and algal percent cover[1]
	Understory kelps and algal density[1]
	Bull Kelp percent cover (surface)[1]
Provision of harvested plants and algae	Bull Kelp percent cover (subsurface)[1]
	Bull Kelp biomass[1]
	Understory kelps and algal presence[1]
Understory kelps and algal percent cover[1]	
Understory kelps and algal density[1]	
Environmental control of harvested plant and alga populations	
Provision of marine mammals	N/A
Provision of seabirds	N/A
Provision of geologically mediated habitats and beach	Habitat distribution[3]
	Habitat complexity[3]
Provision of cognitive value	N/A
Provision of cultural identity	N/A
Provision of a socially-valued seascape	Bull Kelp percent cover (surface)[1]
Provision of water and waves	N/A
Environmental control of water quality	Light/turbidity[3]
	Density of suspended toxins[3]
	Density of suspended bacteria[3]
Environmental control of air quality	N/A
Environmental control of species richness	Relative species abundance[3]
	% Predatory fish[5]
	Species richness/diversity index[3]

	Habitat complexity[3]
	Biotic habitat diversity[3]
	Invertebrate relative abundance[1]
Environmental control of ecosystem resilience	Trophic level of landings[5]
	Food web integrity[3]
	Habitat integrity[3]
	Recruitment success within the marine reserve[3]
Provision of existence/conservation value	Area showing signs of recovery[3]
	Area under no or reduced human impact[3]

Sources:
1. Alix Laferriere, Oregon Department of Fish and Wildlife
2. Selina Heppell, Oregon State University
3. Pomeroy et al. 2004
4. Methratta and Link 2006
5. www.indiseas.org
6. Petellier et al. 2009

The last step in this process was community focus group review of the lists generated during the previous steps. The purpose of this step is to ensure the measures are reliable; that they accurately portray community perceptions of the most important benefits and ecosystem services derived from the reserves. This step was important to make sure that the measures are accurate reflections of participants' opinions. A matrix of final bioindicators and related ecosystem services developed during this exercise is included in Table 49.

Table 49. Final survey indicators and constituent ecosystem services

Survey Indicator	Ecosystem Service
The quality of ocean water for purposes of human contact and consumption of seafood	Environmental control of water quality
The number of non-harvested fish	Provision of non-harvested fish
The number of harvested fish	Provision of harvested fish
The number of non-harvested shellfish	Provision of non-harvested invertebrates
The number of harvested shellfish	Provision of harvested invertebrates
The number of non-harvested plants and algae	Provision of non-harvested plants and algae
The number of harvested plants and algae	Provision of harvested plants and algae
The number of marine mammals	Provision of marine mammals
The number of sea birds	Provision of sea birds
A natural and wild Oregon seascape to view and take in	Provision of a socially-valued landscape
An Oregon ocean that provides personal and scientific discovery	Provision of cognitive value
A community identity defined by a connection with the ocean	Provision of cultural identity
The resilience of the local fish and shellfish stock	Environmental control of ecosystem resilience Environmental control of harvested fish populations Environmental control of harvested invertebrate populations Environmental control of harvested plant and alga populations
The variety of plants, animals, and habitats	Environmental control of species richness Provision of geologically mediated habitat and beach
The protection and natural integrity of the marine ecosystem	Environmental control of overall ecosystem condition

Following the focus group research conducted by OSU investigators within the communities, the final lists of perceived ecosystem services and related bioindicators were utilized in a pilot study.

This pilot study was the basis for a master's thesis (Freeman, 2012).

Table 50, presented on the following page, is a list of the composite ecosystem services and related bioindicators derived from the prior focus group exercise, and then used in this thesis research.

Table 50. Perceived Ecosystem Services and Bioindicators

Survey Items / Final Ecosystem Services	Availability of fish and shellfish for	Number and size of fish and shellfish	Abundance of marine mammals	Abundance of seabirds	Natural sustainability of the local fish and shellfish	Variety of sealife	Cleanliness of coastal waters	Areas for outdoor recreation and	Natural aesthetic of the seascape	Natural integrity of the marine	Coastal culture and lifestyle
Production of harvested fish[1] biomass	■										
Production of harvested invertebrate biomass	■								■		
Production of non-harvested fish biomass		■									
Production of non-harvested invertebrate biomass		■							■		
Production of marine mammal biomass			■								
Production of sea bird biomass				■							
Ecological maintenance of harvested invertebrate					■						
Ecological maintenance of harvested fish populations					■						
Production of genetic diversity across fish species						■					
Production of genetic diversity across invertebrate						■					
Production of genetic diversity across marine mammal						■					
Production of genetic diversity across seabird species						■					
Removal of biological waste in water							■				
Removal of chemical contaminants from water							■				
Deposition and retention of sand								■			
Formation of intertidal structure								■	■		
Production of kinetic wave energy								■			
Support of leisure and recreation								■			
Formation of socially-valued seascapes									■		
Production of visible microalgae biomass									■		
Production of visible aquatic plant biomass									■		
Ecological maintenance of ecosystem health and integrity										■	
Support of social and cultural relations											■
Support of socially-valued lifestyle											■

Source: (Freeman 2012)

The above items were used in an analysis to investigate the relative importance of the ecosystem services to marine reserve stakeholders. Such an analysis is a requisite step to the development of a procedure for quantifying the relative value of the ecosystems services for utilization in future research. These results can then be used to assign economic values to these ecosystem services, which can be used as one approach to quantify impacts related to marine reserves (Table 51).

Table 51. Rank Order of Respondent Preferences for Ecosystem Services

RANK ORDER	SURVEY ITEM	MEAN RANK
1	Number and Size of Fish and Shellfish	8.10
2	Variety of Sealife	7.40
3	Natural Integrity of Marine Ecosystem	7.30
4	Natural Sustainability of Fish and Shellfish Stock	6.63
5	Outdoor Recreation and Leisure	6.33
6	Cleanliness of Ocean Water	5.77
7	Abundance of Seabirds	5.45
7	Availability of Fish and Shellfish for Harvest	5.45
9	Natural Aesthetic of the Seascape	4.92
10	Abundance of Marine Mammals	4.87
11	Coastal Culture and Lifestyle	3.78

Friedman's Q Statistic; Chi-Square = 49.72; N = 30; d.f. = 10; Sig. 0.000

Source: (Freeman 2012)

B.4 Discussion

The community focus group process was an exercise in developing valid measures of perceived benefits and ecosystem services related to the marine reserves. The qualitative effort to define these services and the related bioindicators is quite relevant to the inclusion of a broader range of perceived values, particularly nonmarket values, in the economic analysis of the impact of marine reserve implementation. In general, data resulting from this study can be used to inform the monitoring and evaluation of the marine reserves. This research contributes by defining the hypothetical market for various marine ecosystem services and prioritizing biological and socioeconomic indicators related to the marine reserves.

In particular, the subjects' ranking of survey items in Table 51 illustrates the benefits (marine ecosystem services) the reserves are perceived to provide. These rankings have implications for marine reserves management and monitoring. The top two survey items, *The number and size of fish and shellfish* and *Variety of sea life*, point to a prioritizing of the non-consumptive use of fish and invertebrates over the consumptive use of fish and invertebrates, as well as the non-consumptive use of seabirds and marine mammals. The next most highly ranked survey items, *The natural integrity of the marine ecosystem* and *The natural sustainability of the fish and shellfish stock*, imply that residents place a high value on the condition of whole ecosystem processes and healthy fish populations.

Subjective preference for ecosystem services can be relevant to nearshore management decisions in a number of ways. The results can also be viewed as ranks to prioritize future monitoring. A unique aspect of the approach, however, is that it not only generates relative

preference for ecosystem services, but it links those values to specific bioindicators. These bioindicators could potentially be used to monitor longitudinal changes in ecosystem services. This connection should facilitate development of more sophisticated cost benefit analyses, an important consideration for future research.

C. Coastal Attitudes and Perception Survey

Limited information exists concerning how coastal residents may be affected by marine reserve implementation (Needham, et al., 2013). Investigators from OSU[12], designed a preliminary study to ascertain coastal residents' perceptions of marine reserves. The study consisted of a mail survey to a representative sample of Oregon coastal residents to understand their knowledge, attitudes, and behavioral intentions with respect to Oregon's five marine reserve sites. A summary of the project follows; a link to the full report is provided in Appendix 2.

The objectives of this study were to understand coastal resident:

- Awareness of the marine reserves sites and sources of information for learning about the areas.
- Knowledge of the characteristics, benefits, and constraints of the marine reserve sites.
- Attitudes of support and opposition toward the reserve sites.
- Perceptions of the future effectiveness of the reserve sites in meeting management goals.
- Opinions about activities that should and should not be allowed in the reserve sites.
- Behavioral intentions in response to the reserve sites and how residents may change their use of these areas in the future (e.g., increase or displace any visitation/recreation use).
- Demographic characteristics of respondents.

C.1 Summary of Methods

To accurately generalize research results to residents of the Oregon Coast requires a random sample of all such residents. To achieve that objective, a questionnaire was administered by mail in late 2012 and early 2013 to a sample of residences along the Oregon Coast selected randomly from postal records. A stratified random sample of 2,600 addresses was equally divided into two subpopulations: (a) residents living near the five marine reserve sites (i.e., communities of place), and (b) residents along the rest of the coast (i.e., general coastal sample)[13].

A standard mailing procedure, with safeguards to ensure confidentiality, was utilized for data collection. All of the sampled households received the first questionnaire with a cover letter explaining the nature of the study. After a reasonable duration, a reminder letter was sent to all non-respondents. Subsequently, a second questionnaire and cover letter was mailed to the

[12] Authors were Mark Needham, Ph.D., Lori Cramer, Ph.D., and Elizabeth Perry, M.S.

[13] The 1,300 addresses in the communities of place were distributed equally among five areas corresponding to each marine reserve site (i.e., 260 addresses for each). A 10-mile radius was drawn around the land point nearest to the center of each reserve site and communities within this radius were included in the communities of place delineation. Please note that this community of place definition is slightly different than what was used for the other sections of this report. The other half of the sample addresses (n = 1,300) was spread throughout the rest of the coast and included areas seaward of the Coast Range excluding those in the five communities of place.

remaining non-respondents. The results of this procedure were:

- 357 questionnaires were undeliverable (e.g., incorrect address, vacant, moved) and 595 completed questionnaires were returned, a 27% response rate [595 / (2,600 – 357)].

- The response rate for residents in the communities of place was 30% (n = 326). The response rate for residents along the rest of the coast was 23% (n = 269). The large sample (N = 595) allows generalizations about the population of Oregon coastal residents with a margin of error of ± 4% at the 95% confidence level. This confidence interval is better than the conventional standard of ± 5% which is widely accepted in research on the human dimensions of natural resource management.

- To check for potential non-response bias, a large sample of non-respondents (n = 202) was contacted by telephone and asked 10 specific questions from the mail questionnaire. Their responses to these questions were then compared with responses by residents who completed the entire questionnaire. There were no substantive differences in responses between these two groups. Given this result, the data were not weighted (adjusted) for non-response during statistical analyses. The data were, however, weighted by location and population proportions because the sub-samples were a quota stratified by community. The weights were based on the most recent US Census information for number of households in the sampling areas, to ensure that the sub-sample comparisons and aggregate responses were statistically representative of the target populations.

