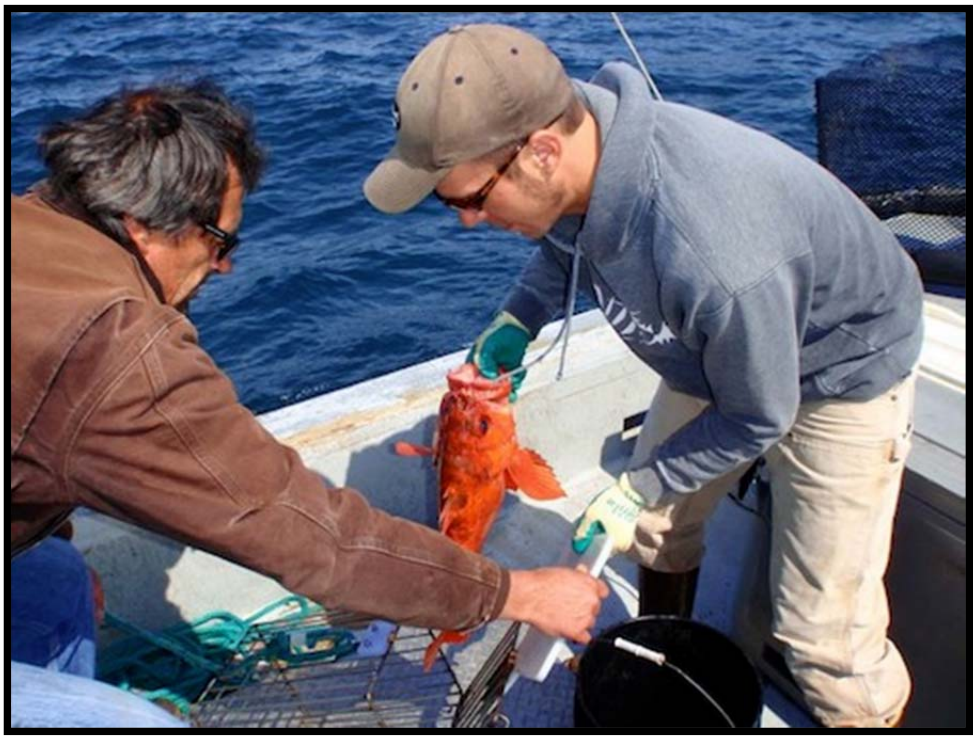
The Economic Contribution From Ocean Research, Planning, and Management Activities at Port Orford, Oregon



Oregon Department of Fish and Wildlife
and
Port Orford Ocean Resources Team

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Preface

The Oregon Department of Fish and Wildlife (ODFW) commissioned an economic analysis study of ocean resource research, management, and planning activity that takes place at Port Orford, Oregon. The ODFW is underway with a monitoring program for the Redfish Rocks Marine Reserve (RRMR) located near Port Orford and the study was related to the human dimension monitoring for the marine reserve site. The work was assigned to an economic consulting firm who was already involved in the RRMR human dimension monitoring efforts.

The study consultant was The Research Group, LLC, Corvallis, Oregon (TRG). Shannon Davis and Hilary Polis were the principal authors and they were greatly assisted by Kari Olsen. Ed Waters, Professional Economist Consultant, Beaverton, Oregon provided IMPLAN system information. Hans Radtke, Consulting Natural Resource Economist, Yachats, Oregon was a study advisor.

The authors' interpretations and conclusions should prove valuable for this study's purpose, but no absolute assurances can be given that the described results will be realized. Government legislation and policies, market circumstances, and other situations can affect the basis of assumptions in unpredictable ways and lead to unanticipated changes. The information should not be used for investment or operational decision-making. The authors do not assume any liability for the information and shall not be responsible for any direct, indirect, special, incidental, or consequential damages in connection with the use of the information.

Acknowledgements

Survey participants need to be thanked profusely for their patience and being candid during interviewing. They took time from their busy schedules to provide quality information about their work at Port Orford. The Port Orford Ocean Resources Team (POORT) administrators and the Redfish Rocks Community Team provided valuable input for the economic assessment and their contributions were appreciated. The following individuals in particular need to be recognized for contributing to study design and draft results reviews: *Cristen Don*, ODFW Marine Reserves Program Leader, *Dave Fox*, ODFW Marine Resources Assistant Program Manager, *Leesa Cobb*, POORT Executive Director, *Tom Calvanese*, OSU Marine Resource Management Program, *Steve Rumrill*, ODFW Shellfish Program, and *Melissa Murphy*, Regional Coordinator, Infrastructure Finance Authority, Business Oregon. The cover photo is credited to Surfrider Foundation, available at: http://oregon.surfrider.org/get-hooked-on-marine-reserve-science/.

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List of Acronyms and Abbreviations

CPUE	catch per unit effort
CRCP	Columbia River Creel Program
CROOS	Collaborative Research on Oregon Ocean Salmon
EBM	Ecosystem-Based Management
FEAM	Fishery Economic Assessment Model
IMPLAN®	IMpact Analysis for PLANning
mllw	mean lower low water
MSA	Magnuson-Stevens Act
MR	marine reserve sites
MRFSS	Marine Recreational Fisheries Statistics Survey
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCZMA	Oregon Coastal Zone Management Association
ODFW	Oregon Department of Fish and Wildlife
ORBS	Ocean Recreational Boat Survey
PacFIN	Pacific Coast Fisheries Information Network
PFMC	Pacific Fishery Management Council
POORT	Port Orford Ocean Resources Team
PSMFC	Pacific States Marine Fisheries Commission
RecFIN	Recreational Fisheries Information Network
REI	regional economic impact
RRCT	Redfish Rocks Community Team
RRMR	Redfish Rocks Marine Reserve
SEB	Shore and Estuary Boat survey
SSHSTRP	Salmon-Steelhead, Halibut, and Sturgeon Tag Return Program
TRG	The Research Group, LLC
TEV	total economic value
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

Executive Summary

The Redfish Rocks Marine Reserve (RRMR) was established in 2009 at Port Orford, Oregon by state statutory recognition. The Oregon Department of Fish and Wildlife (ODFW) is the lead state agency for developing the regulations for prohibiting extractive uses at the site and monitoring how the marine environment and human uses change because of the regulations. Restrictions on extractive uses at the site took effect at the marine reserve on January 1, 2012. The Port Orford Ocean Resources Team (POORT), a local non-governmental organization who advocated for the marine reserve site, and the Redfish Rocks Community Team requested the ODFW include an economic analysis of non-traditional ocean use activities (i.e. activities not related to commercial and recreational fishing or tourism) as part of the site's monitoring.

The ODFW ensued the analysis by developing a census of all ocean resource research, management, and planning activities that occurred at Port Orford over the years 2008 through 2012. A personal interview survey was completed for the list's 29 project contacts, which was a 100 percent response rate. The survey also solicited information about project purposes and any experienced hindrances that local agencies and organizations should address in order to encourage the expansion of similar project activities at Port Orford.

The survey results provided the data inputs for regional economic contribution modeling. Modeling results showed that the period's annual average local spending from the surveyed project types contributed $0.5 million in total personal income (includes the "multiplier effect") in the region, which has an equivalent job count of 15 using countywide average job earnings. The surveyed project's economic contributions are about 12 percent of the onshore landings commercial fishing industry annual average (over the same period) economic contributions. The commercial fishing industry economic contributions represent a large proportion of what all Port Orford City residents earn at 32 percent, based on 2010 decennial census data.

Ocean access in the area is somewhat restricted to using the Port of Port Orford's land and facilities. It was important to know if the access was inconvenient or there were other local circumstances that caused project operational difficulties. The survey results for asking about hindrances were diverse across a number of factors: 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 survey results for project purpose and needs will assist local agencies in determining what might be done for changing facility operations, providing facility improvements, and undertaking promotion programs.

The economic analysis results were useful for showing that the project type's economic contributions are not trivial, and results give suggestions to local leaders for what might be done to promote growth in the project type activities. The results also remind local leaders of the scale of the activities in relation to traditional ocean uses that are occurring at Port Orford. This reminder will be useful information if it is necessary to make tradeoff decisions for economic development investment choices.

The POORT is an advocate for community based fisheries management and other management systems that operate in a way that is consistent with the principles of Ecosystem-Based Management (EBM). An important facet of EBM is that it accounts for the cumulative impacts both between and within different stakeholder groups on the marine ecosystem's ability to provide services to humans. The social and economic impacts of marine reserves on these stakeholder groups need to be determined if tradeoffs are to be compared with other local stakeholder groups.

Marine reserves inspire research opportunities and therefore, scientists, researchers, community planners, and enforcement personnel become important new ocean resource stakeholder groups. These stakeholder groups help bring new money into the economy for carrying out projects. There can also be positive social effects through attraction of new residents with diverse backgrounds and interests into the community. There may be conflicts and compromises to work out with existing ocean users, and there might be investments required to accelerate growth in the new ocean resource use activities. The biological, ecological, and human dimension monitoring results from the newly established marine reserve site will produce information for local decision makers when determining ocean resource uses management and economic development support priorities.

I. Introduction

A. Background

The Port Orford Ocean Resource Team (POORT), a local non-governmental organization who advocated for the marine reserve site, and the Redfish Rocks Community Team (RRCT) requested the Oregon Department of Fish and Wildlife (ODFW) provide an economic analysis of activities related to ocean resource technical investigations, monitoring, and governing that is taking place at Port Orford. The POORT has worked closely with the ODFW in carrying out the responsibilities for designating and monitoring a nearby marine reserve site named the Redfish Rocks Marine Reserve (RRMR) (see Map I.1 for vicinity map).[1] The ODFW viewed the request as a logical extension of their responsibilities for the human dimension monitoring elements required for marine reserve implementation.[2] It was known that the Port Orford area economic analysis study would be covering projects probably not related to the nearby designated marine reserve, but the ODFW was interested in the economic analysis because it would sort out existing projects that did have connections to the RRMR. Knowledge about the economic contribution from either project categories would be important in characterizing the level and extent of the different activities.[3]

B. Approach

The economic analysis study first needed to sort out which type of projects were to be included in the analysis. An encompassing definition was adopted to include projects related to ocean research, resource management, and planning. This would exclude major ocean use categories, such as fishing and tourism. These industries at Port Orford are often studied and economic assessment information is available for them. But the other ocean-related activities, while regularly referenced in qualitative descriptions, do not receive much study. The POORT is interested in the economic analysis, because they would like to raise awareness that protected area economic benefits can come from studying recovery effects when extractive activities are prohibited, and possibly the increased ocean productivity that can come from having protected areas established. The POORT was interested not only in absolute economic contribution estimates, but also in seeing discussion about the potential for increasing non-fishing and non-tourism related ocean use activities at Port Orford.

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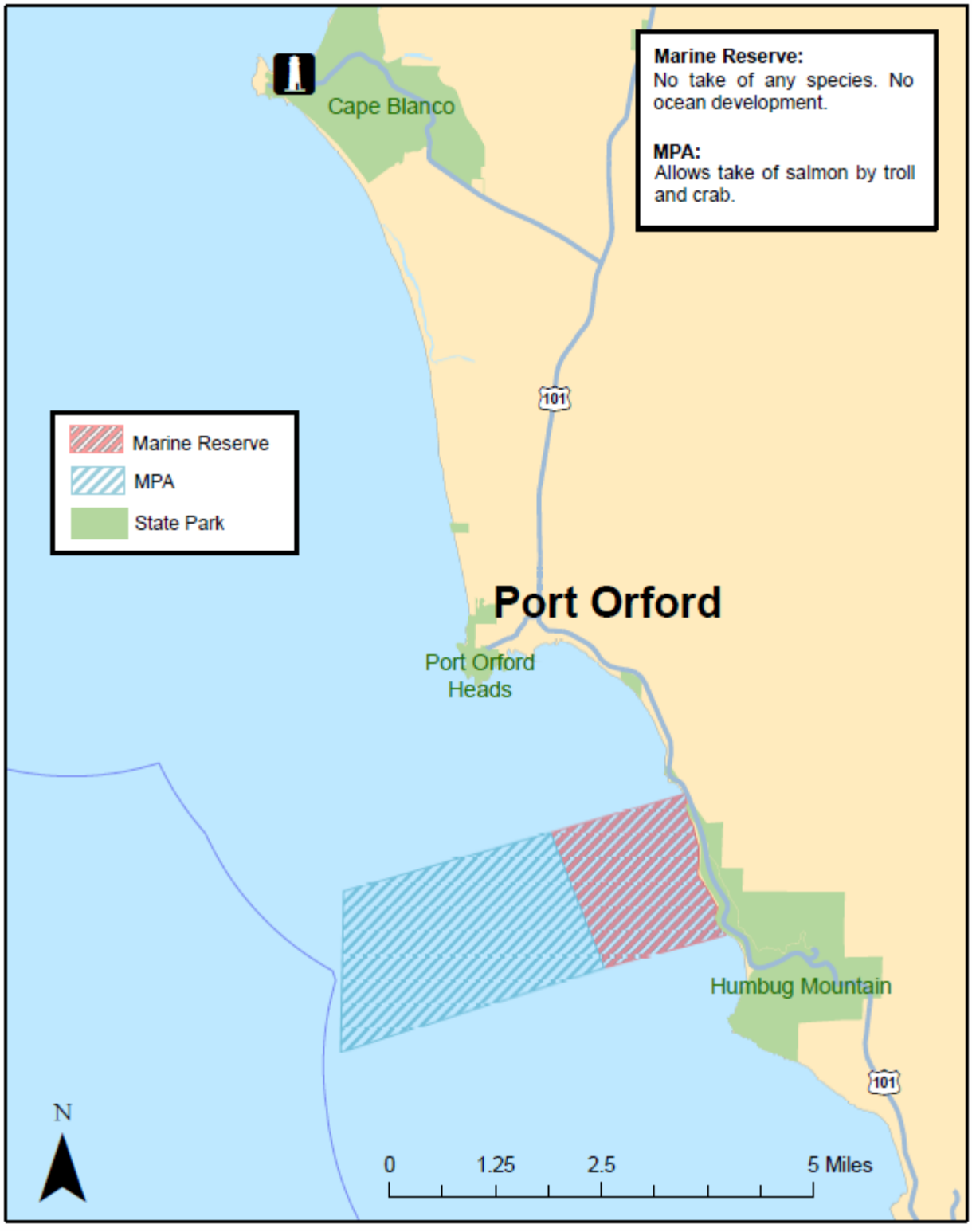
1. The RRMR was designated through passage of Oregon Legislature House Bill 3013 enacted in 2009. Baseline site monitoring began in 2010. Site management to restrict extractive uses began January 1, 2012.
2. The goal of Oregon's marine reserves is to "… provide a framework for scientific research and effectiveness monitoring; and avoid significant adverse social and economic impacts on ocean users and coastal communities" (OPAC 2008).
3. Ocean research, management, and planning activities are one of many ocean ecosystem services. Ecosystem services are "aspects of ecosystems utilized (actively or passively) to produce human well-being" (Fisher et al. 2009). Examples of services from marine ecosystems include environmental control of water quality, provision of fish for harvest, and the provision research opportunities. Quantifying the "value" of the ecosystem services is important, because the provision of these opportunities was a motivation behind marine reserves creation and will likely be one of the biggest types of benefits resulting from reserves in the future.

