

Oregon Marine Reserves

Human Dimensions

Monitoring Report 2010-2011



2014

Marine Resources Program
Newport, Oregon

Acknowledgements

The authors wish to thank the Redfish Rocks Community Team and the Depoe Bay Near Shore Action Team, local stakeholders, staff at the Oregon Department of Fish and Wildlife Marine Resources Program, and all the individuals that donated their time, hard work, and contributions to the development of this document.

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

SUGGESTED CITATION

Swearingen, T.C., Don, C., Murphy, M., Davis, S., and Polis, H. 2014. Oregon Marine Reserves Human Dimensions Monitoring Report 2010 - 2011. Oregon Department of Fish and Wildlife, Marine Resources Program. Newport, OR.

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 2011¹, 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.