C.2 Summary of Results

C.2.a. Coastal Resident Use of Marine Areas and Reserves

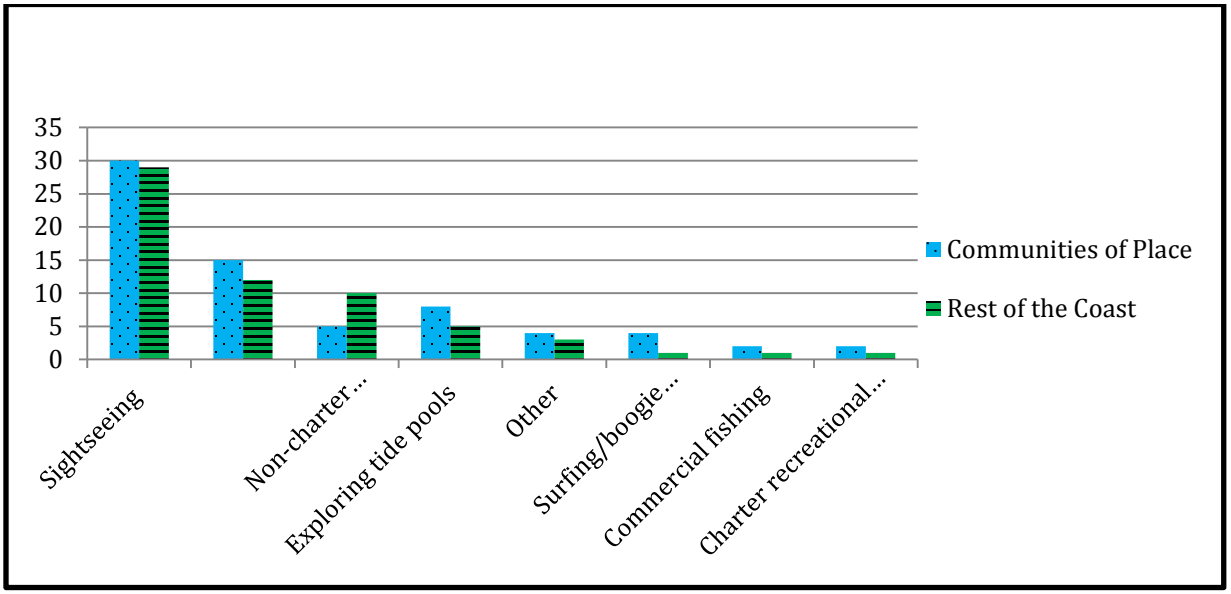
Residents were asked to select all of the activities in which they have ever participated at marine reserve sites in Oregon (Figure 17). These results were similar to participation rates in activities at Oregon marine areas in general (Figure 18).

Respondents were then asked if they had ever visited at least one of the five reserve sites, illustrated on a map. Results showed that 67% of respondents had visited at least one of the reserve sites. Respondents who resided in the communities of place were significantly more likely (74%) than those living along the rest of the coast (64%) to have visited at least one site. Figure 19 illustrates coastal resident visitation by reserve site.

Although two-thirds of respondents stated that they had visited at least one of the marine reserve sites in Oregon, more than two-thirds did not feel any major attachment to these areas. Only 37% of respondents indicated that at least one of these marine reserve sites was special to them. Those living in the communities of place indicated higher levels of attachment.

Coastal residents who had previously visited at least one of the marine reserve sites were asked if reserve implementation might impact their future behavior. The majority of respondents felt that implementation would not affect their visitation (Table 52). There was little substantive difference between proximity of residence to the reserve (i.e., community of place vs. rest of coast) and anticipated behavior.

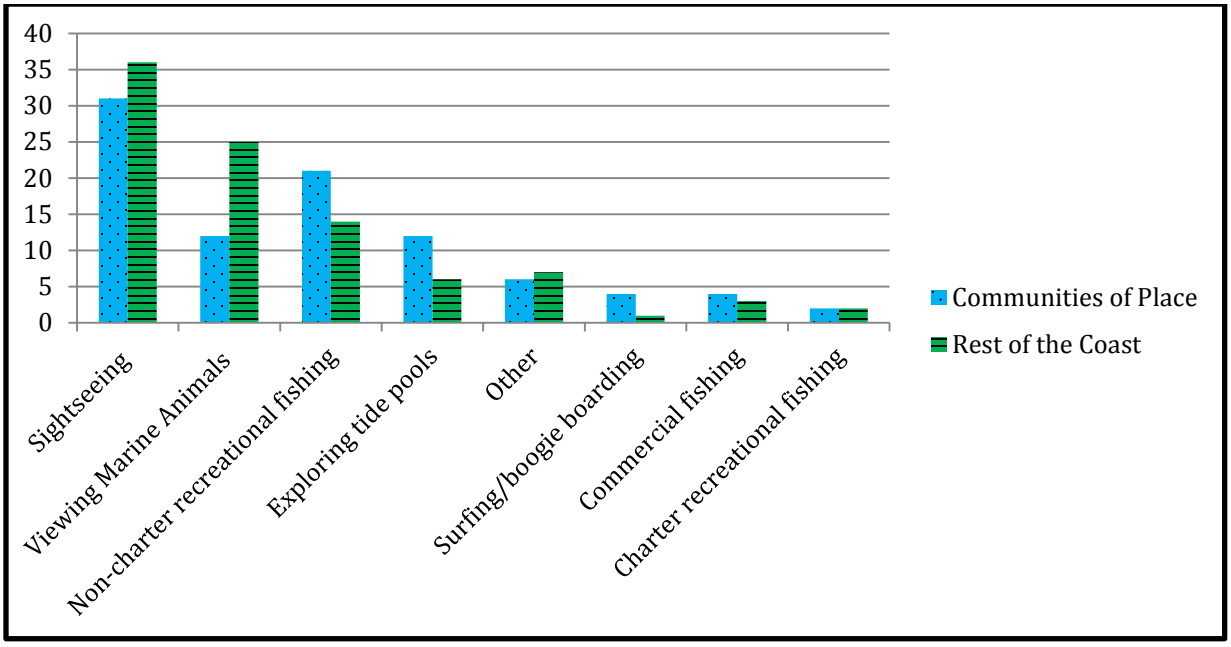
Figure 17. Main Activity Participation at Oregon Marine Reserve Sites



Notes: 1. Cell entries are percentages (%) of respondents who indicated this was their main activity in Oregon's marine areas.
2. Most common "other" activities listed include: beachcombing, clamming, crabbing, and hiking/walking

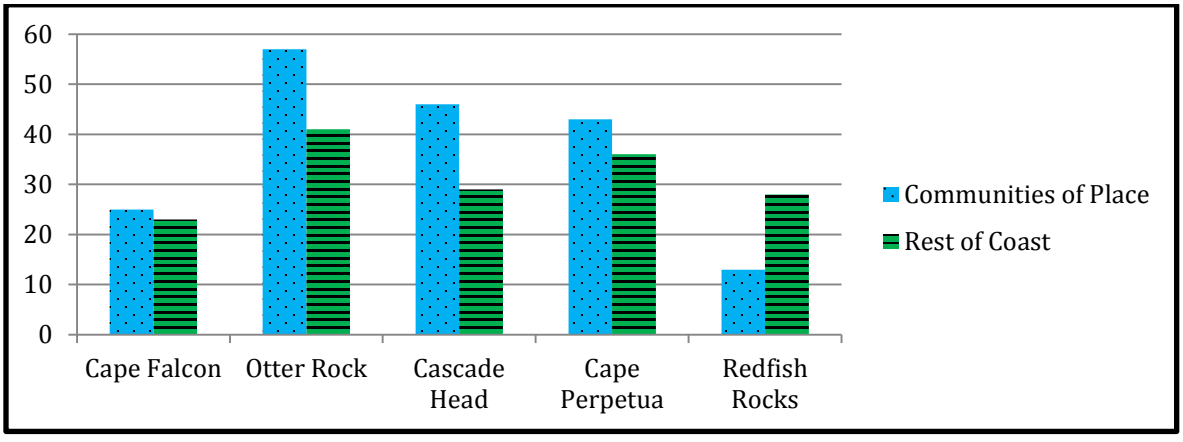
Source: (Needham et al. 2013)).

Figure 18. Main Activity Participation in Oregon Marine Areas



Notes: 1. Cell entries are percentages (%) of respondents who indicated this was their main activity in Oregon's marine areas.
2. Most common "other" activities listed include: beachcombing, clamming, crabbing, and hiking/walking
Source: (Needham et al. 2013)

Figure 19. Oregon Marine Reserve Sites Previously Visited



Notes: Entries are percentages (%) of all respondents who have previously visited the site.
Source: (Needham et al. 2013)

C.2.b. Perceptions of Marine Reserve Area Condition and Protection

Although coastal residents in Oregon overwhelmingly perceived the state's marine areas and resources (e.g., ocean, animals, fish) to be moderately or very healthy (Table 55), only about one-third of the respondents thought conditions have improved in recent years (Table 61).

In this study, value-orientations toward nature (see Glossary, Chapter VII) were assessed on two continuums. The first is a nature-centric (biocentric) to human-centric (anthropocentric) continuum; the second is a protectionist vs. use orientation (preservation vs. instrumental perspectives). The results (Table 54) indicate that the majority of residents in close proximity to the reserves (i.e., communities of place) tend to have a protectionist sentiment, whereas a plurality of residents along the rest of the coast tends to have a more instrumental perspective toward the reserves.

A large majority (81%) of respondents agreed that they felt a personal obligation to help protect marine areas, 59% agreed that they can do more to help protect these areas, and 57% agreed that they felt a personal responsibility to educate other people about helping to protect marine areas. Residents in the communities of place were more likely to agree that they were aware of impacts that humans have on marine areas and that their own behaviors can cause problems in these areas (Table 56).