Map I.1
Port Orford and Redfish Rocks Marine Reserve Vicinity Map



Source: ODFW, personal communication, October 14, 2013.

The economic analysis is used to show measures of yearly economic effects on the regional economy from the project types included in the assessment. The economic effects come from spending at local businesses and agencies by project participants. A yearly average from what happened over a baseline period of years was chosen to represent what might be an estimate of current and near future annual spending. A period of five years starting in 2008 was chosen for the baseline period. It turns out that the project types during that period are diverse, as they have large and small total budgets, are continuous and sporadic, are locally based or centered elsewhere, and have various levels of local spending. There may be years during the chosen period that have had greater and lesser economic effects, so providing an average will represent typical economic effects and not be accurate for any one year. Statistics such as project local expenditure ranges are provided to assist in showing how skewed an average might be from a particular baseline year.

The economic effects measure calculated from the local spending is total personal income. This quantity includes the so-called "multiplier effects" whereby both the first and later accumulated spending is included in the measure's calculation. Personal income can be thought of as net earnings accruing to households in the region. The measure is translated to an equivalent job count using a Curry County average earnings level. Personal income is a comprehensible measure because everyone can identify with their own situation on earnings and the additional jobs necessary to generate the estimated earnings.

There are other economic valuation measures that can also be developed to describe the importance of ocean resources. Appendix F offers a discussion of a total economic value (TEV) and the rationale for the selection of the measure used in this study. While the chosen measure has to do with current ocean resource use for a narrow definition of activities, it is still an important calculation because it is a graspable description (as opposed to an abstract description like TEV). The measurement is also more readily available for other economic activities, which allows for comparisons by policy makers who sometimes must decide tradeoffs in which activities to receive economic development priorities.

In addition to economic effects measures, social effect measures can be calculated and qualitatively discussed. They pertain to how quality of life for local citizens might be enriched from the governance and investments in ocean resources. The study would have to use re-designed methods and be repeated if other social economic analysis measures were deemed necessary.

II. Assessment Workscope

The workscope tasks for completing an economic contribution assessment are:

A. Identify and qualify projects to be assessed,
B. Undertake data collection procedures,
C. Design an analytical framework, and
D. Apply empirical methods and explain results.

While the tasks are traditional in a study of this type, they are worthy of discussion because each contributed especially to this study's economic analysis focus. An appreciation of what the economic analysis results represent will come from understanding task application. The following sections provide a description of how each of the tasks was carried out.

A. Project Type Selection

The first work scope task was necessarily involved because the economic analysis purpose was to have wide-ranging project types to be included in the assessment, yet be qualified for being exclusive of fishing and tourism activities. This would preclude some projects such as those for safety and enforcement, facility operation and maintenance, and providing tourism amenities. Example projects not meeting qualifying criteria would be the U.S. Coast Guard and Oregon State Police intermittent presence at the Port of Port Orford for the purpose of promoting fishing fleet safety and to suppress violations of fisheries laws. Another example is the periodic mooring basin and navigation channel dredging sponsored by the U.S. Army Corps of Engineers and accomplished by private contractors. The maintenance dredging has to do with waterway improvement maintenance and is justified primarily for servicing the fishing industry. The breadth of project types that do satisfy the inclusion criteria is revealed in the compiled project survey list descriptions (see Appendix A).

The initial survey list was developed by communicating with representatives from the POORT, Port of Port Orford, ODFW Marine Resource Program, Oregon Sea Grant Extension, other academic and federal agencies located at the Hatfield Marine Science Center, and others. Representatives of these agencies were targeted for their presumed knowledge about project type activities that have occurred in the Port Orford vicinity in the last five years. Contact information for this initial list was obtained, and recruitment correspondence (via telephone call, email, and/or letter) was sent out to the potential interviewees. This initial list of people was asked in the recruitment correspondence to confirm that they had completed research, management, or planning activities in the Port Orford vicinity in the past five years, and/or if they could identify others who may have done so. Cross verification between identifiers was used as a means to confirm that the same project contact was being recommended multiple times. This procedure is sometimes referenced as "snowball sampling" technique (Goodman 1961). Snowballing is a common sociological survey method and is helpful in cases where the initial survey population is undetermined. (This study's methods differ somewhat from what Goodman (1961) describes in that this study's authors wanted the survey to be a census rather than a sample.)

The initial list plus additions from recruitment correspondence resulted in a final list of 40 participants and eight management personnel to be included in the survey. Applying project qualifying criteria and eliminating duplicate participants who represented the same agency or project group winnowed down the contacts who were selected to participate in the survey. Members of the POORT were asked to review and approve the final participant list.

Follow-up correspondence was sent to projects' contacts on the final participant list, asking them to confirm that they matched the interview criteria and would be willing to be interviewed.

Interviews were scheduled and conducted either by telephone calls or in-person for those projects headquartered in Corvallis, Oregon. The participant list was continually updated throughout the interview process, as participants often remembered other potential interviewees during their interviews.

B. Data Collection Procedures

Survey procedures were drawn from the well-known Dillman (2007) method. This involves making interviewees feel included as part of a group, administering the survey through an organization which the interviewees knew and trusted (i.e. the ODFW) and keeping the survey brief (around 10 minutes) in order to increase response rates. The questionnaire used for the telephone or in-person interviews is provided in Appendix B.

The final survey instrument had a total of 22 questions. Introductory questions about the research project, title, and project completion date were included to ensure that just one researcher from each research project was interviewed. A question about any Port Orford vicinity trip purpose was necessary in order to attribute spending to the specific business category needed for the economic modeling. The project spending questions were divided into two categories; one for participants based in Port Orford, and one for participants based outside of Port Orford.

Interviews occurred during the summer of 2013. First interviews found that most research-related activities were occurring by organizations that were headquartered away from Port Orford. Interviewing protocols were changed for the participants not located in Port Orford category to dramatize that survey results needed spending itemized for occurring within the Port Orford vicinity.

It was necessary to explain the definition of a "trip spending" during interviewing. Interviewees were most familiar with overall project spending. It was explained that trip spending occurred because it was supporting some level of project requirement. A trip started when a project participant left home and ended when they returned home, regardless of whether they were gone one day or more than one day. Trip spending could have occurred at home, en route, and at the destination. Interviewees were taxed with separating the spending location because the economic analysis would only apply to the destination spending. For the category of those projects based in Port Orford, the question was reworded to ask about annual operating expenditures, such as labor costs, rent, equipment and supplies.

All questions except two were multiple-choice, coded numerically, and entered in a database for statistical analysis. One of the open-ended questions was included to see if there was anything hindering research projects at Port Orford and answers to this question were categorized and subsequently coded for analysis. The final question asked for comments about survey protocols. These comments are paraphrased in Appendix C.

C. Analytical Framework

A wider scope for determining economic contribution from project types included in the assessment would include looking at project "outcomes."[1] This would include determining changes in economic efficiency for such items as industry productivity improvements, industry product market development and heightened market penetrations, natural resource science discoveries that result in long-range user benefits, workforce training resulting in job placements, etc. However, this assessment is instead limited to reviewing economic contributions to the regional economy for project "inputs." Project inputs would include spending for such items as operations (labor, equipment, fees, etc.), outreach and training, or capital investments.

The economic assessment limitation is an important consideration when results are used for policy-making purposes. An obvious example for showing this limitation is related to the purpose of establishing marine reserves. Total economic contributions from marine reserves include the benefits from increasing biodiversity and the possible spin-offs from that change for increasing marketable species productivity in surrounding ocean areas. Another example of study limitation is the inclusion of programs initiated and sometimes maintained by POORT. Only the operational spending by POORT is included in this assessment while individual programs will generate their own economic contributions. Unless the programs fall within this assessment's qualifying criteria, then the programs are extra to the offered economic analysis results. Including the total budget for POORT in the assessment is a somewhat liberal interpretation of economic effects since there may be POORT expenditures for missions that do not meet qualifying criteria.

There are no ongoing data collection programs that can be drawn upon to provide the data needed for the assessment. It was necessary to use a survey of qualifying projects over a baseline period that is representative of what might occur in the near future. The list of projects is small enough that a census rather than a sampling approach is used. Averaging methods had to include review of outlier spending in order to settle upon typical annual spending during the baseline period. This retrospective approach might leave out new projects in the future that are not reflective of what was occurring in past projects. In such a case, a prospective approach for assessing the new projects' economic effects would be used and results would become additive to the average annual economic effects determined by this assessment.

The economic contribution metric for the assessment is total personal income accruing to households from qualified projects' spending in the region. The economic effects from subsequent rounds of spending (indirect and induced effects) that occurs before money has leaked from the economy are included, thereby accounting for the so-called "multiplier effect." (See Appendix E for explanations about the derivation of multipliers used to calculate the economic contributions.) Such an analysis approach is a short-term perspective for how the spending impacts the local economy. There may very well be adjustments to the economy in the longer term that may cause increased economic contributions. For example, a business start-up

1. Literature suggests that regional economic contribution and regional economic impact are different concepts, but in this report the two terms are used interchangeably. A stricter use of the term "contribution" would be for an economic activity that exists, and use of the term "impact" when an economic activity is to be subtracted or added.

may occur to satisfy a goods and services demand from the projects so that operators would not have to make purchases outside of the regional economy.

An input-output model was used for acquiring the multiplier factors. The geographic resolution for the input-output model is at the Curry County level. This makes sense because businesses where local spending occurs may be anywhere in the vicinity of Port Orford and persons working at the business may commute from residences in other locations than Port Orford. The calculated personal income can be considered a portion of the net earnings component of all household income. A follow-on calculation is used to show how many county average earnings jobs it would take to produce these net earnings.

D. Method Application and Results

Calculations based on the analytical framework were completed and shown in tabular and graphic displays. Narrative explanations were offered. Some comparative statistics are referenced to put the calculated personal income estimates into perspective. For example, the assessed projects annual economic contributions are compared to the fishing industry annual economic contributions. The assessment results were disseminated through presentations and in a written report.

III. Survey Results

A total of n=29 interviews were conducted from April to July 2013. Some of the potential contacts (eight out of 40 or 20 percent) were removed from the list, because during the survey process it was discovered that they had not actually undertaken ocean research, management, or planning activities in the Port Orford vicinity, or their activity had been completed before 2008. In addition, three out of 40 (or eight percent) participants were eliminated from the contact list because it was discovered that information on their project had already been gathered in a previous survey. Often participants from the same project group were interviewed if they had made trips or spent money separately. Participants represented 21 different project groups (see Appendix A).

About half of the participants responded to an email asking them to schedule a survey time, and those who didn't respond received follow-up phone calls. This mixed-mode of survey initiation was very effective, as no contacts were unwilling to take the survey and only one contact proved unreachable, yielding a 100 percent response rate using Dillman 1978 response accounting methods.

A question to decipher which projects were related to research supporting the implementation and monitoring of RRMR was not originally included in the survey. After the survey was complete, it was decided that this information would give a beneficial background context. Project descriptions were further reviewed to determine whether or not activities were used for RRMR research, management, or planning (Appendix A). This did not mean that the main purpose of the project had to be for these activities, just that ODFW, POORT, or the RRCT

would use the data to carry out marine reserve system implementation responsibilities. Management personnel from the ODFW Marine Reserves Program were consulted for projects that were difficult to classify from the project description. A vast majority (80 percent) of project groups did some sort of project activity related specifically to RRMR in the last five years. However, since this classification was a post-survey judgment call, it has limited usefulness without further review and project sponsor questioning as to the purpose, availability, and utility of the information being gathered.