Table 52. Potential Behavior Changes in Response to Oregon Marine Reserves

	Communities of place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
Visit the marine sites(s) the same amount	61	50	53	4.34	.037	.11
Go to other marine areas on Oregon coast instead	26	30	29	.50	.481	.04
Go to other nearby or adjacent marine areas instead	29	26	27	.38	.540	.03
Visit the marine sites(s) more often	24	24	24	.01	.917	.01
Participate in a different primary activity in the marine sites(s)	16	19	18	.37	.543	.03
Visit the marine sites(s) less often	13	16	15	.70	.402	.04
Never visit the marine sites(s) again	11	15	14	1.09	.297	.05

Notes: 1. Cell entries are percentages (%) of respondents who had already previously visited at least one of the reserve sites (i.e., responded with "yes" to question 26 of the survey) and said they would be "likely" to engage in the action (question 31).
Source: (Needham et al. 2013)

Table 53. Perceived Threats to Oregon Marine Areas

	Communities of Place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
Other types of pollution (marine trash, debris)	85	85	85	.01	.948	.00
Water pollution	82	75	77	3.39	.065	.08
Invasive / exotic species	75	74	74	.02	.895	.01
Ocean acidification (lower pH, higher acidity)	74	69	70	1.73	.189	.06
Overfishing	67	66	66	.04	.850	.01
Changes in water temperature	74	63	65	7.79	.005	.12
Global climate change	71	60	63	7.50	.006	.12
Loss or disturbance of marine / coastal habitat	69	61	63	3.78	.052	.08
Oil / gas exploration and transport	70	58	61	8.33	.004	.12
People who fish commercially	63	57	58	2.33	.127	.07
Dams	58	55	56	.47	.495	.03
Tsunamis	60	53	55	2.59	.108	.07
Rise in sea level	64	49	53	12.66	< .001	.15
Naval or other military operations	44	40	41	.80	.370	.04
Wave energy / power development	40	37	38	.78	.378	.04
Viewers getting too close to marine animals	39	34	35	1.59	.208	.05
People who purchase / consume seafood	41	30	32	8.19	.004	.12
People who fish recreationally	26	25	25	.25	.618	.02

Notes: 1. Cell entries are percentages (%) of respondents who perceived the issue to be a “moderate or extreme threat” (4 – 8 on scale).
Source: (Needham et al. 2013)

Table 54. Value Orientations Towards Marine Areas

	Communities of place	Rest of the coast
Strong protectionist orientation	25	19
Moderate protectionist orientation	28	23
Mixed protection – use orientation	37	42
Use orientation	10	16

Notes: 1. Cell entries are percentages (%)

Table 55. Perceived ecological health of marine areas and other natural resources in Oregon[a]

	Communities of place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
Wildlife in Oregon	75	78	77	.56	.454	.03
Other marine animals in Oregon	73	75	75	.23	.635	.02
Forests in Oregon	70	77	75	2.66	.103	.07
Marine areas (ocean) in Oregon	73	73	73	.01	.972	.00
Marine fish in Oregon	69	73	72	.62	.431	.03
Rivers and streams in Oregon	70	71	71	.07	.799	.01
Bays and estuaries in Oregon	66	66	66	.01	.980	.00

[a] Cell entries are percentages (%) of respondents who perceived the resource to be "moderately or very healthy" (4 – 8 on scale).

Table 56. Awareness of Impacts and Ascription of Responsibility for Marine Reserves[1]

	Communities of place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
Awareness of consequences						
I am aware of impacts that humans can have on marine areas	93	85	87	9.08	.003	.13
My own personal actions can impact marine Areas	81	80	80	.10	.752	.01
I know that my own behaviors can cause problems in marine areas	76	67	69	4.79	.029	.09
Ascription of responsibility						
I feel a personal obligation to help protect marine areas	84	80	81	1.23	.268	.05
I can do more to help protect marine areas	65	57	59	3.29	.070	.08
I feel a responsibility to help educate others about protecting marine areas	59	57	57	.29	.589	.02

Notes: 1. Cell entries are percentages (%) of respondents who “agreed” with the statement.

C.2.c. Marine Reserve Knowledge, Attitudes, and Opinions

Residents answered 16 true/false or multiple-choice questions measuring their factual knowledge about Oregon's marine reserve sites. Most answers to these questions revealed that coastal residents' factual knowledge about reserves is extremely low (Table 57).

Residents were also asked which groups they believed would benefit from marine reserves (Table 58). There was general agreement that scientists, agencies, and people living along the coast would be the main beneficiaries. There was significantly less agreement regarding potential constraints associated with these reserves, however 60% of respondents agreed that these reserves would reduce commercial fishing. A slight majority also agreed that the reserves would be expensive to manage (55%), be difficult to enforce (53%), and both reduce recreational fishing and prevent people from using these areas (52%) (Table 59). A large majority of coastal residents had strong positive attitudes toward marine areas and marine reserve sites in Oregon (Table 60).

Subjects were asked if they agreed with a series of statements about marine reserve management issues and policies (Table 61). A majority (65%) of residents of communities of place were significantly more likely to advocate more government protection for the reserves than residents along the rest of the coast. Other than that one issue, none of the differences between residents were substantively different. In general, respondents think managerial efforts at protection are inadequate and laws protecting marine resources are not too strict, but the condition of Oregon's marine areas is not improving. However, respondents do not think that fishing or seafood consumption is harming marine areas.

Table 57. Factual Knowledge About Oregon Marine Reserves

Item	Correct Response [a]	(% correct) Communities of Place	(% correct) Rest of the Coast	Total	χ^2 value	P value	ϕ
Scientific research would be allowed in:	MPA & MR	79	80	80	.07	.789	.01
The government has been considering marine reserves for the past several years	True	68	72	71	.97	.326	.04
Commercial fishing would be allowed in all marine reserves	False	62	68	67	2.02	.155	.06
There have been opportunities for public involvement in agency discussions about marine reserves	True	60	58	58	.29	.588	.02
Keeping fish caught in marine reserves would be allowed in all reserves	False	59	57	58	.07	.797	.01
Only scientists and no other people would be allowed in all marine reserves	False	54	54	54	.01	.942	.01
The government has approved marine reserves for this state	True	43	47	46	1.18	.278	.05
Non-extractive recreation/tourism activities (e.g., surfing, swimming) would be allowed in:	MPA & MR	38	40	39	.23	.631	.02
New developments such as wave energy or fish farms would be allowed in all marine reserves.	False	36	36	36	.01	.954	.01
All marine reserves would include coastal lands such as beaches and coastlines	False	36	34	34	.40	.529	.03
What agency organization is currently responsible for marine reserves in Oregon?	ODFW	30	35	34	1.75	.186	.06
Non-extractive recreation/tourism activities (e.g., surfing, swimming) would be allowed in all marine reserves.	True	32	34	34	.16	.688	.02
The government has established five marine reserve sites.	True	29	30	30	.13	.718	.02
Recreational fishing would be allowed in:	MPA	17	10	12	5.28	.022	.10
Removing any species or habitat would not be allowed in:	MR	13	9	10	2.17	.141	.06
Commercial fishing would be allowed in:	MPA	8	6	7	1.04	.309	.04
Total factual knowledge score (average percent (%) correct) [b]		42	43	43	.37	.713	.02

[a] All questions also included an "Unsure" response category coded as "incorrect" in this analysis.
MR – marine reserves, MPA = marine protected areas
[b] Tests of statistical significance are *t*-tests with point-biserial correlation effect sizes.

Table 58. Beliefs That Groups Could Benefit From the Oregon Marine Reserves

	Communities of place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
Scientists / researchers	90	85	86	2.79	.095	.07
Government agencies	52	48	49	.89	.345	.04
People who live along the Oregon coast	48	41	43	3.04	.081	.07
People who recreate in marine areas	32	30	30	.24	.623	.02
Local businesses	34	23	26	9.08	.003	.13
People who *do not* live along the Oregon coast	31	24	26	3.53	.060	.08
People who fish recreationally	28	23	24	1.76	.185	.06
People who fish commercially	24	14	16	8.01	.005	.12

Notes: 1. Cell entries are percentages (%) of respondents who said group could "slightly or strongly benefit" from the reserves.

Table 59. Attitudes toward potential constraints of Oregon marine reserves[a]

	Communities of place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
Reduce commercial fishing	64	59	60	1.42	.234	.05
Cost a lot to manage	49	57	55	3.40	.065	.08
Be difficult to enforce	51	53	53	.25	.619	.02
Reduce recreational fishing	55	50	52	1.11	.293	.05
Prevent people from using the reserve areas	51	52	52	.13	.715	.02
Cause some species to become overpopulated	32	32	32	.01	.966	.00
Not be effective in conserving marine areas	14	18	17	1.47	.225	.05

[a] Cell entries are percentages (%) of respondents who "agreed" with the statement.

Table 60. Attitudes Towards Establishing Marine Reserves in Oregon

	Communities of place	Rest of the coast	Total	χ^2 or *t* value	*p* value	ϕ or r_{pb}
Marine reserves in Oregon are beneficial	79	61	66	19.10	< .001	.19
Marine reserves in Oregon are positive	76	58	62	19.55	< .001	.19
I like the idea of marine reserves in Oregon	74	57	61	18.23	< .001	.19
Marine reserves in Oregon are good	76	55	60	23.85	< .001	.21
Average (mean) attitude [2]	4.06	3.59	3.70	4.22	< .001	.18

Notes: 1. Items were asked on 5-point semantic differential scales (e.g., 1 "dislike" to 5 "like;" 1 "harmful" to 5 "beneficial").Cell entries are percentages (%) that selected 4 or 5 (i.e., positive attitude) for each pair unless specified as averages (means).
2. Represents the overall average (mean) on 5-point scale for all 4 items combined where 1 represents the most negative attitude and 5 represent the most positive attitude. Cronbach alpha reliability = .98.

Table 61. Beliefs about Oregon Marine Areas

	Communities of place	Rest of the coast	Total	χ^2 value	*p* value	ϕ
The government should do more to help protect marine areas in Oregon	65	45	50	21.31	<.001	.20
People who fish commercially are harming marine areas in Oregon	46	39	41	2.50	.114	.07
Fishing is not harming marine areas in Oregon	29	42	38	10.25	.001	.14
The condition of marine areas in Oregon has improved in recent years	36	34	34	0.39	.534	.03
Managers are doing everything they can to protect marine areas in Oregon	26	31	30	1.59	.207	.05
Laws protecting marine areas in Oregon are already too strict	16	24	22	4.90	.027	.09
People who purchase/consume seafood are harming marine areas in Oregon	20	15	16	2.21	.136	.06
People who fish recreationally are harming marine areas in Oregon	23	11	14	12.99	<.001	.15

Notes: Cell entries are percentages (%) of respondents who "agreed" with the statement

C.3 Discussion

This study analyzed data from a random sample of coastal residents to provide a baseline description of coastal resident perceptions of Oregon marine reserves at an early stage in their establishment. Although more than two-thirds of respondents had positive attitudes towards the benefits of these areas, trusted the ODFW to manage these areas, and would vote in favor of reserves, these perceptions can change over time. Periodic replications of such research can monitor temporal changes in coastal resident attitudes and perceptions. Additional research to assess the knowledge and perceptions of non-coastal Oregon residents should be conducted with a sample east of the Coast Range.

Information about temporal changes in marine reserve visitation will help ODFW gauge the future economic impacts of tourism at the reserves (Table 52). The current results indicate respondents do not expect marine reserves and protected areas to significantly change coastal tourism. However, the fact that nearly 1/3 (29%) of respondents think they might visit other areas on the coast instead of the reserve area indicates that some local spending would be displaced from communities of place to other locations along the coast. However, 22% of respondents think they would visit reserve areas more often. Their behavior could offset the economic impact of residents who said they would stop visiting the sites (14%) or visit the sites less often (15%). Viewed from this broader perspective, respondents expect minimal change in economic impacts associated with local visits and tourism to the marine reserves.

It is clear that coastal resident knowledge about these reserves is minimal, and more outreach is warranted to educate the public about these areas. Residents would prefer this information to be disseminated through channels such as newspapers and television.

There was significantly higher support and more favorable attitudes towards marine reserve sites among residents in the communities of place (82%) compared to the rest of the coast (65%). This is important because these communities are more likely to be affected by reserve implementation and related management decisions. Individuals living along the rest of the coast and elsewhere, however, are still an important constituency that could be impacted by these reserves.

D. Economic Impact of Marine Recreational Fishing: Oregon Pilot Survey

Catch data from private and charter recreational fishermen are crucial to federal and state fish resource management. Collection of social and economic information from these stakeholder groups is also important for marine reserves monitoring. The Ocean Recreational Boating Survey (ORBS) is an important tool for collecting data on Oregon's coastal fisheries and was used to collect additional socio-economic data from recreational fishermen. In this study, ORBS field personnel asked recreational fishermen to fill out postcards with their contact information. This contact information was then used to conduct subsequent phone interviews to gather data about angler expenditures associated with recreational fishing trips in Oregon. [14]

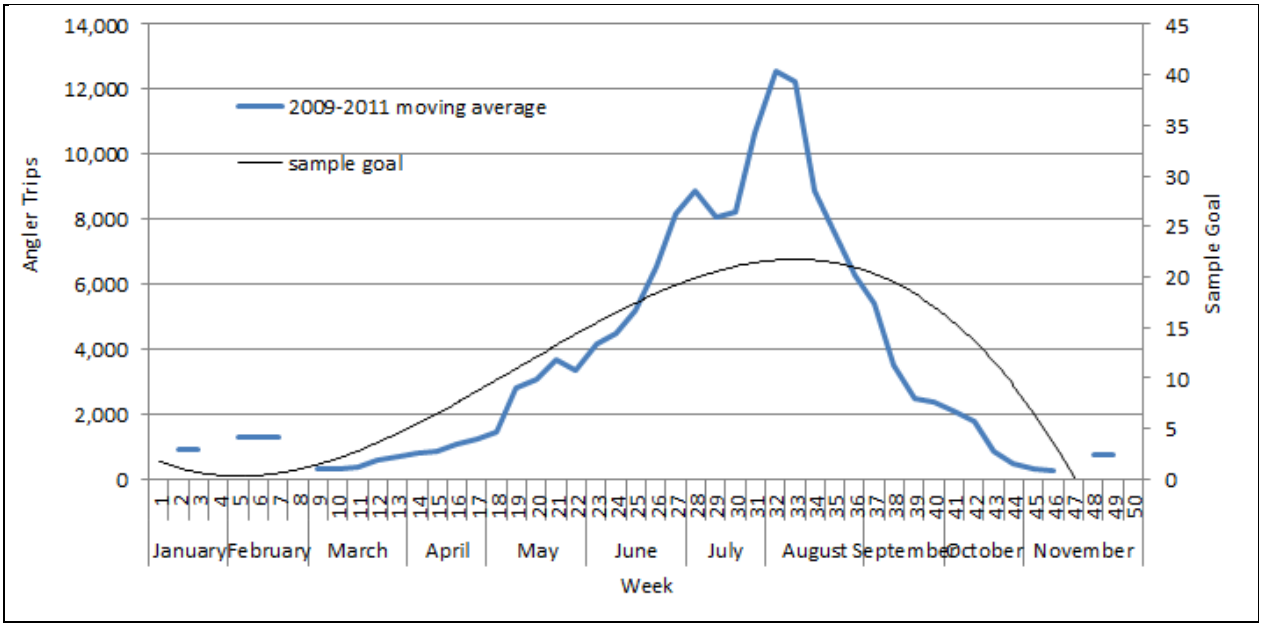
The data collected through the on-site ORBS interviews and the subsequent phone interviews included information on who is recreationally fishing in Oregon marine environments, where they are fishing, what they are fishing for, and their economic impacts on coastal Oregon communities. These data also enable an assessment of recreational fishing activities in and near marine reserve sites and estimation of the impacts of marine reserve restrictions. One purpose of the phone interviews was to study displacement of these fishing activities. Collecting such behavioral information in a general context, not associated with a specific marine reserve site, allows this information to be used for a broad scope of management issues.

D.1 Summary of Methods

ORBS interviewers distributed postcards to recreational anglers, in addition to their traditional sampling duties, and asked anglers if they would be willing to participate in an additional follow-up interview. ORBS samplers use a modified random sampling design to randomly select fishermen to contact at various access points along the port during their duties. This economic study was considered an "add-on" to traditional ORBS duties. Figures 20 and 21 show the sampling plan for the add-on survey in terms of target numbers of interviews to be completed by date and port. These targets were eventually revised due to low response and participation rates. Using the angler contact information collected from postcards distributed by ORBS samplers, a follow-up telephone interview was then conducted with anglers. The telephone survey included questions about fishing trip spending; annual spending for fishing gear, equipment, and boats; hypothetical behavioral changes due to fishing regulations; and demographic information.

[14] The discussion of this research herein is original; there is no prior report citation.

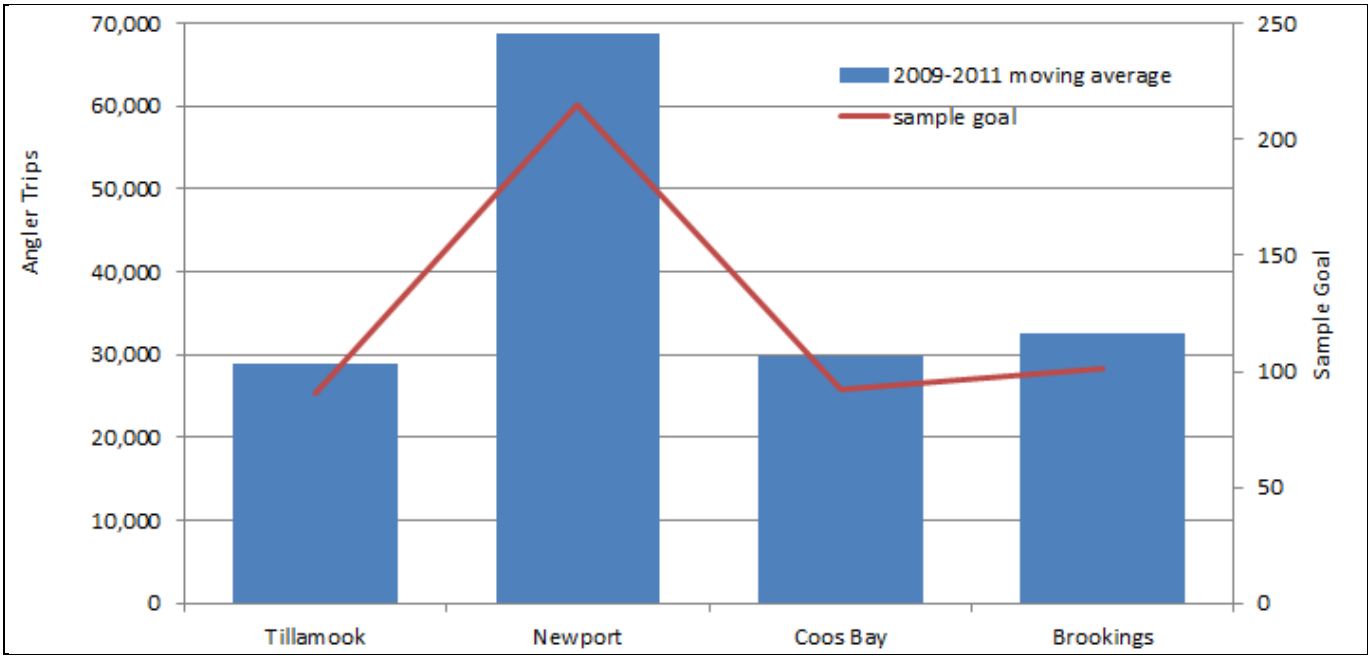
Figure 20. Weekly Recreational Angler Trips and Sample Goal



Notes:
1. Proportional distribution of sampling goal based on moving average of 2009 to 2011 of Oregon ocean weekly fishing pressure south of Cape Falcon. Pressure measured by sum of all recreational angler days for any trip purpose.
2. A moving average is commonly used with time series data to smooth out short-term fluctuations and highlight longer-term trends or cycles. A moving average is necessary because recreational fishing seasons are generally the same, but can have different opening and closing dates depending on stock abundance. Also, the number of trips anglers are willing to make is related to perceived CPUE, weather, and other factors for a particular year.
3. Sample goals are useable results from completed interviews. Sample goal time distribution based on assigning sample size allowed by budget proportional to trips during a month. The distribution was smoothed using a third order polynomial equation.
4. Angler trips include charter and private trips for salmon, bottomfish, combination, tuna, halibut, dive, and non-fishing.

Source: Schindler, Eric, ODFW, Personal communication, March 2012.

Figure 21. Recreational Angler Trips and Sample Goal by Port Groups



Notes: 1. South of Falcon includes Tillamook area (Garibaldi and Pacific City), Newport area (Depoe Bay and Newport), Coos Bay area (Florence, Winchester Bay, Charleston, and Bandon), and Brookings area (Port Orford, Gold Beach, and Brookings).
Source: Schindler, Eric, ODFW, Personal communication, March 2012.

D.2 Summary of Results

Postcards were distributed from October 2011 to October 2012, and phone interviews were conducted simultaneously with distribution. During the sampling period, 232 postcards were received, and 113 telephone interviews were conducted. Postcards were distributed at 17 ports; the majority of the postcards were received from 13 of these ports. The data described in this section only includes results of interviews of 58 recreational fishermen who were interviewed from the communities of place associated with the Otter Rock and Redfish Rocks sites. The data are aggregated for Port Orford, Newport, and Depoe Bay. Of the 58 interviews, 12 respondents were from Port Orford, 30 were from Depoe Bay and 16 were from Newport.

D.2.a. Spending on Recreational Fishing Trips

- For the purposes of this survey, a trip was defined as starting when the angler left home and ending when they returned home, regardless of whether they were gone one day or more than one day. Recreational fishermen interviewed took a total of 951 trips each year to the port where they were contacted; an average of 19 trips per year and a median of 11 trips per year. The range of trips was from a minimum of 1 trip to a maximum of 130 trips, with a standard deviation of 25 (Table 62).

- The greatest percentage of annual angler[15] spending associated with recreational fishing trips to communities of place for Otter Rock and Redfish Rocks was for boat fuel (24% of total spending, $1,360 mean per angler per year) and travel fuel (20% of total spending, $1,185 mean per angler per year). Other spending categories included lodging (14%, $819), buying food at a grocery store (12%, $650), eating at a restaurant (12%, $693), charter or guide fees (9%, $530), and gear, tackle, and bait, (8%, $441). (Figure 22/Table 63)

- An important part of determining trip cost is examining income that anglers forego in order to go on a fishing trip (opportunity cost). About 12% of all anglers gave up income to go on their fishing trip, and 9% of anglers used vacation days to go on their trip. The mean amount of income given up per trip was $599, and the median amount of foregone income per trip was $200 per trip.

- To characterize anglers' utilization of fish resources, one question focused on the type of fishing activity. The majority (68%) of respondents said they were sometimes catch-and-release anglers, 27% said they were never catch-and-release anglers, 3% were always catch-and-release anglers, and 2% just observed ocean resources (Figure 23).

D.2.b. Annual Expenditures on Fishing Gear/Equipment/Boats

- The majority of anglers interviewed (86%) owned a boat. These subjects indicated that an average of 63% of their boat use was for saltwater fishing in Oregon.