The average duration of the interviews was 12 and a half minutes, the median duration was 12 minutes, the shortest interview lasted five minutes and the longest interview lasted 26 minutes. The surveys were delivered in a variety of modes; three interviews were completed in-person, 25 interviews were completed over the phone, and one interview was completed on behalf of a co-worker by another interviewee.

Responses to survey questions (see survey instrument in Appendix A) follow. The responses are organized in sections that pertain to survey question groupings. The sections and groupings are:

Section Title	Survey Questions
A. Background Information on Project Activities	3 and 5
B - E. Project Spending in Port Orford Vicinity	9-18
F. Attitudes and Opinions About Research Possibilities in Port Orford	19 and 21

A. Background Information on Project Activities

- This survey aimed to sample people that represented every organization and divisions within organizations that are actively doing ocean research, management, or planning activities in Port Orford or have participated in these activities in the past five years. These participants represented organizations such as non-profits (38 percent), academic institutions (31 percent), state or federal agencies (21 percent), private for profit businesses (seven percent), and tribal groups (four percent) (See Figure III.1). Participants represented 16 different research organizations and 21 different departments or groups within these organizations. A list of research organizations and project titles is located in Appendix A.

- Most project groups listed multiple purposes for their work in Port Orford. Participants described the primary purpose of their research as terrestrial, marine, or social science for professional or personal interest (83 percent), natural resource plan development (52 percent), market/business/investment projects (17 percent), public health (seven percent), enforcement (four percent), and other (14 percent) (see Figure III.2).

- A large majority of participants (90 percent) said they expected to use the results of their work at Port Orford for resource management purposes, 73 percent expected to report

their research to a government entity, 65 percent planned to use their work for monitoring purposes, and 55 percent planned to use their work to further their academic area of research. Additional expected uses were cited as risk management (35 percent), creating business opportunities (10 percent) and other (10 percent) (see Figure III.3).

- Two-thirds of the participants' projects were ongoing at the time of the interview and one-third of the participants' projects were completed. All participants who had completed their project at the time of the survey had made trips to Port Orford in the past five years.

B. Project Trip Spending in Port Orford Vicinity

There were a total of 19 project groups who were not home-based in Port Orford in the years 2008-2013. Some participants from the same project group took trips separately to Port Orford, and in these cases these participants from the same project group were interviewed separately. A total of 23 participants from these 19 project groups were interviewed. (Year 2012 was when extractive use activity was restricted at the RRMR.) (See Tables III.1 to III.3 for trip spending information.)

- In the year 2013: 14 participants took a total of 125 trips to Port Orford, with an average of nine trips per project group, a median of five, a maximum of 60, a minimum of zero, and a standard deviation of 15.

- In the year 2012: 18 participants took a total of 356 trips to Port Orford, with an average of 20 trips per project group, a median of eight, maximum of 156, a minimum of zero, and a standard deviation of 36.

- In the years 2008-2012: 23 participants took a total of 1,481 trips to Port Orford, with an average of 74 trips per project group, a median of 30, a maximum of 468, a minimum of 1, and a standard deviation of 104.

- A total of nine different project groups utilized the Port Orford hoist to launch a vessel from 2008-2013. Not all of these groups were required to pay the research hoist fees; these fees were accounted for in charter contracts and therefore are not included in this section. The fee to launch a vessel was changed from a flat rate of $25 for all users to a split rate of $85 for tenants and $125 for non-tenants on January 1, 2011. Survey participants paid for 22 research launches before this date and 22 research launches after this date. This resulted in a total of $3,525 in lift fees charged during this time and an average of $641 per year in lift fees.

- Participants who were not home-based in Port Orford traveled an average distance of 148.1 miles (one-way) and a median distance of 149 miles to get to Port Orford on a typical trip. The maximum trip distance being 277 miles, the minimum trip distance being 28.2 miles, and the standard deviation being 79.

- The average size of the project group traveling to Port Orford varied from trip to trip for many participants, so this number is reported as a range. Group sizes ranged from one to 10 people and the average group size was 1.6 to 2.14 participants. Each researcher surveyed considered all people traveling with them to Port Orford to be part of their research team.

- Of those participants not home-based in Port Orford, 74 percent (17/23) spent at least one night away from home on their typical trip. The number of nights spent away from home varied per trip for many participants, so this number is reported as a range. The average number of nights spent away from home per trip was 1.7 to 2.7, with a minimum of zero nights and a maximum of 14 nights. The average number of nights spent in Port Orford per trip was 1.5 to 2.5, with the same minimum and maximum. Participants spending the night away from home primarily stayed at a motel (71 percent), others stayed at a rental house (18 percent), or with friends or family (12 percent).

C. Project Spending for Local Contractors

Project participants paid for a total of 21 contracts for services based in Port Orford from 2008 to June 2013. The majority (17) of these contracts were for vessel charter. The other four contracts were for community-based organizing and outreach. The average annual amount paid by all project groups for contracts during this time was $30,000 (see Table III.4).

D. Local Agency Spending

In a few cases, organizations were located at Port Orford and/or project groups had members temporarily living and spending money in the vicinity in a manner not connected to trips. Interviewees identified 11 different participants and one organization that were located in Port Orford for more than six months for the purpose of conducting ocean research, management, or planning activities. These participants and organization were asked a different set of questions about the annual spending that occurred for personnel that were living in the vicinity and expenditures being made for materials, supplies, boat launches, etc. Annual expenditures for participants based in Port Orford were $82,000 annually (see Table III.4) and annual expenditures for organizations based in Port Orford were $529,000 (see Table III.4).

E. Project Spending for Contractors Based Outside of Port Orford

1. Qualified Project Contractors

Four project contractors based outside of Port Orford did work in Port Orford from 2008-2013.[1] These contracts included research fishing and dive boat charters. There were 10 contracts for local and outside fishing and dive boat charters being used for research purposes during this

1. Many of these contracts were multi-year and could have spanned before 2008 and all of 2013. To account for this previous and prior spending, five years was chosen as the divisor for the averaging.

time. The total sum of contract amounts for boat charter from 2008-2013 was $159,000, with an average of $30,000 per year.

2. Dredging Contractors

Mooring basin and navigational channel dredging is an activity that has significant local spending and is performed by contractors located outside of Port Orford. There is a history of shoaling around the port dock, which necessitates regular dredging activity in order to maintain a navigable waterway at all tide levels. (See Appendix D for a more detailed explanation of this issue.) Even though this project type was judged to be outside of project qualifying criteria, the Corps (federal agency responsible for the dredging) and one dredging contractor were interviewed. In the years 2008-2012, there were three private dredging contracts and Corps contract administration fees totaling $1.8 million. Expanding on information from the one contractor interview, an estimated $328,000 of one dredging event's contract money will be spent in the Port Orford vicinity (Table III.5). An estimated $108,000 will be spent on living expenses (food and groceries) for employees and $220,000 will be spent on fuel, supplies, and maintenance for the dredge. This is an import of federal money into the economy, which in itself has large economic contributions, besides the economic contributions that it allows for fishing, tourism, and other vessel travel dependent activities.

F. Attitudes and Opinions About Project Hindrances

When asked if there was anything that has or is hindering their project at Port Orford, 14 respondents stated that nothing was hindering their project in the area and several participants stated that they enjoyed working in Port Orford. Fifty-five percent of respondents felt their research was being hindered in some way. Respondents listed 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) as the major factors limiting their research. Participants were especially vocal about the high lift fees for research vessels, stating that they would like to do more research on boats and contract with local fishermen at the port, but the high lift fees and sand inundation prevent them from doing so. Refer to Appendix C for paraphrased participant comments and opinions.

IV. Economic Assessment Results

A. Economic Contribution Calculations

The analytical framework described in Section III.C explains the metrics to be used to show the qualified project type activities' economic contributions. Sometimes a suite of metrics is used for the economic measurements, such as business output (analogous to business sales), tax generation, and product added value that are in addition to this assessment's chosen units for personal income and job count representation. The suite of metrics offer a description of the

same economic effects, but in different dimensions. The choice of one metric or another is related to a person's familiarity with a particular measure, and how the measure will be used in providing information for possible tradeoff decisions. The chosen metric has qualities for being understandable and comparable. All too often a metric is chosen simply because it is larger (such as business output) than another (such as personal income) in order to impress and justify issue positions. The meaning and usefulness of economic measurements can be lost in this choice.

The economic modeling used to calculate economic contributions is involved because different types of spending have quite different effects on an economy. For example, spending on fuel in a local economy has very little effect as upwards of 90 percent immediately leaks to the external economy. On the other hand, spending at a business establishment with high labor requirements or spending directly for labor by local agencies participating in resource use have greater economic effects. The multipliers developed for the different project types and local agencies are unique to their spending patterns (see Figures E.1 and E.2).

The annual economic contribution of ocean research, management, and planning to the Port Orford regional economy comes from economic effects for the sum of annual trip expenditures, annual expenditures from agencies located in the Port Orford area, and annual project contract fees spent in the Port Orford area. Table IV.2 shows the local spending for the qualifying project types is $507 thousand which translates to $479 thousand in economic contributions using a total personal income measurement. Using a countywide average earnings level, the economic contributions represents 15 jobs.

B. Economic Analysis Results Perspective

The POORT is an advocate for community based fisheries management and other management systems that operate in a way that is consistent with the principles of Ecosystem-Based Management (EBM) (POORT 2013). (See Appendix H for an explanation of EBM.) An important facet of EBM is that it accounts for the cumulative impacts both between and within different stakeholder groups on the marine ecosystem's ability to provide services to humans (Mcleod 2009). It is helpful to distinguish and know the scale of stakeholder groups' involvement in the ecosystem. The scale should be shown using a variety of across-science indicators that have qualities for validity, consistency, and relevancy. The economic assessment completed for this study provides one indicator measure for the stakeholders involved in the qualified project type activities and the same measure can be borrowed from another study for the commercial fishing stakeholder group.

The economic contributions for the commercial fishing industry come from economic effects for annual operating expenditures and net proprietorship income allowed by revenue generated from onshore landings and primary processing activities. The Research Group, LLC (2013) provides economic contributions at the port group level for which the Port Orford area's economic contributions are included in the Brookings Port Group.[1] A proxy variable using landed harvest

1. The cited report contains a definition for the commercial fishing industry that includes economic effects from distant water fisheries. Example distant water fisheries are the West Coast offshore whiting fishery and all of

value (sometimes called ex-vessel value) proportion can be used to approximate the scaled down amount of the port group total that would represent the economic contributions generated by the Port Orford commercial fishing industry.[1] Using the proxy variable approach, the estimated economic contribution annual average from onshore commercial fish landings to the Port Orford vicinity is $4.1 million total personal income for 2008-2012 (Table IV.1). Using a countywide average earnings level, the economic contributions would be equivalent to 130 full-time jobs. Therefore the estimated economic contribution from project types included in the assessment is about 12 percent of onshore landings commercial fishing industry economic contributions.

The Research Group, LLC utilized habitat and species biological and catch data to estimate the economic impacts associated with the displacement of fishing effort at RRMR, which can also provide a relevancy comparison for this study's estimated annual project type activities (Appendix G). These impacts were calculated using year 2009 catch and economic conditions. The estimate for total annual personal income from the displaced potential commercial catch is $42 thousand and displaced potential recreational catch is $25 thousand. Most likely, the actual economic impact would be lower than the offered estimate as some displaced commercial fishermen would chose to fish in other areas along the coast, rather than completely stop fishing.

Both of the described stakeholder groups' economic contributions occur in diverse economy that has many sources of personal income. The analytical framework being used to calculate the economic effects assumes the economic contributions can occur anywhere in Curry County. However, the inconvenience of commuting and the presence of businesses selling goods and services for the types of purchasing from the qualified project type spending would mean the economic effects would be concentrated in the Port Orford vicinity. The 2010 decennial census provides an estimated City residents' labor force at 420. If the City's labor force has an earnings profile consistent with the County level, then total earnings for City residents is $12.9 million. Therefore, the onshore landings commercial fishing industry economic contributions represent 32 percent of City resident earnings. A caution for this indicator's reliance is that participants in the commercial fishery have residency other than within City Limits.

Alaska based fisheries. The cited report does contain modeling results for distant water fisheries economic contributions at the port group level. However, there is not much cross over between the participants that typically deliver to Port Orford and the distant water fisheries. This contrasts with Oregon's regional commercial fisheries centers like Coos Bay where vessels commute, crews work both fisheries types, and businesses sell provisions to participants in both fisheries. Therefore, the distant water fishery economic contribution component was judged not relevant to be included in the comparison statistic.

1. A consideration for this approach is that the processor sector inclusion could invalidate the ratio if large plants with high employment were concentrated in one community in the port group. In the case of the Brookings Port Group, there are no general seafood processing plants. The processing sector consists of buying stations with little local handling wherever harvest deliveries occur in the port group.