- The greatest percentage of annual spending on boats used for saltwater fishing in Oregon was for replacement of electronics and equipment attached to the boat ($1,084 mean annual spending per boat owner), maintenance and repair ($517), storage and slip fees ($255), insurance ($183), other ($142), and license fees ($33) (Figure 24/Table 64).

- Anglers were asked what they would hypothetically do if there was a new spot closure regulation that prevented them from fishing the area where they fished most during their trip (Table 65). A majority of respondents (53%) suggested they would substitute other fishing at other places during the immediate trip, and only 7% would have completely cancelled their trip due to restrictions.

[15] Averages are for all anglers' interviews, not just participants who spend money in the category.

Figure 22. Annual Trip Spending per Angler by Type

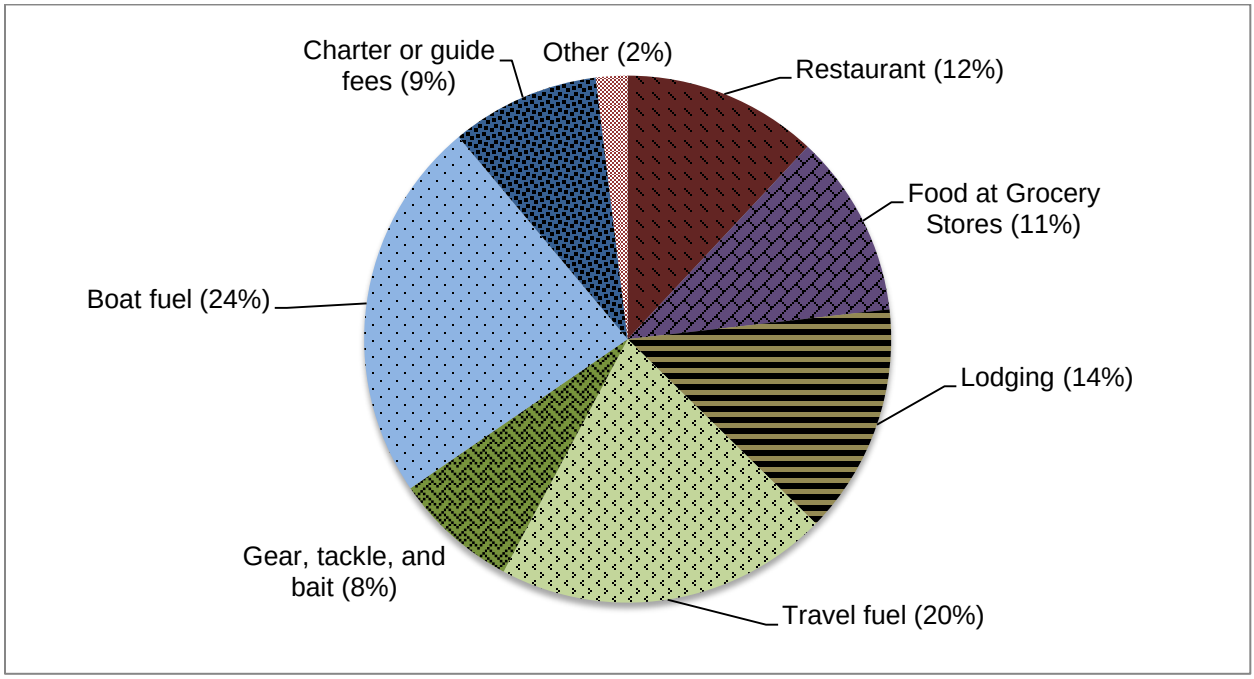


Figure 23. Types of Angling Engaged in by Respondents

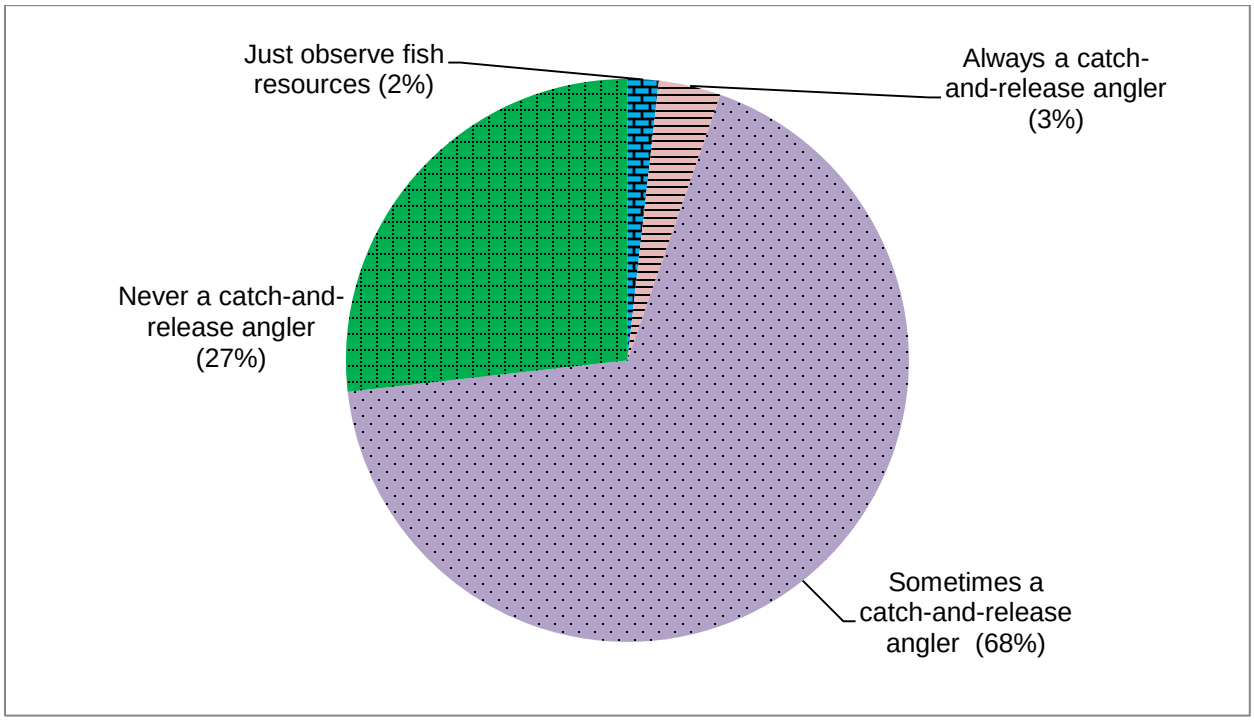


Figure 24. Annual Spending for Boats Related to Saltwater Fishing in Oregon

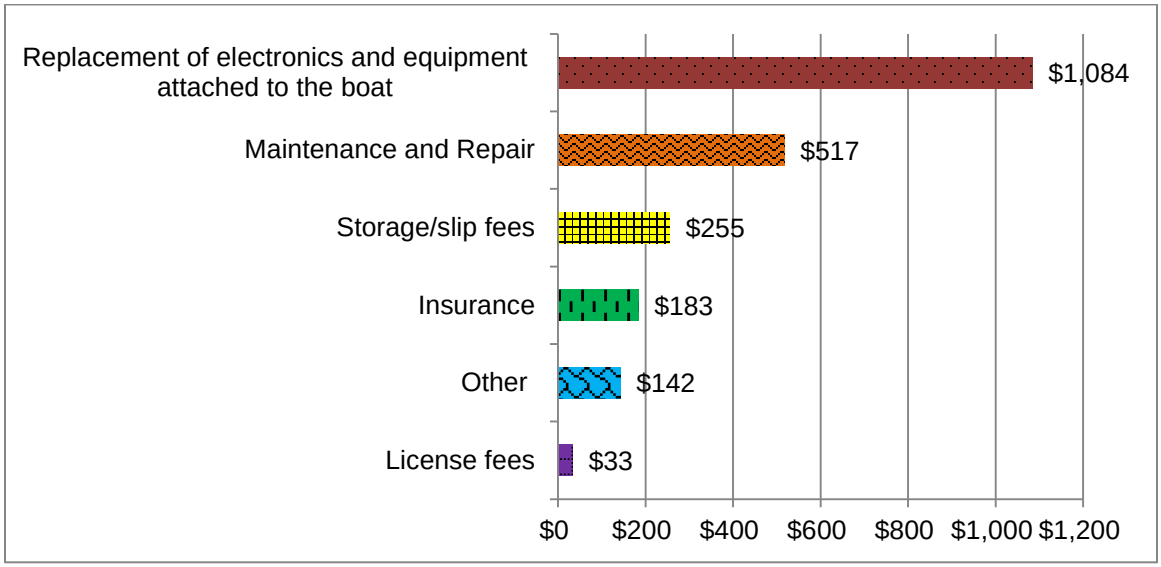


Table 62. Annual Recreational Fishing Trips to Communities of Place

	Total	Average number for those that answered	Average of all Respondents	Maximum	Minimum	Median	Standard Deviation
Trips to Designated Port	951	19	16	130	1	11	25
Saltwater and Freshwater trips taken to any location	2584	45	45	300	1	25	54
Nights spent away from home per trip	-	2	2	13	0	1	3
Size of group	-	4	4	17	0	3	3
Number of days spent fishing per trip	-	2	2	32	1	5	1

Source: Economic Impact of Marine Recreational Fishing in Oregon Pilot Survey

Table 63. Annual Spending on Recreational Fishing Trips to Communities of Place

	Average per person	Average per actual spender	Avg. per trip	Avg. per actual spender per trip	Median	Max	Min	Standard Deviation
Restaurant	$693	$1,1148	$58	$95	$138	$8,000	$0	1,500
Food at Grocery Stores	$650	$897	$45	$63	$115	$4,000	$0	972
Lodging	$819	$2,793	$74	$254	0	$19,000	$0	2,654
Travel fuel	$1,185	$1,347	$95	$108	$800	$8,000	$0	1,359
Gear, tackle, and bait	$441	$692	$29	$46	$120	$5,600	$0	947
Boat fuel	$1,360	$1,923	$87	$123	$500	$8,450	$0	1,987
Charter or guide fees	$530	$2,561	$55	$266	0	$19,000	$0	2,563
Other	$112	$929	$8	$65	$0	$2,400	$0	399
Total	**$5,790**	**-**	**$451**					

Source: Economic Impact of Marine Recreational Fishing in Oregon Pilot Survey

Table 64. Annual Spending on Boats for Saltwater Fishing in Oregon

Category of Spending	Average per Boat Owner	Average per Actual Spender	Median	Max	Min	Standard Deviation
Replacement of electronics and equipment attached to the boat	$1084	$1,748	$30	$20,000	0	3,066
Maintenance and Repair	$517	$834	$10	$6,000	0	1,142
Storage/slip fees	$255	$796	$0	$4,800	0	701
License fees	$33	$63	$0	$240	0	47
Insurance	$183	$285	$40	$1,140	0	245
Other	$142	$1,774	$0	$4,000	0	662

Notes: 1. Annual spending for saltwater fishing in Oregon was calculated by multiplying annual spending for boats, by the percentage of time the boat was actually used for saltwater fishing in Oregon.
Source: Economic Impact of Marine Recreational Fishing in Oregon Pilot Survey

Table 65. Behavioral Changes Associated with Spot Closure Regulations

Response	Percentage of Responses
I would choose another port to launch or charter from and fish in an entirely different area	36%
I would make the trip at another time when the spot closure was over	21%
I would have made the trip and avoided the spot closure	17%
Other	9%
Where I fished was very important, so I would have not made the trip	7%
Don't know	5%
Refused	5%

Notes: 1. Answers shown are responses to the question, "Hypothetically, what would you do if there was a new spot closure regulation that prevented you from fishing where you fished on this trip?"
Source: Economic Impact of Marine Recreational Fishing in Oregon Pilot Survey

D.3 Discussion

The number of postcards that were mailed back to ODFW was much smaller than originally targeted. Therefore, this study should be considered a pilot project, because the sample size was too small to draw conclusions about a larger population of recreational fishermen in Oregon.