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Table III.1
Total and Average Expenditures for Project Trips in 2012

	Spending Location								2012	
	Home	En Route	Port Orford	Category Total	Max	Min	Avg. per Spender	Var. (sd)	Avg. per Person	Trip Avg.
Restaurant/Café	$0	$1,000	$6,000	$7,000	$1,800	$0	$504	625	$368	$20
Grocery/Market	$0	$1,000	$3,000	$4,000	$900	$0	$337	504	$211	$11
Lodging	$0	$1,000	$18,000	$19,000	$9,000	$0	$1925	2818	$1,000	$53
Fuel(vessel or auto)	$4,000	$4,000	$5,000	$12,000	$2,700	$0	$806.7	1442	$632	$34
Equipment/Supplies	$2,000	$4,000	$3,000	$10,000	$4,200	$0	$1438	1584	$526	$28
Transportation	$2,000	$0	$0	$2,000	$1,600	$0	$1600	N/A	$105	$6
Permits	$0	$0	$0	$0	$0	$0	$0	0	$0	$0
Other	$0	$0	$0	$0	$0	$0	$0	0	$0	$0
Category Total	$8,000	$11,000	$35,000	$54,000						
2012 Avg. per person	$421	$579	$316							
Trip Average	$22	$31	$98							

Notes:
1. Expenditures were calculated using estimates of typical trips, multiplied by the number of trips taken per time period. Spending on specific individual trips may have been higher or lower than what is estimated here.
2. Equipment and supplies were often one-time or annual fees and expenditures were adjusted accordingly to reflect the correct time period.
3. Average per actual spender means the average per the total number of people who actually spent money in that category, the total number of people spending money may vary for each category. The standard deviation measures the variance for the average per actual spender.
4. Year 2012 was the first year that restrictions on extractive uses took effect at Port Orford.

Table III.2
Total and Average Expenditures for Project Trips in 2008-2012

	Spending Location								2008-2012	
	Home	En Route	Port Orford	Category Total	Min	Max	Avg. per Spender	Var. (sd)	Avg. per Person	Trip Avg.
Restaurant/Café	$0	$7,000	$39,000	$46,000	$0	$9,000	$2,293	2,946	$2,000	$31
Grocery/Market	$0	$6,000	$23,000	$30,000	$0	$7,500	$1,975	2,834	$1,304	$20
Lodging	$0	$18,000	$139,000	$157,000	$0	$52,500	$11,209	17,598	$6,826	$106
Fuel (vessel or auto)	$20,000	$34,000	$23,000	$77,000	$0	$16,620	$3,652	6,569	$3,348	$52
Equipment/Supplies	$9,000	$1,000	$15,000	$25,000	$0	$10,000	$3,259	3,196	$1,087	$17
Transportation	$3,000	$0	$0	$2,000	$0	$3200	$3,200	N/A	$87	$1
Permits	$0	$0	$0	$0	$0	$0	$0	0	$0	$0
Other	$0	$0	$2,000	$2,000	$0	$1400	$1,840	N/A	$87	$1
Category Total	$32,000	$66,000	$241,000	$339,000						
2008-2012 Avg. per person	$1,391	$2,870	$2,053							
Trip Average	$22	$45	$163							

Notes:
1. Expenditures were calculated using estimates of typical trips, multiplied by the number of trips taken per time period. Spending on specific individual trips may have been higher or lower than what is estimated here.
2. Equipment and supplies were often one-time or annual fees and expenditures were adjusted accordingly to reflect the correct time period.
3. Average per actual spender means the average per the total number of people who actually spent money in that category, the total number of people spending money may vary for each category. The standard deviation measures the variance for the average per actual spender.

Table III.3
Contract Amounts for Contractors Based in Port Orford in 2008-2013

Type of Service	Number of Contracts	Sum of Contract Amounts	Average Contract Amount per Year
Fishing/Dive Boat Charter	17	$124,000	$25,000
Community-Based Organizing and Research	4	$23,000	$5,000
Total	21	$147,000	$30,000

Notes: 1. Average contract amount per year was calculated by dividing the sum by 5.
2. Some contracting is for multiple years and the total contract amount was tabulated for being in the beginning contract year.

Table III.4
Annual Expenditures for Organizations Based in Port Orford in 2008-2012

Spending Category	Annual Expenditures for Organizations	Annual Expenditures for Participants	Total
Labor and manager payments based in Port Orford	$283,000	$41,000	$324,000
Expenditures for utilities and supplies	$6,000	$1,000	$7,000
Expenditures for professional services (accounting and legal)	$5,000	-	$5,000
Local expenditures for construction of new facilities	$183,000	-	$183,000
Maintenance	-	$3,000	$3,000
Equipment and capital items	-	$1,000	$1,000
Fees and dues	-	$1,000	$1,000
Rent and living expenses	-	$13,000	$13,000
All other research expenditures (travel, outreach. etc.)	$52,000	$22,000	$74,000
Total	$529,000	$82,000	$611,000

Notes: 1. Construction of new facilities is not included in the economic analysis because it is a one-time expenditure.

Table III.5
Average Spending by Dredging Contractors Within Port Orford Area in 2008-2012

Spending in Port Orford for per diem type spending	$108,000
Spending in Port Orford for other goods and services	$220,000
Total	$328,000

Notes: 1. The Corps sponsored three dredging contracts during the five year baseline period. The shown average spending in Port Orford is based on the contract number and not the years in the period.

Table IV.1
Economic Contribution of Commercial Fishing for Brookings Port Group in 2008-2012

	2008		2009		2010		2011		2012	
Area	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Brookings Area										
All income sources	764.3	1.2%	716.1	2.0%	710.9	1.5%	728.3	1.9%	743.8	2.2%
Earned income	305.3	3.1%	281.0	5.0%	278.6	3.8%	288.6	4.9%	294.8	5.6%
Fishing income	9.5	100.0%	14.2	100.0%	10.5	100.0%	14.1	100.0%	16.6	100.0%
Onshore	7.5		12.6		9.1		12.2		14.9	
Distant water	2.0		1.5		1.4		1.9		1.7	
Equivalent jobs	303		448		328		438		524	

Notes:
1. Economic contributions are measured as total personal income in millions of 2012 dollars.
2. Economic contributions are calculated with the Fisheries Economic Assessment Model (FEAM) originally developed by Hans Radtke and William Jensen for the West Coast Fisheries Development Foundation in 1988. The estimates include direct, indirect, and induced impacts; therefore include "multiplier effects."
3. Earned income is the sum of wages and salaries, proprietors' income. All income sources include transfer payments, or dividends, interest, and rent.
4. 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.
5. 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.
6. The Brookings port group includes all harbors in Curry County where commercial fishing harvests are delivered. The harbors, harvest value in 2012, and share of County total harvest value in 2012 are Port Orford ($3,253,285, 21%), Gold Beach ($314,251, 2%), and Brookings ($11,812,153, 77%).

Source: TRG (September 2013).

Table IV.2
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	$19
Construction	$183	
Projects not based in Port Orford		
Trip related expenses	$49	$19
Vessel charters and other contracts	$30	$8
Other project expenditures outside of Port Orford	$21	
Spending for contracts based outside of Port Orford	$32	
Total spending in Port Orford	$507	$479
Total spending away from Port Orford	$53	
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.

Figure III.1
Participating Project Organizations by Type

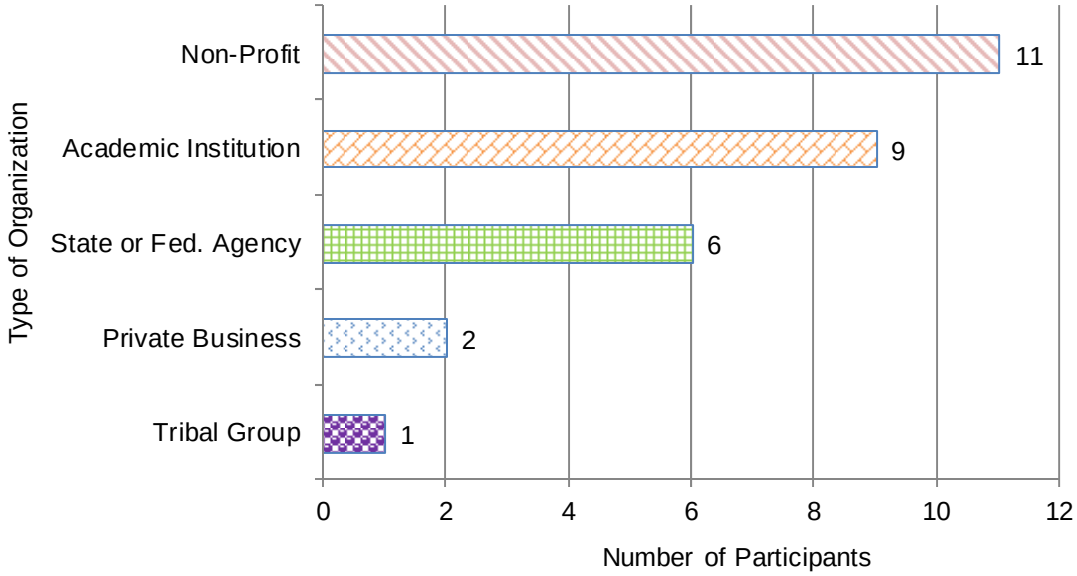
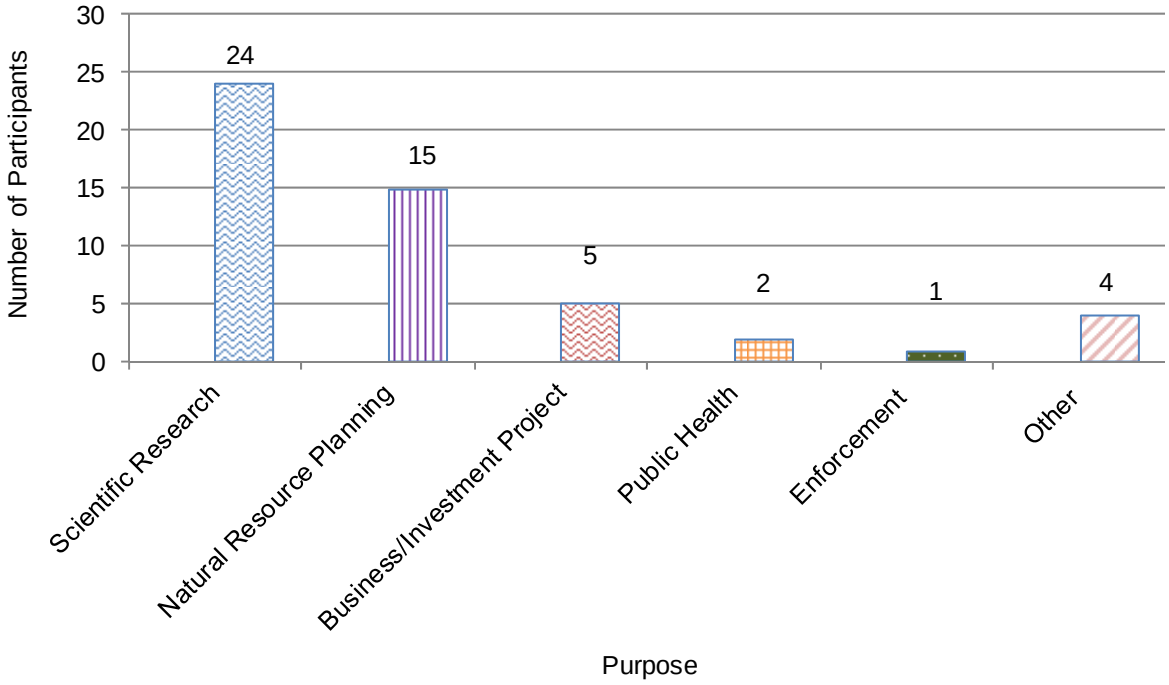
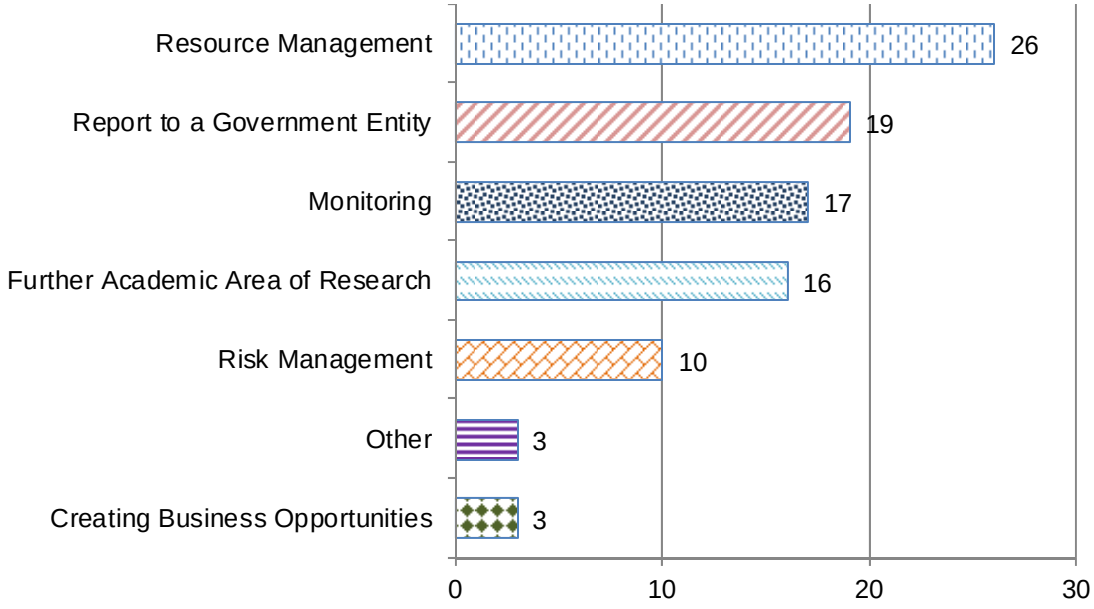