Using ORBS samplers to collect this information was an efficient use of human resources and program budgets. It helped to avoid the need to add another layer of enumerators at fishing access sites who would be collecting duplicate information. This method also provided more representative and less biased data than other user survey administration techniques might have. It was also more cost effective than a general angler survey because it avoided having to filter a majority of license holders that did not participate in saltwater (marine) fishing trips.

There were some challenges associated with utilizing ORBS personnel. Samplers had varying levels of interest and engagement in the project. As a result, the number of postcards received from each port was very unbalanced.

To replicate this study, several measures should be taken to ensure higher response rates. This would include planning a more comprehensive training of ORBS samplers and continuing to follow up with these samplers once the survey period started to ensure proper postcard distribution. In addition, a contracted company completed most of the phone interviews. In the future, the use of an intern or fellow within ODFW would allow the Department to better ensure that interviews were being conducted on a timely basis after the postcards were received. This would mean that anglers would be contacted at a time when they could better recall details about their trip.

Responses to the hypothetical scenario question can help predict how the behavior of recreational fishermen may change after spot closures, like marine reserves, are implemented. The responses to this question lead to the prediction that the Oregon coastal economy on the whole is unlikely to see major overall changes in recreational expenditures associated with reserve site implementation, as only 7% of fishermen responded that they would stop making fishing trips completely if a spot closure was implemented at their favorite fishing site.

At the same time, reserve site implementation is expected to cause changes in the time periods and locations where these fishermen spend money. The largest proportion of respondents (36%) said they would fish from an entirely different port and location if a spot closure were implemented. Spending which originally would have occurred in adjacent communities of place would be displaced to other communities along the coast. In addition, 21% of anglers said they would wait until the spot closure ceased to fish from their usual spot is another indication that reserve communities could see decreases in spending by recreational fishermen with marine reserve implementation.

VI. Discussion

A. Applications to Ecosystem Based Management

The recent transition in United States ocean policy to an approach that views humans and ecological systems as inextricably linked, known as ecosystem based management (EBM), has created a need for understanding human interactions with the environment (Pomeroy, 2007). Marine reserves and MPAs correspond to the central philosophies of EBM, because they are a tool for managing human influences on the ecosystem, rather than just the biological system itself. As a result, the success of the protective measures associated with these reserve sites depends on whether or not the stakeholders who utilize reserve areas are willing to follow new regulations (Christie et al., 2003).

Human dimensions research provides a mechanism for understanding stakeholder attitudes, values, motives and behaviors. Knowledge gained from this research can be utilized to enhance agency and stakeholder relationships, which should lead to better local stewardship, compliance, and support. As stakeholders have more trust in and knowledge of the purpose of reserve policies, they may become more engaged in local reserve stewardship. Such engagement should minimize the necessity for enforcement. There are many fundamentals of EBM integrated within the Human Dimensions Monitoring Program that allow for better understanding, communication, and collaboration with the marine reserve communities of place. The intention of this integration is to facilitate long term program success. A list of these fundamentals, associated benefits, and projects is included below[16].

- Incorporating local knowledge into the monitoring strategy provides an important socio-cultural and historical context for marine reserve management decisions. The residents of the local community may possess natural resource management wisdom of many generations (Kliskey, et al. 2009). (Long Form Fishing Community Profiles, Modeling the Economic Impact of Marine Reserve Restrictions using Spatial Habitat and Fisheries Data)

- Analyzing the cumulative impacts of marine reserve sites among multiple sectors of local economies helps to quantify the tradeoffs of marine reserve implementation within and between sectors, to facilitate understanding of marine reserves impacts on local economies. (Commercial and Recreational Fishing Economic Data, Business Survey, Economic Value of Research to Port Orford, Modeling the Economic Impacts of Marine Reserve Restrictions Using Spatial Habitat and Fisheries Data)

- Valuing ecosystem services provided by marine reserves provides managers with an understanding of the true value of the reserves to society and local communities. Reserves can then be managed to sustainably provide beneficial ecosystem services. (A Community-Based Approach to Valuing Marine Ecosystem Services)

- The place-based approach of the marine reserve monitoring program is designed to focus specifically on the communities of place in close proximity to each marine site. Each community has a different social and ecological context. These geographic variations will affect marine reserve implementation and associated effects at each site (Pomeroy, 2007).

[16] This list of Fundamentals of Ecosystem Services (McLeod & Leslie, 2009) is associated with benefits described in Murphy (2012).

(General Economic, Social, and Cultural Overview of Marine Reserves Communities, Long Form Fishing Community Profiles)

- The Precautionary Approach, fundamental to EBM, provides a justification for marine reserve conservation. Successful marine reserve management, however, requires an understanding of human behaviors, because management decisions which anticipate human responses and behaviors will contribute to successful conservation. Because human dimensions research can assess the attitudes and behavior of ocean users, managerial decisions which incorporate this knowledge embrace the precautionary approach of EBM. (Coastal Attitudes and Perceptions Survey, Pressure Counts, Marine Recreational Fishing Survey, Modeling the Economic Impacts of Marine Reserve Restrictions using Spatial Habitat and Fisheries Data).

- Long-term human dimensions monitoring will allow managers and policymakers to determine if marine reserves create significant social and economic impacts. Adverse impacts can be mitigated with adaptive management and policies focused on the needs of ocean users. (All studies; especially the marine reserve mandate to pursue a longitudinal monitoring protocol.)

- Natural and social science integration, in embracing the interdisciplinary approach of EBM, creates collaboration which will foster more complete understanding of how humans are connected to the broader ecosystem. This knowledge can better inform marine resource management and policy decisions. (All studies; the marine reserves monitoring plan is specifically interdisciplinary.)

B. Challenges

The Human Dimensions Monitoring Program has taken an integrated interdisciplinary approach, which involves research across a broad range of constituencies for evaluating a comprehensive set of social and economic tradeoffs and interactions. Such an integrated approach anticipates a broader managerial strategy than traditional sector-by-sector management approaches (Rosenberg, et al., 2009). However, this integrated approach poses challenges.

B.1 Limited Resources

The ODFW marine reserves program has funding for only one full-time human dimensions staff person. It is difficult, if not impossible, to account for the numerous social and economic impacts associated with marine reserve implementation given limited staff and resources. This is especially difficult for longitudinal monitoring processes, which require consistent data for each marine reserve across time periods. Therefore, efforts were made to focus monitoring projects on groups most likely to be affected by marine reserves, such as commercial and recreational fishermen and coastal residents. All future studies must address three criteria: managerial relevance, efficiency of study designs and data collection, and replicability. Creative research strategies will be required to sustain the longitudinal research mandate of the marine reserves.

B.2 Pioneering New Approaches

The inception of the Human Dimensions Monitoring Program occurred one year before baseline data collection began. Therefore, many of the research methods described in this report were developmental and unique to this program. These circumstances inevitably presented unforeseen challenges. Examples of these challenges included low response rates for the marine recreational fishing economic study, inclement weather affecting pressure count data collection, low response rates for mail surveys, and omission of charter fishing spatial data from habitat and species economic modeling. As a result, much of the initial human dimensions research can be construed as preliminary, helping to define what can be accomplished in this setting with these research tools. An assessment of accomplishments and issues will impact future human dimensions monitoring. Methods will be adapted, streamlined and focused to sustain a consistent and reliable longitudinal research agenda, while still addressing the research mandate for the marine reserves.

C. Future Work

Over the next ten years, the monitoring methods described in this report will be replicated, with improvements and adaptations, at Redfish Rocks and Otter Rock, and implemented at the new reserves at Cascade Head, Cape Perpetua, and Cape Falcon. The results of human dimensions monitoring at all of these marine reserves will be presented in future reports. A description of the timeline for future monitoring activities is presented in Table 66.

C.1 Redfish Rocks Camera Monitoring Pilot Study

An important aspect of any research design is the ability to adapt the data collection methods over time as new information or technology becomes available. An example of this flexible adaptation is the use of time-lapse cameras to obtain pressure counts at the Redfish Rocks site. This method for visitor behavioral data collection is currently under review and development. Previous research (Arnberger, et al., 2005) has compared the use of time-lapse video cameras with physical counts by human observers while monitoring visitor use. The results indicated that there was no significant difference between observations recorded by human observers and interpreted video counts. In addition, video monitoring worked best during periods of high visitation, but in-person counts seemed to yield better accuracy for counting mobile visitors. The Redfish Rocks camera pilot study adopts a mixture of visitor observation techniques from traditional pressure counts and the Arnberger study. Lessons learned from this pilot may allow more extensive human activity monitoring in less accessible locations with limited personnel.

C.2 Coastal Attitudes and Perceptions Survey Extension

The current plan is to replicate the Coastal Attitudes and Perceptions Survey in three to five years. OSU researchers and ODFW may expand the study sampling design to include the population of residents on the western side of the Cascades, or a state-wide sample of all residents.

C.3 Charter Vessel Trip Accounting Program

Although longitudinal data on commercial fishing at marine reserve sites can be tracked through mandatory logbook programs, data associated with recreational and charter fishing are more difficult to collect. Therefore, a recreational and charter vessel trip accounting program is desirable to facilitate such data collection. One benefit of such a program would better information on the impact of marine reserve implementation on fishing behavior. A charter vessel trip accounting program would also improve the ODFW Oregon Recreational Boating Survey (ORBS) by providing more detailed catch and effort spatial statistics.

D. Conclusion

The need for utilization of social science data in marine ecosystem-based management extends far beyond the Oregon marine reserve sites. Social science research for all coastal regions of the country currently lags behind ecological sciences, yet the need for understanding the connections between the natural and social systems within this context is growing (Lester, et al., 2010). The Human Dimensions Monitoring Program for Oregon's marine reserves will help address this knowledge gap by providing information that is broadly applicable to management of the nearshore environment. Much of the human dimensions research described in this paper included data on residents of the Oregon coast, rather than the specific marine reserve communities of place. These data can be utilized to support EBM across the Oregon coast. The research methods employed in these studies are relevant to assessment of the socio-economic impact of other marine spatial planning decisions in Oregon, such as fisheries regulations, wave energy planning, and coastal development. Information presented in this report should contribute to management of the nearshore environments and innovations in marine spatial planning.

E. Schedule of Monitoring Activities

In consultation with the Human Dimensions science advisory group, the following schedule of monitoring activities was created to plan the longitudinal socio-economic research related to the reserves. With the completion of this first biennial report, this schedule is under review, as the Human Dimensions program is adapted to reflect knowledge gained during this first round of research. Most studies will be revised to address efficiency of agency and partner resource utilization, nearshore managerial relevance of the information, and longitudinal replicability of the study for comparative purposes.

Table 66. Expected Schedule of Monitoring Activities

Expected Monitoring Interval (Years)	Action	Metric Type
1 2	Spatial Use Counts • Consumptive (at sea) • Non-consumptive (on shore)	Secondary & On-site Video
2	Spatial use economic analysis	Modeling
5	Recreational user economic data collection and analysis	Survey/Secondary
5	Affected coastal business data collection	Survey
5-10	Ecosystem services study	Focus Group/Survey
5	Community and State resident data collection	Survey/Secondary
2	Fishing Community Profiles	Survey/Secondary
2	Supporting institution tracking (tribes, academia, education, government, enforcement, stakeholder groups	Focus Group/Survey
5-10	Economic Impact Assessment	Primary/Secondary
5-10	Social Impact Assessment	Primary/Secondary

VII. Glossary

Bioindicator: Component or variable inferring the state, conditions, or attributes of the coastal ecosystem (Freeman, et al., 2013).

Benefit: A valued use or experience derived from the use of ecosystem services (Freeman, et al., 2013).

Comparison Area: An area that provides a baseline to compare with non-reserve areas, specifically to evaluate changes in habitat, species abundance, and species composition due to natural changes, fishing and other human effects.

Community of Interest: Any group of individuals that share a common interest, activity, or feature that bonds them together. These individuals may only interact with others within this community when participating in the interest. For example surfing and surfers could be a community of interest.

Community of Place: Any group of individuals connected through a specific location in which they spend a continuous portion of their time, such as a town, work, a fishing port, a tavern, or vacation spot. For the Coastal Resident Attitudes and Perception survey, this meant all residents within a 10-mile radius of the land point nearest to the center of each reserve site.

Creel Survey: A method of determining fishing effort by conducting surveys with fishermen and counting their catch.

Direct Effects: The first level effects of a change in a market driver or availability of a resource to individuals or groups directly connected to the market or resource. A marine example may be the effect of fishing regulations on the commercial fishing industry.

Ecosystem-Based Management: An integrated approach that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

Ecosystem Service: The benefits gained by humans from healthy and functioning ecosystems. Ecosystem Services fall into four main categories – Provisioning (ex: food), Regulating (ex: pollination), Supporting (ex: seed dispersal), and Cultural (ex: discovery).

Ecosystem Service Provider: Organisms, species, functional groups, populations or communities, or their trait attributes that contribute to the delivery of a specified ecosystem service (Freeman, et al., 2013).

Ecosystem Service Tradeoff: Giving up delivery (i.e., type, magnitude, and relative mix) of some ecosystem services for the delivery of others (Freeman, et al., 2013).

Existence Value: The value derived from the knowledge of the continued existence of a resource. People often hold existence value for the ecological processes that make up the whole ecosystem, and they hold this value out of moral conviction regarding an inherent quality of the ecosystem, rather than its production of outputs (Freeman, et al., 2013).

Human Dimensions: The study of how humans interact with their environment and what drivers are responsible for human actions, attitudes, engagement, and connection to the natural resources within the environment. Areas of study could include social, cultural, and

economic aspects and are often used to better understand and manage natural resources.

In-Direct Effects: The secondary effects of a change in a market driver or availability of a resource to individuals or groups not directly connected to the market or resource. A marine example could be the impact on a hotel in a port town where fishing regulations have directly affected the commercial or recreational fishing opportunity.

Intrinsic Value: The value something holds in and of itself or for "its own sake" as opposed to being valued for its association to something else (Zimmerman, 2010).

Logbook Program: A program implemented by the state to collect data on commercial fisheries. Commercial fisheries logbooks record data on species caught, location of catch, port the catch was landed in, processor, etc. Oregon has commercial logbook programs for most of the commercial fisheries.

Marine Reserve (Oregon): An area within Oregon's Territorial Sea or adjacent rocky intertidal area that is protected from all extractive activities, including the removal or disturbance of living and non-living marine resources, except as necessary for monitoring or research to evaluate reserve condition, effectiveness, or impact of stressors such as climate change (OPAC, 2008).

Marine Protected Area (Oregon): Any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part of all of the natural and cultural resources therein (Executive Order 13158, May 26, 2000).

Marine Reserve Site- All locations where restrictions are in effect, includes both marine reserves and marine protected areas.

Non-consumptive Activity: Activity that does not involve a harvest element, or the physical removal of a resource from the environment (Eardley, 2010).

Nearshore: The area from the coastal high tide line offshore to the 30 fathom, (180 feet or 55 meter) depth contour (ODFW, 2006).

Oregon Recreational Boater's Survey (ORBS): The ORBS survey samples the marine recreational fishing industry in the State of Oregon and can be used to make catch and effort assessments and aid in fisheries management decision-making (Schindler, 2012).

Oregon's Territorial Sea: The Territorial Sea Boundary is 3 nautical miles (3.45 statute miles) seaward of the coastal base line (Mean Lower Low Water) along the shore and from the baseline around offshore rocks or islands. This boundary is the seaward limit of Oregon's Coastal Zone (OPAC, 1994).

Rapid Assessment Approach: Rapid assessments are a common cultural research technique used when social scientists do not have the time and budget resource to collect more extensive data over time. Social scientists gather primary data during short visits. Both observations and local participant interviews may be conducted (Bernard, 2006).

Regional Economic Impact Analysis (REI): An REI determines the economic impact of a management policy or activity on a specified area. In the fisheries sector, this can mean measuring the economic contributions from activities in the industry, such as harvesting, processing, and distributing seafood products. These economic models track monetary exchanges within and between industries, sometimes describing the related income which reaches households. The sum of all of these monetary exchanges which reach households is called total personal income and can be used to compare economic effects within and

between industries (The Research Group, 2013a).

Relative Preference Weight: A measure of the relative importance of a criterion as judged by the decision maker (Freeman et al. 2013).

Stakeholder: An individual or group that has an interest in a particular resource, project, organization, or other entity (Eardley, 2010).

Value Orientations: An expression of general values which are revealed through the pattern and direction of multiple basic beliefs that an individual holds regarding a situation or issue (Fulton, et al., 1996). Research has shown that value orientations influence attitudes, intentions, and behaviors, so knowing resident orientations can be useful for estimating possible reactions to potentially controversial management actions.

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IX. List of Contributors

A Community-Based Approach for Evaluating Tradeoffs Across Marine Ecosystem Services

Peter Freeman, M.S. Marine Resource Management, Oregon State University (OSU)
Randall Rosenberger, PhD., Department of Forest Ecosystems and Society, OSU
Gil Sylvia, PhD., Department of Applied Economics, OSU
Selina Heppell, PhD., Department of Fish and Wildlife, OSU
Michael Harte, PhD., World Wide Fund for Nature-Australia, College of Earth, Ocean, and Atmospheric Sciences, OSU

Coastal Attitudes and Perceptions Survey

Mark Needham, PhD., Department of Forest Ecosystems and Society, OSU
Lori Cramer, PhD., Department of Sociology, OSU
Elizabeth Perry, M.S., Forest Ecosystems and Society, OSU

Long-form Fishing Community Profiles

Flaxen Conway, Marine Resource Management Program Director, OSU
Christina Package, M.S., Marine Resource Management, OSU
Leesa Cobb, Executive Director, Port Orford Ocean Resources Team
Bryan Tilt, Ph.D., Department of Anthropology, OSU
Erin Wilson, M.S., Marine Resource Management, OSU
Valerie Mecum, Port Orford Community Liaison
Michelle Cottrell, Newport Community Liaison
Fred Robison, Depoe Bay Community Liaison
Melissa Murphy, Oregon Department of Fish and Wildlife

Oregon Department of Fish and Wildlife Marine Resources Program

Dave Fox, Marine Resources Program Assistant Manager
Cristen Don, Marine Reserves Program Leader
Thomas Swearingen, PhD, Marine Reserves Human Dimensions Project Leader
Melissa Murphy, Former Socioeconomic Analyst, Marine Reserves Program
Dan Crowther, Graduate Research Assistant, Washington State University
Chris Eardley, Oregon Sea Grant Fellow
Brian VerWey, Undergraduate Research Assistant

The Research Group

Shannon Davis
Hans Radtke
Kari Olsen
Hillary Polis

Modeling the Economic Impacts of Marine Reserve Restrictions Using Habitat and Species Data

Jim Golden, Golden Marine Consulting
Shannon Davis

Social and Economic Research Working Group

Sarah Kruse, Economist, Ecotrust
Christine Broniak, Economist, Oregon Legislative Revenue Office
Aaron Jenkins, Economist, Oregon Department of Fish and Wildlife

William Jaeger, PhD., Department of Applied Economics, OSU.
Michael Harte, PhD
Shannon Davis
Gil Sylvia
Randy Rosenberger, PhD
Hans Radtke
Flaxen Conway
Mark Needham, PhD
Lori Cramer, PhD
Jim Golden

X. Appendices

Appendix 1: Long Form Fishing Community Profiles: Interview Questions

Interview Questions, Long Form Fishing Community Profile, Depoe Bay, OR

1. **Please describe for me the importance of fishing for Depoe Bay?**

2. **How does Depoe Bay support fishing-related activities, such as:**
   - offloading/selling/processing fish,
   - providing gear/fuel/ice,
   - offering boat repair,
   - book keeping or legal services,
   - or social contacts [church, schools, socializing]?

3. ***This is a 2-part question:***
   - **Please describe how you perceive the communication process within the fishing community**
     - formal [such as meetings, conference calls, testimony, mailings], or
     - informal [such as one-on-one]

   - **Please describe how you perceive the communication process between the fishing community and Depoe Bay or others (such as fisheries managers, USCG, etc.)**
     - formal [such as meetings, conference calls, testimony, mailings], or
     - informal [such as one-on-one]

4. **Please describe for me a typical Depoe Bay fisherman (commercial, charter, or both)?**

5. ***This is a 2-part question.***
   - **In your opinion, what are Depoe Bay fishing families like?**
     - who's involved in the family business,
     - are there differences between boat owners and crew members,
     - do many wives, etc. have outside jobs?

   - **And have Depoe Bay fishing families changed over the last 30 years?**

6. **Please share with me your perception of the ocean and fisheries off the coast of Depoe Bay, such as:**
   - the health of the fisheries,
   - any ocean changes,
   - the numbers of fish out there, etc.?

7. **In your opinion, have the charter customers changed over the last 30 years?**

For the next three questions, we're looking for changes you've perceived over 4 time periods: historical (1980's and before), distant past (1990's), recent past (2000's), and today (2010).

8. **Please share with me your perception of the economic changes you've seen, if any, related to fishing and seafood in Depoe Bay?**
   - Historical (1980's and before)
   - Distant past (1990's)
   - Recent past (2000's)
   - Today (2010)

9. **Please describe the fishing effort changes you've seen, if any, off the coast of Depoe Bay?**
   - Historical (1980's and before)
   - Distant past (1990's)
   - Recent past (2000's)
   - Today (2010
10. **Please share the effects of management decisions you've seen, if any, on Depoe Bay such as the groundfish buyback, salmon disaster, RCA closures, permit stacking, etc.?**
    - Historical (1980's and before)
    - Distant past (1990's)
    - Recent past (2000's)
    - Today (2010)

And, lastly, another 2-part question:

11a. Please describe the fishing community in Depoe Bay 5 years from now?