Figure III.2
Purpose of Research, Planning, or Enforcement Activities in Port Orford



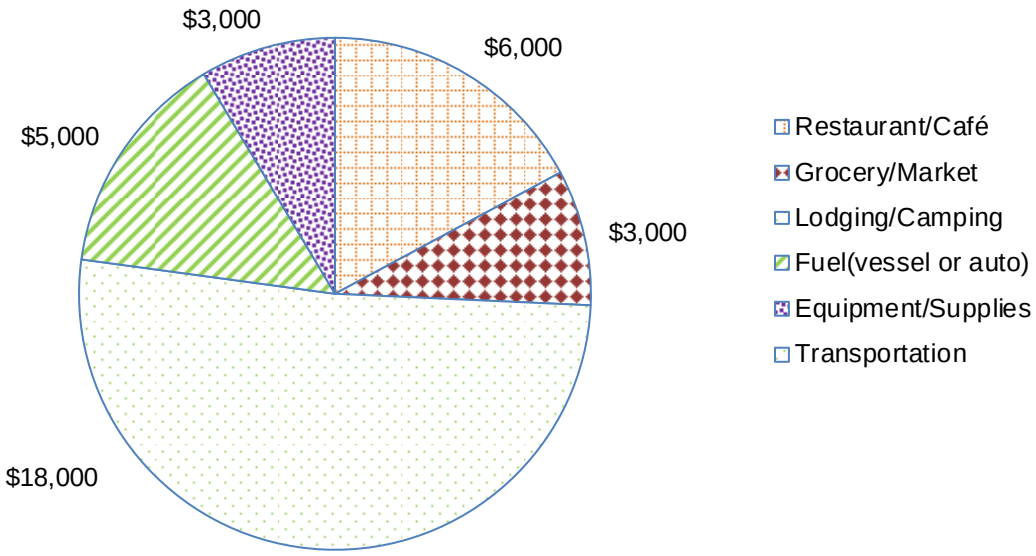
Notes: 1. Results show number of participants that listed each category as the purpose for their research; participants could choose more than one purpose.

Figure III.3
Expected Use of Results of Port Orford Projects



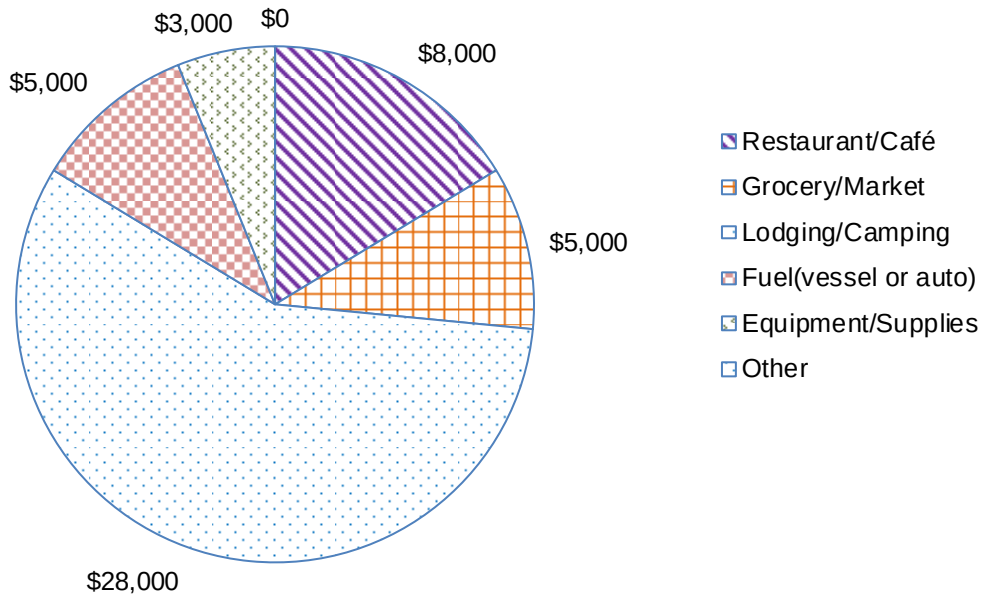
Notes: 1. Results show number of participants that listed each category as the expected use for the results of their research; participants could choose more than one expected use.

Figure III.4
Project Expenditures by Category in 2012



Total Average Annual Spending in PO (2012): $35,000

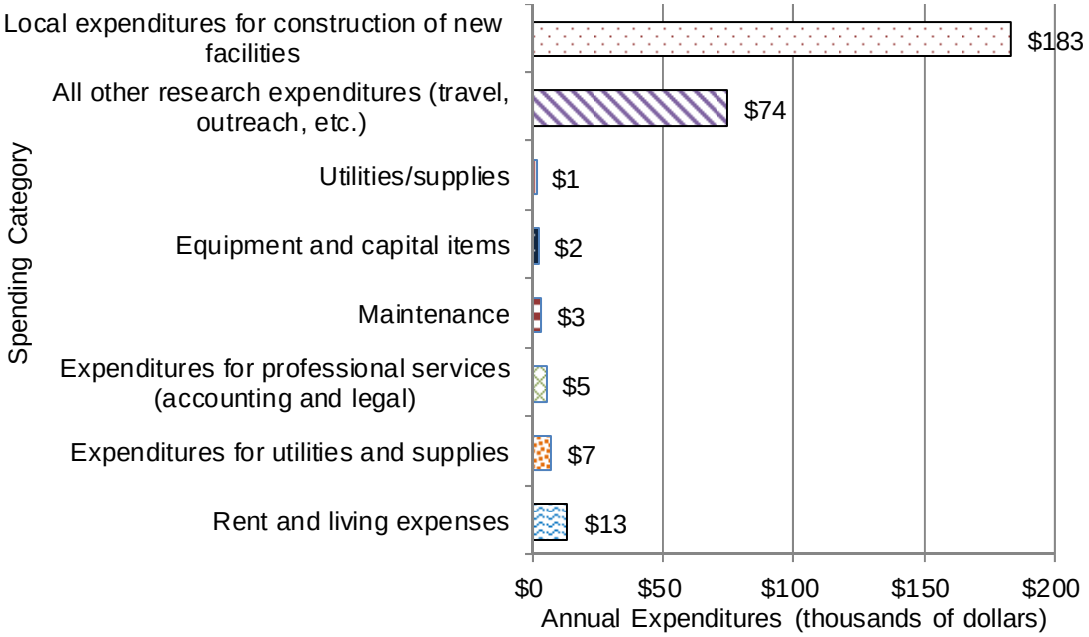
Figure III.5
Average Annual Trip Spending in the Port Orford Area for Projects Not Based in Port Orford 2008-2012



Total average annual spending in PO: $49,000

Notes: 1. Average annual spending was calculated by dividing total spending from 2008-2012 by five years.

Figure III.6
Annual Non-Labor Spending for Projects Based in Port Orford



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Appendix A: List of Projects and Organizations Included in the Study

Organization	Research Title/Description	Project Completion Date	Is research to be used for Marine Reserve monitoring and planning?
Coastal Oregon Marine Experiment Station (COMES)	Strategic Advising for the Port Orford Ocean Resources Team	Ongoing	Yes
Coquille Indian Tribe	Pseriduan State Park Cultural Monitoring	Ongoing	No
EcoTrust	Oregon Territorial Sea Planning, Mapping Uses, Socioeconomic Profile, POORT establishment, Shoreside Economic Study	2010-2012	Yes
Golden Marine Consulting	Marine Consulting Services for POORT and Redfish Rocks Community Team (ODFW)	Ongoing	Yes
ODFW Habitat Program	Habitat Assessment Program	2010	Yes
ODFW Marine Reserves Program	ODFW Marine Reserves Human Dimensions and Ecological Monitoring	Ongoing	Yes
ODFW Ocean Fisheries Program	Oregon Recreational Boater's Survey, Commercial Troll Sampling Project	Ongoing	Yes
ODFW Shellfish Program	Stock Assessments for Fisheries Management (Sea Urchins and Abalone)	Ongoing	Yes
Oregon Institute of Marine Biology	Range Limits of Limpets	Ongoing	No
OSU Fisheries and Wildlife	Collaborative Research in the Port Orford Live Fish Fishery	2010	Yes
OSU Marine Resource Management	Identifying and Understanding Space Use Conflicts on the Outer Continental Shelf	2011	Yes
OSU Marine Resource Management	Long-form Fishing Community Profile	2008	Yes
OSU Marine Resource Management	Rockfish Movement and Distribution at Redfish Rocks	Ongoing	Yes
PISCO	Coastal Biodiversity Survey (Rocky Shore)	Ongoing	Yes
Port Orford Ocean Resources Team (POORT)	Developing a Collaborative Research Center	Ongoing	Yes
Redfish Rocks Community Team	Redfish Rocks Community Team Marker Buoys, Facilitating Communication between fishermen, scientists, and the local community	Ongoing	Yes
SHN Consulting	Garrison Lake Outlet and Dam	2011	No
South Coast Watershed Council	South Coast Watershed Council Restoration Work	Ongoing	No
Surfrider	Blue Water Task Force, NOAA Marine Debris Monitoring, Outreach and Education with POORT, Support for Redfish Rocks Community Team	Ongoing	Yes
The Nature Conservancy	Looking at Diversity within Algal Communities and Consulting with R.R. rocks community team group	Ongoing	Yes
U.S. Army Corps of Engineers	Bathymetric Surveys	Ongoing	Yes

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Appendix B: Survey Instrument

Economic Impact of Research, Planning, and Enforcement Activities at Port Orford, Oregon

Personal Interview Questionnaire

Interviewer: _____ **Unique ID.** PORS_____

Interviewee

Name: _____ Organization: _____

Telephone number: __

Telephone interview event

Codes:

C: Complete or partial	F: Fax machine	L: Spoke to contact person and agreed to interview later
G: Give-up after 6 rings.	R: Refused immediately	S: Spoke and competed interview
B: Business number	D: Disconnected or bad number	O: Other_____
N: No English spoken	A: Answer machine	

First try date: _____ code: __, Second try date: _____ code: __,

Third try date: _____ code: __, More tries: _____

Interview results: Complete ___, Partially Complete ___, Incomplete ___, Refusal ___

Completed interview duration (minutes): _____

Introduction

Hello my name is _____. I am employed by the Marine Reserves Program (Program) in the Oregon Department of Fish and Wildlife (ODFW). The Program has been asked to help assess the economic impact of research, planning, and enforcement activities that occur at or near Port Orford. Port Orford is the community most near the Redfish Rocks marine reserve where ODFW is currently conducting scientific monitoring. You have been identified as an individual who may have conducted or is responsible for these types of activities. The survey will only take about 10 minutes to complete and you can refuse to answer any question or stop at anytime.

1. First, do you represent an organization that has or is undertaking any of these types of activities at or near Port Orford, and if yes is now a good time to talk?

1 Incorrect organization [THANKS, END, RECORD IN LOG]
2 Correct organization and yes can talk now. [CONTINUE WITH Q2]
3 Correct organization, but prefer to talk later or prefer you talk to someone else. [RECORD WHEN AND TELEPHONE NUMBER TO CALL-BACK IN LOG]
8 Don't know [PROBE FOR FUTURE CALLING POSSIBILITIES, BUT END INTERVIEW]
9 Refused [IF THEY REFUSE, PROBABLY HOPELESS SO THANK AND END]

2. Great, thank you. We already are assessing general tourism and fishing related economic activity at Port Orford. Now we want find out about other types of activities that are occurring at or near Port Orford. I will be asking questions about trips. When I say "trips," I mean an event that has occurred or is continuing to occur in the vicinity of Port Orford. And "vicinity" is arbitrarily defined because we want to know if your organization is spending money in the community. For example, you might have a destination to a beach 10 miles distant of Port Orford city limits, but occasionally make purchases at businesses located nearby Port Orford.

Our preliminary investigations have found that most of the non-tourism and non-fishing related activities are occurring by organizations that are headquartered away from Port Orford. In these cases, we want to know about trip spending in the vicinity of Port Orford. In a few other cases, the organization is located at Port Orford and workers/contractors are living and spending money in the vicinity in a manner not connected to trips. This survey is to find out about both cases, so you need to give me some guidance for which case best applies to your organization. Would you say your organization funding and conducting the research, managing, or enforcement activities is based in Port Orford or based outside of Port Orford?