11b. If *you* could create the future for the fishing community in Depoe Bay, describe for me what it would look like?

Appendix 2: Links to Digital Versions of Reports

Final reports for all of the Oregon Department of Fish & Wildlife, Marine Reserve Human Dimensions research projects discussed in this biennial report, and additional related research reports, are posted on-line, accessible via links located on the following web page:

http://www.oregonocean.info/index.php/marine-reserves-sp-26120/science?id=416

Appendix 3: Otter Rock Pressure Count Form

Pressure Count Form - Otter Rock			
8am			
Observation Area: Punch Bowl	Vehicles		
	Beverly Bch	Male/Female	Age Group (Child/ Yadult/ Adult/ Senior)
agate hunter			
dog walker			
beach goer			
surfer			
Other			
	Ocean Veiw -inside	**Ocean View - outside**	
boater (motorized)			
kayaker fishing			
boater (non-motorized)			
8am			
Observation Area: Otter Crest			
	Beverly Bch	Male/Female	Age Group (Child/ Yadult/ Adult/ Senior)
agate hunter			
dog walker			
beach goer			
surfer			
Other			
	Ocean Veiw -inside	**Ocean View - outside**	
boater (motorized)			
kayaker fishing			
boater (non-motorized)			

Appendix 4: Business Survey Questionnaire

Otter Rock: Business Interview Questions Results Overview

1. Are you locally owned? If not can you elaborate?
2. How many employees do you have on a regular basis? Does this increase seasonally and if so how?
3. What percent of your customers are local?
4. How long have you been in business?
5. What types of things attract people to this area of the coast?
6. Do you know about the marine reserves designated for the central coast area?
7. Do you think a marine reserve would have an impact on the number of visitors to this area? How?
8. Do you think a marine reserve would affect your business? How?
9. Did you know about the community groups focusing on these reserve areas? How would you like to see a group like this represent your position on the marine reserves?
10. Would you like more information about the marine reserves?
11. Would you like to comment on anything further?

Redfish Rocks: Business Interview Questions Results Overview

1. Are you locally owned? If not can you elaborate?
2. How many employees do you have on a regular basis? Does this increase seasonally and if so how?
3. What percent of your customers are local?
4. How long have you been in business?
5. What types of things attract people to this area of the coast?
6. Do you know about the marine reserve (proposed and/or designated) for this area?
7. Do you think a marine reserve would have an impact on the number of visitors to this area? How?
8. Do you think a marine reserve would affect your business? How?
9. Did you know about the community team evaluating and this site? How would you like to see this team represent your position?
10. Would you like more information about the marine reserves?
11. Would you like to comment on anything further?

Appendix 5: A Community-Based Approach for Evaluating Tradeoffs Across Marine Ecosystem Services for Oregon Marine Reserves

Following the community focus group exercises, OSU researchers designed a survey instrument that included a trade-off exercise using the survey items developed in the during the focus group process, as well as additional questions aimed at gathering other information relevant to marine reserves decision-making in Oregon. One goal of an indicator-based valuation model is to find out the relative importance of each survey item for the citizens of Oregon. This can be accomplished by weighting each item according to the stakeholders' relative preference for the item. These preference weights can aid in prioritizing efforts to monitor biological and socioeconomic change resulting from the establishment of marine reserves in Oregon.

Researchers administered surveys by individual mailings to the same focus group participants who contributed to previous steps in the approach, as well as stakeholders recruited to participate in the focus groups but were not able to attend. The following tables are drawn from that work.

It is important to note that this project had multiple funding sources. ODFW supported the initial identification of candidate bioindicators for survey use and Oregon Sea Grant provided funding for the entirety of the project. The summary in this monitoring report includes methods and tables from a combination of an original report for ODFW, the MS thesis, and the Sea Grant Guide. Therefore, any inconsistencies in lists of ecosystem services, indicators, and methodologies in this summary are due to the fact that these areas were adapted for each type of report.

This entire project is fully documented in Peter Freeman's MS thesis, available at: http://ir.library.oegonstate.edu/xmlui/handle/1957/35062

The Oregon Sea Grant Guide to Valuing Marine Ecosystem Services to Support Nearshore Management in Oregon was published on the Oregon Sea Grant website (http://seagrant.oregonstate.edu/) in 2013.

Table of Final Survey Indicators and Bioindicators

Survey item title	Survey item description	Bioindicator title	Bioindicator description
The variety of sealife	This item represents the diversification of fish, shellfish, marine mammal, and plant and algae species *inside* protected areas. An increase in this item would mean new species of plants and animals could be seen or uncommon plants or animals might become more common. A decrease would mean the range of species seen would go down and some animals might become more rare.	“Number of species”	The total number of species observed
		“Relative abundance”	How common or rare a species is relative to other species
The abundance of seabirds	This item represents the natural production of seabirds *inside* protected areas. An increase in this item would mean more seabirds (e.g. pigeon guillemot) could be seen in flight or on the rocks or water in the marine reserves. A decrease would mean these animals would be less commonly seen.	“Seabird abundance”	The number of seabirds observed
		“Nesting population”	The size of seabird nesting colonies
The abundance of marine mammals	This item represents the natural production of marine mammals *inside* protected areas. An increase in this item would mean more marine mammals (e.g. Pacific harbor seals, California sea lions, grey whales) can be seen in the water or on rocks from the shore or while in the water. A decrease would mean these animals would be less commonly seen.	“Seal abundance”	The number of Pacific harbor and Northern elephant seals observed
		“Sea lion abundance”	The number of California and Stellar sea lions observed
		“Whale abundance”	The number of grey and other whale species observed
The natural integrity of the marine ecosystem	This aspect represents the ability of the marine ecosystem (*inside and outside* of protected areas) to self-organize and support a mature, rich community of organisms. An increase in this aspect means organism populations and interactions (such as the food web) naturally become more functional and resilient. A decrease would mean more reliance on and signs of human intervention and management.	“Recruitment success”	The amount of larval input, settlement, and survival (from new births or new entrants)
		“Average trophic level”	The distribution of organisms throughout the food chain
		“Biodiversity index”	The relative abundance of each species
		“Size distribution”	The range of sizes of individuals within each species
		“Primary production”	The growth in number and size of photosynthesizing organisms (aquatic plants, algae, phytoplankton)
		“Habitat complexity”	The degree of variation in habitat types
		“Direct human impacts”	Visually apparent signs of human use (past and present)

Survey item title	Survey item description	Bioindicator title	Bioindicator description
The cleanliness of coastal waters	This item represents the coastal water quality (*within and outside* protected areas) with respect to human contact and consumption of local seafood. An increase in this item means an improvement to the natural processes and organisms that remove biological and chemical waste from coastal waters. A decrease means less removal of waste and poorer water quality.	"Water quality"	The level of nutrient concentrations, suspended solids, and industrial contamination
		"Nutrient recycling"	The rate at which nutrients are recycled into living matter
		"Filter feeder biomass"	The number and size of organisms that filter the water (e.g. mussels and clams)
The coastal culture and lifestyle	This item represents the vitality of the culture and lifestyle that Oregonians consider characteristic of the coast. An increase in this item means that coastal communities exhibit a stronger economic, social, and cultural connection to the ocean. A decrease means that these aspects of the communities are less tied to the ocean and ocean-based activities.	"Ocean-based tourism"	Employment, income, and investment from ocean-based tourism (e.g., whale watching, sea kayaking, etc.) companies
		"Research and education"	Employment, income, and investment from marine research institutions, aquariums, and other educational ventures
		"Stewardship opportunity"	The amount of personal and professional activity dedicated to natural resource supervision (e.g. beach clean ups, conservation organizations)
		"Fishing and seafood"	Employment, income, and investment from the commercial and recreational fishing sectors, seafood processing sectors, and seafood preparation industry
The number and size of fish and shellfish	This item represents the natural production of all fish and shellfish (harvested and non-harvested) *within* protected areas. An increase in this item would mean that there would be more and larger fish, crabs, sea stars, and anemones present while diving, for example. A decrease would mean that there would be less of these visible species, and they would be smaller on average.	"Growth rate"	How quickly large fish and shellfish grow in size and weight
		"Abundance"	The number of large fish and shellfish present within the reserve
		"Focal species biomass"	The number and size of all sedentary rockfish and red urchins in the reserve
The natural aesthetic of the seascape	This item represents the natural formation of pleasant coastal scenery *inside* protected areas. An increase in this item means more areas displaying the natural features and dynamics that Oregonians find inspiring. A decrease means these areas would display less of these features and the dynamics would be modified.	"Wave patterns"	The degree to which the flow of water and waves is unimpeded by structures
		"Colonized rock"	The proportion of above-water rocky formations that are colonized by plants and animals
		"Visible kelp, plants, and algae"	The amount of surface canopy forming kelp and intertidal plants and algae.

Survey item title	Survey item description	Bioindicator title	Bioindicator description
Areas for outdoor recreation and leisure	This item represents the amount of areas suitable and available for outdoor recreation and leisure *inside or adjacent to* protected areas. An increase in this item means more natural supply of accessible beach, tide pools, swimmable areas, etc. A decrease means these areas would diminish in quantity and quality.	“Beach area”	The amount of beach sand naturally deposited and retained
		“Tide pool abundance”	The number of organisms (e.g. snails, sea stars) in tide pools and intertidal areas
		“Water supporting (non-fishing) recreation”	The amount of coastal waters used for diving, surfing, swimming, kayaking, etc. (but not fishing)
The availability of fish and shellfish for harvest	This item represents the natural production of all harvestable fish and shellfish outside the marine reserves. An increase in this item would mean an increase in the stock size of legal-size fish and shellfish of those species available for commercial and recreational harvest. A decrease would mean a lower stock size and fewer legal size fish.	“Relative abundance”	The proportion of stocks of harvested species to non-harvested species
		“Average size”	The average length and weight of harvested species
		“Focal species biomass”	The number and stock size of economically important species (e.g., Dungeness crab, black rockfish)
		“Catchable spillover”	The degree to which legal-size adults cross reserve boundaries into fished areas
		“Reproductive spillover”	The degree to which fish within the reserve contribute eggs and larvae to fished areas
The natural sustainability of the local fish and shellfish stock	This item represents the natural ability of the harvested fish and shellfish populations outside protected areas to persist into the long-term future. An increase in this item would mean that stocks are more resilient to fishing or natural disturbance, and are more able to reproductively replace individuals. A more sustainable stock also allows for a larger stock size. A decrease would mean that stocks would have difficulty repopulating and therefore might be more vulnerable to overfishing or environmental changes in the future.	“Harvest limit”	The amount of fish and shellfish allowed for harvest each year
		“Age distribution”	The age demographics of economically important species
		“Biomass buildup”	The growth and accumulation of harvested species within the marine reserve
		“Lifetime egg production”	The number of eggs produced by an individual over the course of its lifetime.

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Notes: These survey items were condensed in order to come up with the survey items administered in the actual survey.

2014

Marine Resources Program
Newport, Oregon