1 The organization is home-based at Port Orford
2 The organization is not home-based in Port Orford
8 Don't know
9 Refused

3. Please describe your organization's purpose. Can I quickly read you some type and purpose categories to help in formulating a description? [READ IF THEY EXPRESS AN INTEREST]

_____

_____

_____

_____

Purpose
1 Science related for professional or personal research
  Terrestrial/Wildlife/Riverine/Riparian
  Marine/Fisheries/Estuary
  Social/Cultural/Economic/Anthropologic
2 Market/business/investment related
3 Natural resource plan development
4 Public health
5 Enforcement
6 Other

Affiliation
1 Government agency
2 University
3 Non-government
4 Community group
5 Private business

Organization Type
1 Private for profit
2 Non-profit
3 Academic
4 State or federal agency

Expected Use of Results
1 Report to government entity
2 Further academic area of research
3 Business opportunity
4 Resource management
5 Risk management
6 Monitoring
7 Other

4. To avoid duplication in who we interview, please tell me the project title and some individuals that participated in the activities that occurred in Port Orford vicinity.

1 Title _____
2 Team members:

_____

_____

5. Are the activities at Port Orford ongoing or finished?

1 Finished [CONTINUE WITH Q6]
2 Ongoing [SKIP TO Q7]
8 Don't know
9 Refused

6. Given that your project is finished, have one or more trips occurred to the Port Orford area in the last five years?

1 Yes - Year of most recent trip(s) _____ [CONTINUE WITH Q7)
2 No [THANK AND END]
8 Don't know
9 Refused

7. Did any member of your organization's team live more than six months in the Port Orford vicinity to carry out project activities?

1 Yes (IF YES, FIND OUT THE NAME AND ENTER INTO LOG FOR INTERVIEWING)
Name of individual:_____
2 No
8 Don't know
9 Refused

8. [ONLY READ IF ORGANIZATION IS BASED IN PORT ORFORD, I.E. THE ANSWER TO Q2 IS 1]. Given your organization is or was based in Port Orford, the information we need is about the annual spending that occurred for personnel that were living in the vicinity and expenditures being made for materials, supplies, boat launches, etc. If the project is finished, think about a typical year when expenditures were being made. If the project is ongoing, use the most recent complete year for expenditures.

1 Labor and manager payments (include labor overhead) for:
a. Reside near Port Orford $_____
b. Reside somewhere else and commute to Port Orford $_____
2 Expenditures for contract services for personnel:
a. Reside near Port Orford $_____
b. Reside somewhere else and commute to Port Orford $_____
3 Expenditures for professional services, such as accounting and legal
$_____
4 Expenditures for fuel
$_____
4 Local project expenditures for rent, utilities, and supplies
$_____
5 Local project expenditures for maintenance and upkeep on equipment
$_____
6 Local project expenditures for fees and dues
$_____
7 Local project expenditures for equipment and other capital items
$_____
8 All other project expenditures (such as for travel outside the local area) that when added above equals total annual organizational expenditures
$_____
[SKIP TO Q19]

9. Given your organization is not based in Port Orford, I will be asking about trips. The definition of a "trip" is an event that occurred because it was supporting some level of research, planning activity, or enforcement mission. A trip starts when you leave home (home can mean your home town or place of employment) and ends when you return home, regardless of whether you were gone one day or more than one day. It doesn't matter if you were able to complete the trip's purpose.

Given that a trip may be more than one day, how many trips to the Port Orford vicinity have you or your organization's team taken this year, last year, and the last five years?

1 This year trips ____
2 Last year trips ____
3 Total from years 2008 through 2012 ____
8 Don't know
9 Refused

10. Think back about all of the trips taken to the Port Orford vicinity. I would like to ask about a typical trip. In what city did you and/or your team usually begin a typical trip from? [IF ASKED, SAY HOME CAN MEAN HOME TOWN, TOWN OF EMPLOYMENT, OR TOWN OF ORGANIZATION].

1 _____
8 Don't know
9 Refused

11. Including yourself, how many people travelled to the Port Orford vicinity on typical trips?

1 People ____ [IF MORE THAN ONE PERSON ASK Q12, OTHERWISE SKIP TO Q13]
8 Don't know
9 Refused

12. Were all these people part of your organization's team? If no, please tell us the number who did travel and their relationship.

1 Yes
2 No. Family ____ Friends ____ Colleagues____ Media ____ Other____
8 Don't know
9 Refused

13. [ONLY ASK IF RESEARCH FOCUSED ON MARINE/RIPARIAN/ESTUARY FROM Q3.] How many times did you use the Port Orford hoist to launch a vessel during your most recent trip? Only count the launch not the haul ups.

1 Number of launches ____ [MAY BE ZERO]
2 Don't know
8 Don't know
9 Refused

14. How many nights did you and/or your team spend away from home on your most recent trip to the Port Orford vicinity?

1 Nights ____ [IF MORE THAN ZERO ASK Q15]
8 Don't know
9 Refused

15. How many nights did you and/or your team spend in the Port Orford vicinity on your last trip?

1 Nights ____ (IF MORE THAN ZERO ASK Q16. IF ZERO ASK Q18. IF NUMBER IS DIFFERENT FROM NUMBER GIVEN IN Q9 ASK WHY DIFFERENT]
8 Don't know
9 Refused

16. Where did your team stay in Port Orford on your last trip?

1 Motel
2 Rental House
3 RV/camp ground
4 Friend/Family
8 Don't know
9 Refused

17. Where did your team stay when not in Port Orford on your last trip?

1 Motel
2 Rental House
3 RV/camp ground
4 Friend/Family
8 Don't know
9 Refused

18. Did you utilize any contractor services for your research at Port Orford?

1 Yes (go to 18b)
2 No

18b. How much did you pay the contractor(s)?

Contractor #1 Dates of Contract_____Total Amount_____

Contractor #2 Dates of Contract_____Total Amount_____

Contractor #3 Dates of Contract_____Total Amount_____

Contractor #4 Dates of Contract_____Total Amount_____

18c. Can you give us the names and contact info of each of the contractors you worked with in Port Orford?

Contractor #1 Name_____ Phone_____
Email_____

Contractor #2 Name_____ Phone_____
Email_____

Contractor #3 Name_____ Phone_____
Email_____

Contractor #4 Name_____ Phone_____
Email_____

19. For this next question we need to find out how much was spent on different items over the duration of your last trip. I will ask you how much on average was spent on specific categories in three different phases of your trip. Please try and answer the best you can.

Category of Spending	***Home***	***En Route***	***Port Orford***
Restaurant/Cafe			
Grocery Store/Market			
Lodging/Camping			
Fuel (vessel or auto)			
Equipment/supplies			
Repairs			
Souvenirs			
Permits			
Other			

20. Is there anything that has or is hindering your project at Port Orford? For example, unable to launch due to sand inundation.

_____
_____
_____
_____

21. Would you be willing to take part in future surveys conducted by the ODFW?

1 Yes
2 No
3 Don't know
4 Refuse

22. Do you have any further comments you would like to share about this survey?

_____

_____

_____

_____

Thank you for your participation in this survey. Have a good day and if you have any further questions please don't hesitate to contact ODFW at (541)867-7701 x 229.

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Appendix C: Participant Comments

- "There is not really anything hindering my work at Port Orford. It is easy to work with ODFW and POORT. The politics can be a bit of an issue, but Port Orford generally had good people to work with. There is room to work with the Pacific Fisheries Management Council; the big council makes it difficult to do community-based work. To a lesser degree working with the state council can create these problems as well. Fishermen often don't want to share information about where they fish, which can make it difficult to do Coastal Marine Spatial Planning work."

- "Sand inundation is a concern, because it affects research scheduling and we now need to wait for the correct tides to launch, which can impact time-sensitive research projects. We prefer to use local vessels"

- "Sand inundation is hindering our research project"

- "The shallow draft and weather creates a limited window of opportunity for going out and doing research. Port Orford's remote location and lack of infrastructure poses challenges as well. Having commercial fishermen in the area is a great asset, but it can also be a challenge too. When the weather is nice, fishermen want to be out fishing rather than doing research charters."

- "The lack of infrastructure and resources to support that infrastructure hinders my work at Port Orford. Lots times we have to drive up to Coos Bay to get supplies and materials, and I think this is an issue that a lot of Port Orford residents face."

- "There is a limited volunteer base in Port Orford, and this impacts our work."

- "In this past decade the town has become deeply divided politically. When you combine this division with a small population it can often mean that the deciding vote comes down to one person and this poses challenges to political decision-making."

- "Our research is limited by weather. This survey has great value; the research within Port Orford is only one piece of the total economics picture. The Redfish Rocks Marine Reserve has prompted grants for work that has taken place outside of Port Orford and these grants are coming from outside sources such as the Oregon Sea Grant and federal programs."

- "Fishermen not wanting to cooperate and weather is hindering our research."

- "The expense of launch for research projects is minimizing my plans to do projects that require boat work, I would make more trips if I had a cheap place to stay."

- "The inability to launch due to sand inundation is limiting my project, the research launch fees are asinine and prohibitive. My spending at Port Orford goes up and down relative to when I have funding available."

- "I know sand inundation is an ongoing problem."
- "Funding is our only limitation"
- "Nothing is hindering our research, except for sometimes fishermen are uncooperative"
- "High lift fees are a hindrance to participants, because fishermen were donating their time and now it is difficult for them to donate time. The increased costs of lift fees and gas has become a big deal for them. This makes it more difficult to hire local fishermen and it makes their bids non-competitive. This makes it difficult to bring participants to Port Orford or have fishermen get bids.

Appendix D: Background on the Dredging Situation at Port Orford

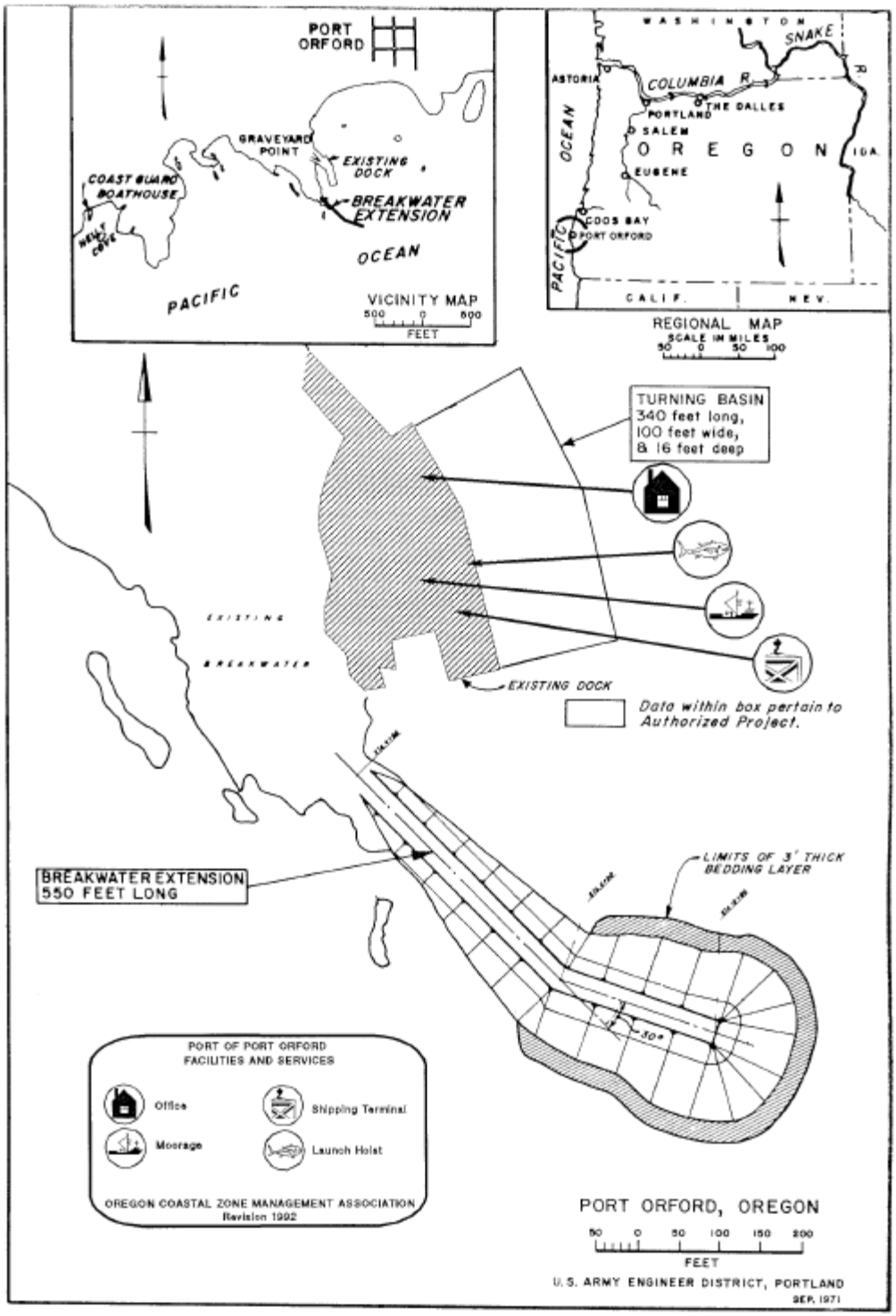
The shoreline annual sand transport processes at Port Orford allowed for sufficient navigation channel water depths to be naturally maintained next to the Port dock until 1968. In this year, the U.S. Army Corps of Engineers (Corps) constructed a jetty extension for ocean storm protection of the dock and transiting fleet, which unintentionally caused sand to build-up where vessels are launched during winter storms. Periodic dredging in the channel is now required to deepen depths to the 16 feet (mllw) federal authorized depth so that the types of vessels located at Port Orford can safely use the mooring basin launch and line-up for hoisting back to dry moorage.[1] Dredging has been accomplished in a variety of methods by contractors including suction dredge with material pumped onshore and clamshell dredge with material barged to an ocean location. 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 significant economic impacts on the Port Orford fishing community (Kirby and Kellner 2010). In addition, it has posed challenges for the marine reserves ecological monitoring team, who sometimes can't access the ocean at the specific times that their research necessitates. A more detailed description of the shoaling and dredging issue is available in the Oregon Solutions Port of Port Orford Economic Development Declaration of Cooperation (Oregon Solutions 2009).

Port Orford is considered a low-use port, and thus the Corps considers dredging the area to be a low priority (USACOE 2012). Congressional action by Oregon representatives has not been able to influence Corps budget decisions for maintaining navigation channels at low-use ports since federal budget earmarks were banned in 2010. This has meant Port Orford has been excluded from receiving Corps sponsored dredging services for the past three years.

In response to this situation, the Oregon State Legislature's coastal caucus worked together with Governor Kitzhaber and the Oregon Regional Solutions Program to provide the Corps with $3 million in state funding in order to dredge these ports.[2] The Corps plans to start dredging the South Coast ports first, and dredging is expected to begin at Port Orford in February 2014 (Oregon Governor Press Release 2013). The appropriations are an interim measure that the port hopes will not be necessary in the future. In September 2013, the U.S. House Committee on Transportation and Infrastructure unanimously approved The Federal Water Resources Reform and Development Act, and moved the bill to the house floor. This bill could provide a more long-term solution to dredging, because it would change funding mandates for the Corps, streamline project reviews, and support traditionally underserved ports, all of which could be beneficial for Port Orford's situation (U.S. House 2013).

1. Port Orford's mooring basin and navigation channel is maintained by the Corps. The dredging project at Port Orford features a 550-foot extension of a locally-constructed breakwater and a 340-foot-long, 100-foot-wide, and 16-foot-deep mooring basin. (Portland District USACOE 2013).
2. 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 D.1
Port of Port Orford Map



Source: Adapted from U.S. Army Engineer District, Portland.

Appendix E: Regional Economic Contribution Modeling Methodology

Economic analysis studies when economic contribution is to be the measurement start with assessing the direct effects of local spending from the industry activity being studied. Direct effects capture the consequences of businesses selling goods and services directly to the study industry participants. In addition to these direct effects, economic analysis also reports on the secondary effects from local spending through the use of multipliers. The concept of a multiplier is that an initial amount of spending will also have successive re-spending rounds using the new money brought into an economy. The added spending means the economic contribution will be greater than the initial amount. These secondary effects assess the impacts on backward linked industries that sell goods or services to the studied industry-related businesses (indirect effects) and the impacts from household spending of income earned at the local businesses (induced effects). The total business spending changes is sometimes called changed business "output." A portion of the output from businesses will be what those businesses need for purchasing, manufacturing, and/or providing services for the sold product. Those costs will include wages and salaries and proprietorship profits (or income). For example, Figure E.1 shows the relationship between output and income that accrues from successive re-spending rounds of the new money brought into an economy. Figure E.2 has a cumulative view of how local businesses first supply goods and services to the external economy's demand, and the leakage of the new money out of the local economy as it circulates between businesses (accounted for in Type I multipliers) and is re-spent by local households (accounted for in Type II multipliers). The households receive a portion of the new money via employment at the businesses where studied industry participants spending occurs.

For this study, input output models were used from the IMPLAN system.[1] IMPLAN is a widely used regional economic modeling system originally developed by the USDA Forest Service. The IMPLAN system based on 2011 data was used for the extraction. Multipliers for key industry related sectors were extracted from the Curry County IMPLAN model. If economic contribution was to be calculated for the state or U.S. level economy, different multipliers would have to be extracted from the IMPLAN system. An economic ratio for average countywide net earnings component of personal income is used to convert the effects from spending into associated jobs.[2]

It is necessary to state the geographic scope of the economy being assessed for the studied industry's activity. For example, project trip spending can include spending at home, en/route, and at the destination. The size of the region being analyzed will determine whether a particular region is receiving purchases. Unless the industry being analyzed is bringing "new money" into the economy, economic analysis studies will exclude its spending. Economic analysis attempts

1. The multiplier effects are calculated using economic response coefficients generated from the IMPLAN input-output model. IMPLAN models are available for various U.S. geographic levels, states, national economy, and international economies. The models are distributed by IMPLAN Group LLC, 16740 Birkdale Commons Parkway, Suite 212, Huntersville, NC 28078.
2. 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.

to identify spending that would be lost to the region being studied in the absence of the studied industry activity. Such a "with versus without" analysis requires considerable knowledge of industry activity purposes and potential substitution behaviors to assess which spending would be lost if the project or policy did not occur.

The economic contribution measurement selected for this study is personal income. It could just have well been other metrics that would describe the same economic direct and secondary effects, but in a different dimension. In the event the other dimensions might be useful, Table E.1 is provided. It shows the multipliers and economic effects for output, value added, personal income, and jobs at the regional level. The definitions for the other dimensions are:

- **Value added** includes labor income as well as profits and rents and indirect business taxes. Value added is the preferred measure of the contribution of an activity or industry to gross state product as it measures the value added by that activity/industry net of the costs of all non-labor inputs to production.
- **Output** represent the business sales in the region with the exception that sales in the trade sector (wholesale and retail) are only the margins on the sales. Therefore, they exclude the cost of goods sold.
- **Income** is measured as net earnings which includes wages and salaries, payroll benefits, and income of sole proprietors.
- **Jobs** are not full time equivalents but include full and part time jobs, consistent with employment estimates of the Bureau of Economic Analysis.

A criticism of regional economic contribution modeling is that it tends to overstate actual economic impacts because it assumes that all possible adjustments to disturbance are instantaneous and permanent, and that individual responses to disturbances are limited. People who lose a job, for example, are assumed to stay unemployed. In reality people and businesses adjust over time, as they consider and try alternative occupations, technologies, and locations. Economic changes created by the alternatives can be "short-run" or "long-run." Short-run describes the effects of construction or other temporary spending that typically lasts for less than a few years while industry adjusts to the changes.

Regional economic contribution modeling (a type of modeling more often termed regional economic impact modeling) that is an appropriate methodological approach for understanding key relationships, such as effects across broad economic sectors from investment incentives to promote an industry activity. However, the quantitative results do not provide a complete picture of an industry activity effects on a region. For example, it does not show project feasibility. A project can be unprofitable and still show positive economic contributions through its spending. Government agencies public financing incentives for establishing a private sector business will be interested in the long-term success of an industry activity in order to derive the expected returns in jobs and other financing program objectives.

Second, the economic modeling does not show fiscal impacts such as the effects on government services and revenues. Local governments may have to finance new roads, schools, buildings and other infrastructure to accommodate the new industry activity. Residents may have to endure crowding costs (such as increased traffic) if there is under capacity in infrastructure.

Third, economic modeling uses in a prospective analysis may not address lag structures of the studied industry expenditures (time relationships between expenditures and economics impacts). Lagging may occur if there is a business start-up horizon that requires regional economy adjustment.

Finally, economic contribution modeling does not show social impacts on residents.[1] Current housing stock value may increase, especially if the economy is already growing and the anticipated impact is comparatively large. The value may make shelter costs unaffordable to current residents. Use of regional economic contribution modeling results in local government policy making should at least acknowledge its limitations and more appropriately be accompanied by additional fiscal and social analyses.

1. There are accepted methodological practices for conducting social impact assessments just as there are for regional economic impact analysis. They are directed more at finding distributional impacts across households and demographics. For example, economic impact analysis may show net job growth, but there may be winner and loser individuals in the calculation for net. The experience and training of those employed in the negatively impacted sector may not qualify individuals for jobs in the positively impacted sector. A subset of a social impact analysis is a social equity analysis where historically disadvantaged and vulnerable groups are examined.

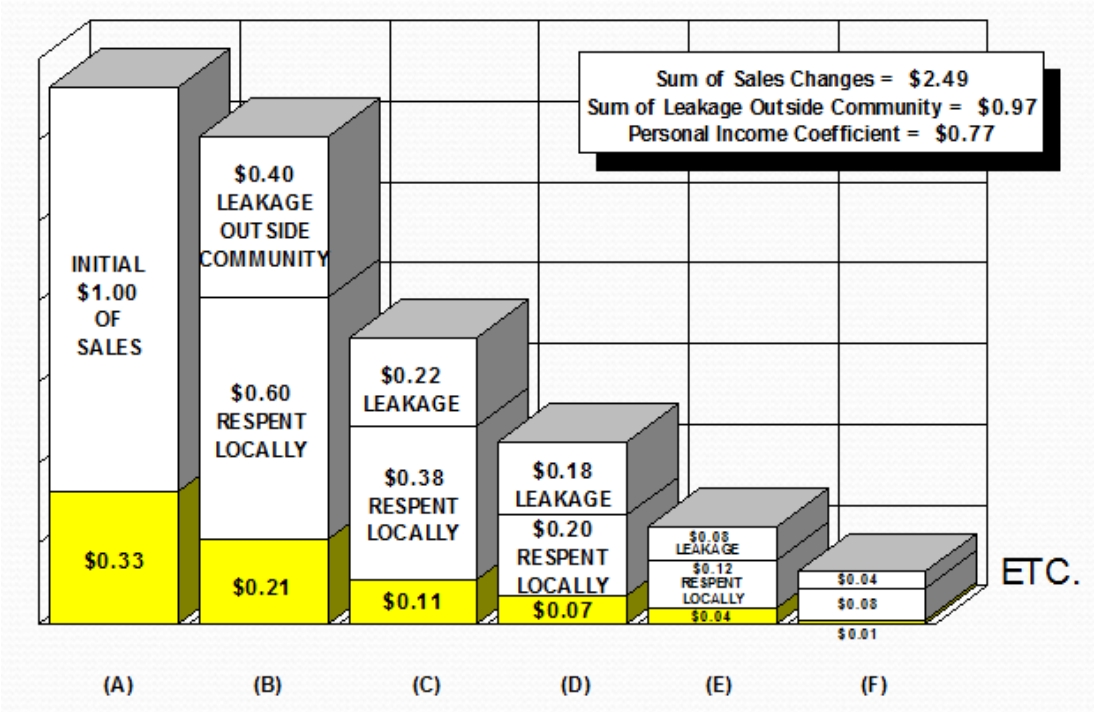
Table E.1
Multipliers for Project Type Expenditures

Typical Average Annual Spending in Port Orford	Direct	Multipliers: Added Value	Multipliers: Output	Multipliers: Income	Amounts: Added Value	Amounts: Output	Amounts: Income	Jobs
Projects not based in PO	79,000				42,572	75,936	27,190	
Spending in PO for trip related expenses	49,000				30,102	54,610	18,925	
Restaurant	8,000	0.346117	0.685985	0.207452	2,769	5,488	1,660	
Grocery	5,000	0.323727	0.652176	0.197546	1,619	3,261	988	
Lodging	28,000	0.824724	1.471027	0.528566	23,092	41,189	14,800	
Fuel	5,000	0.285557	0.435964	0.168642	1,428	2,180	843	
Equipment/Supply	3,000	0.398132	0.830766	0.211460	1,194	2,492	634	
Spending in PO for charters and organizations	30,000	0.415677	0.710882	0.275502	12,470	21,326	8,265	
Projects based in PO	428,000				569,250	733,281	452,043	
Labor	324,000	1.659	2.115	1.337	537,590	685,228	433,093	
Non-labor	104,000				31,661	48,054	18,950	
Fuel	-	0.286	0.436	0.169	-	-	-	
Rent	13,000	0.286	0.427	0.154	3,715	5,545	2,005	
Utilities	7,000	0.389	0.516	0.234	2,721	3,609	1,641	
Maintenance	3,000	0.398	0.831	0.211	1,194	2,492	634	
Fees and dues	1,000	0.918	1.663	0.412	918	1,663	412	
Equipment	1,000	0.286	0.427	0.154	286	427	154	
Accounting and legal services	5,000	1.044	1.253	0.822	5,220	6,264	4,108	
Other	74,000	0.238	0.379	0.135	17,607	28,054	9,996	
Projects total	507,000				611,823	809,217	479,233	15
Dredging	328,000				214,884	359,317	133,412	4
Spending in PO for per diem type spending	108,000	0.825	1.471	0.529	89,070	158,871	57,085	
Spending in PO of other goods services	220,000	0.572	0.911	0.347	125,814	200,446	76,327	
Average annual Curry County earnings for full and part-time workers and proprietors in 2011 from BEA	31,700							

Notes: 1. Spending in retail categories is bridged and margined to input-output sectors to fashion multipliers. Some producer sector allocations are not represented in local economy.
2. Jobs are calculated using summed income and average annual countywide earnings.

Source: Study.

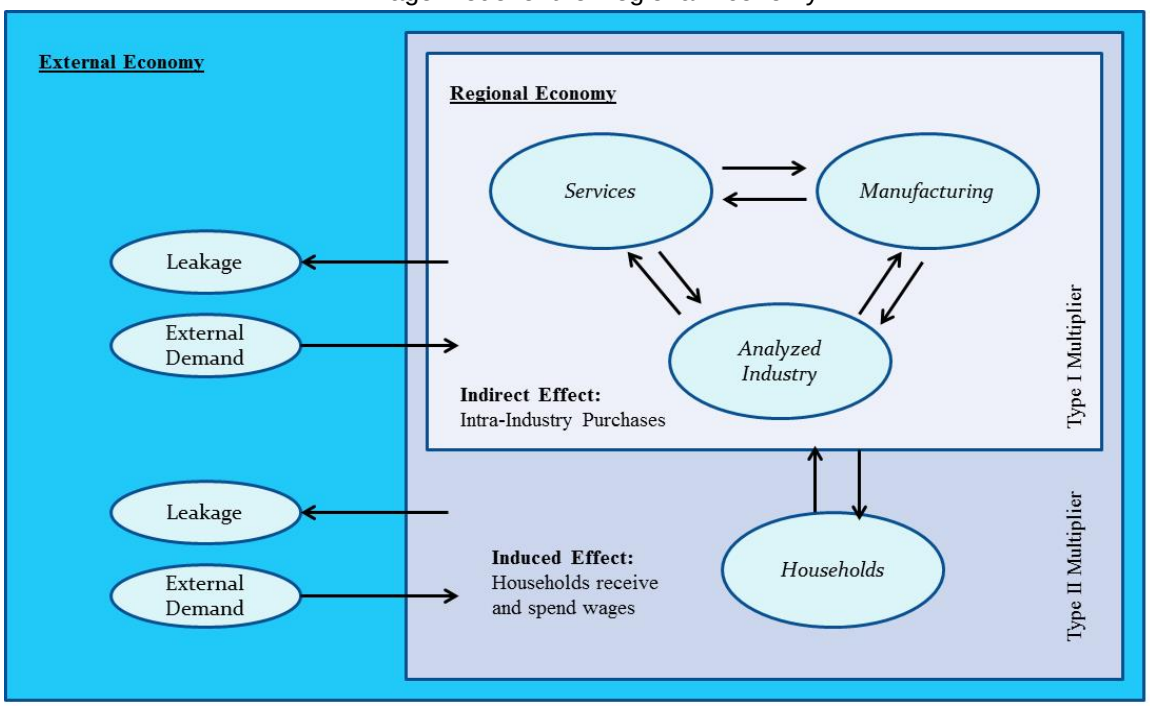
Figure E.1
Output and Personal Income Multipliers



Notes: 1. The shaded portion of the bars shows output (sales) that goes to households in terms of wages, salaries, and proprietorship profits. The shaded portion when summed over respending is called total personal income.

Source: Radtke and Davis (April 1994).

Figure E.2
Linkage Model of the Regional Economy



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Appendix F: Total Economic Value Measurements

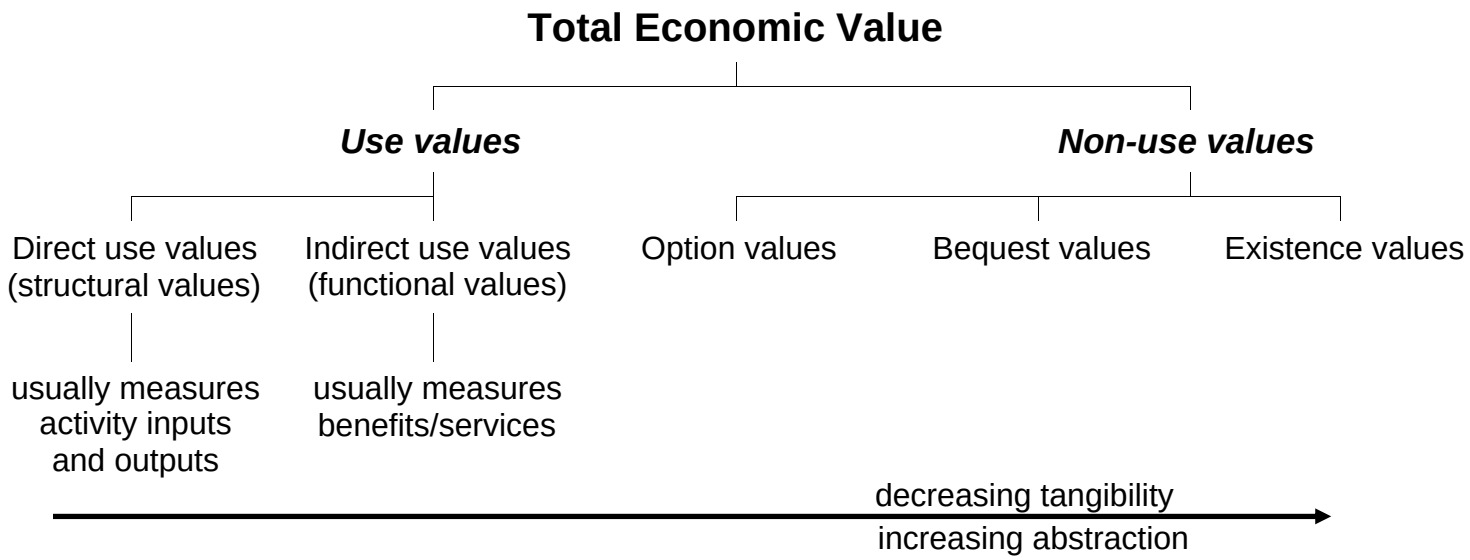
The total economic value (TEV) measurement across an ocean resources use spectrum is depicted in Figure F.1. TEV is typically used in benefit-cost analysis (BCA) studies that involve environmental resources. The accounting of benefits in a BCA would include valuations for not only extracting or disturbing natural resources, but also appreciating their non-use. The accounting for costs in a BCA would include opportunity costs, such as for the next best use of the investment being studied. The TEV measure for ocean resource use reflects what society is willing to pay or accept for one more unit of usage minus the cost to access the ocean resource times the demand for the use. It includes all economic producer and consumer surpluses. For the example of calculating producer surplus from commercial fishing, the economic value is business profits less an expected rate of return on vessel assets and less compensation for alternative expected returns on labor. Determining ocean resource economic value when there are prices and cost information available is tedious but doable, however establishing economic values for the right side of the usage spectrum on the figure is much more difficult. Economists apply a variety of procedures in an attempt to elicit a dollar amount for restoring or just preserving ocean resources, such as asking a person's willingness to pay extra on a utility bill or choosing between preservation and another activity that has a known value. Even though TEV analysis methods and modeling results become somewhat abstract, they are still worthwhile for discussion purposes. The discussions provide an understanding and appreciation for the importance that ocean resources play in our lives. Leaving out the non-use benefits as well as opportunity costs during economic analysis exercises will tend to undervalue marine reserve functions, and therefore provide incomplete valuation information used in policy decision making processes.

TEV would be the proper measurement for addressing the need for quantitative information about the net economic effects from establishing marine reserves. Figure F.2 itemizes what might be gains and losses in TEV as applied to a marine reserve site. In the case of the Redfish Rocks Marine Reserve (RRMR), it has been mentioned that commercial and recreational fishing has been displaced. The areal extent of the RRMR is comparatively small (21.7 sq. km) and there are accessible fishing grounds of similar habitat nearby. However, the commuting distance might be longer and congregated fishing pressure might decrease commercial vessel operational efficiency and decrease angler satisfaction for the same amount of catch. But ecological improvements attained at the site by restricting extractive uses may spill over to adjacent areas and cause fish resource productivity increases. There might be increased benefits from other uses, such as increased visitors to Port Orford who are attracted to the area because the marine reserve is there. And there may be changed non-use valuations due to views that the environment is being allowed to return to a natural state without absorbing the impacts of extractive uses. TEV methods provide the consistent units whereby the sum of benefits minus the costs applied over a relevant time period will generate a net economic effect quantity.

There is a substantial body of literature on the ecological benefits of marine reserves, and a lesser but growing published studies about the bio-economic modeling of marine reserves.[1] The

1. An investigation of available socio-economic and ecological related literature should include Cohen et al. (2008). For the economic benefits of the one ocean resource use for fishing, pioneering work on bio-economic modeling was done by Polacheck (1990). Holland and Brazee (1996) confirmed broad findings of Polacheck

Figure F.1
Total Economic Value Measurements



Notes: 1. Total economic value (TEV) includes both use and non-use values.
- Use values include direct use (both consumptive, i.e. fishing, and non-consumptive, i.e. observing) and indirect use (sustaining species and other non-direct ecosystem services, i.e. provisioning (e.g. water to scrub pollution), regulating (e.g. regulation of climate), cultural (e.g. spiritual values), and supporting (e.g. soil formation)).
- Non-use values include option values, bequest values, and existence values.

2. There may be unknown values to be discovered in the future, i.e. genetic material (e.g. new cure for cancer).
3. Valuation is easiest for finding in direct-use values, quite difficult for finding in indirect-use values, and very difficult finding in non-use values.

Source: Adapted from Peterson and Randall (1984).

and expanded on model development using a Gulf of Mexico Red Snapper fishery example. Smith and Wilen (2003) applied the same techniques to the northern California sea urchin fishery. Grafton et al. (2005) did an extensive review of various bioeconomic models. Many authors have since repeated the two patch approach (one patch is no take and the other patch has regulated fisheries) based on economic optimization approaches. Less work has been done on simulation models that include bio-economic modeling components as well as other economic premiums induced by fishing restrictions such as increased biodiversity.

Figure F.2
Net Economic Consequences of Marine Reserves

Net economic value changes (benefits minus costs)

1. Example Benefits
    a. Spillover benefits in fishing opportunity within harvest areas through increased catch and increased CPUE measured by changes to commercial economic rent and recreational willingness-to-pay
    b. Ecotourism increases
    c. Biodiscovery
    d. Existence value
2. Example Costs
    a. Displaced fishing opportunity for commercial and recreational sectors.
    b. Ecotourism decreases
    c. Potential impacts to other uses such as mineral exploration or ocean energy development

Notes: The example benefits for biodiscovery may arise from the protection of genetic material for possible future development of commercially valuable product. The value of preserving this future option is likely to be significant, but is difficult to estimate.
Source: Study.

challenge becomes specifying parameters in the TEV models and calibrating them to the marine reserves unique situation. Using rules-of-thumb and borrowing results from other studies where primary data collection occurred may provide adequate prospective information to assist in understanding how a marine reserve net economic effects may play out. However, such approaches based on a TEV model may not provide the reliable solutions needed for policy making. The approach would foster criticism about modeling results appropriateness and be of lesser usefulness than if the weak approach was not developed. If the mathematical approach is used, sufficient study resources should be mustered to acquire through surveys and ecological investigations the necessary parameterization data.

The design of TEV models would be confined to assessing the objectives for which Oregon's marine reserve system was established. Those objectives (paraphrased in the Introduction section of this report) were not to cause spillover or buffering benefits. Knowing those benefits might be relevant to decision makers weighing future policy decisions about the implementation plans for Oregon's system, but it would be extra knowledge because the location, size, and spacing of the Oregon system would have been different if spillover and buffering objectives were to be satisfied. Applying TEV methods can provide the organizational approaches to find out if initial objectives are being satisfied and identifying were there might be unintended (positive or negative) consequences. In such cases, there needs to be the flexibility to adapt management plans to address consequences.

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Appendix G: Modeling the Economic Impacts of Marine Reserve Fishing Restrictions Using Spatial Habitat and Fisheries Data

A. Approach[1]

Spatially defined 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 marine reserve site. The results give the maximum economic risk that would occur from marine reserve site management.[2]

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 marine reserve sites and reference areas. Commercial fishing logbook, and other spatially defined information about marine reserve site 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 marine reserve sites 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 marine reserve site habitat allowed for same harvest levels as reference areas.
6. Average economic consequence estimates for harvest activities at reference areas and marine reserve sites were calculated using existing commercial and recreational fishing economic model.
7. Models were generalized so that it could determine economic consequence estimates for different marine reserve site designs and locations.

It was an admission at model development initiation that the information being supplied could be questioned for its accuracy and uncertainty, but it would be the best available information given time and cost limitations for undertaking a more thorough quantitative assessment and analysis.[3]

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1. See TRG and GMC (2012) for a detailed description of the modeling approach.
2. The modeling was a simulation, cross sectional model not suited for determining biological nor human behavioral responses relying on optimization theory from marine reserve management alternatives.
3. Best available information was used which meant scaling down known data and data relationships at reference area level, down to a discrete marine reserve site 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 marine reserve sites 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 marine reserve sites are congruent with this function.

B. Methods

The data and other studies used in developing displaced commercial and recreational harvests are shown in Table G.1. Marine reserve site area size and proportion of habitat types within sites is shown in Table G.2. The existing regional economic impact (REI) models which had complexities for providing the detailed factors necessary for calculating REI by marine reserve site target fisheries is described in TRG (2011a) and TRG (2011b).

At the most basic level, the devised methods were to develop a REI ratio estimator that would be applicable to the known physical characteristics of the sites. Those characteristics could be area size and habitats because of the availability of Surficial Geologic Habitat Maps (OSU 2011). 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 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 preferring 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. There were discussions with ODFW fishery managers and input from fisherman groups about target fisheries that occurred within and nearby the marine reserve sites. The discussions resulted in many species such as deep water pelagics 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 (OPAC 2008). It was assumed fishery performance would be sufficiently dissimilar within the two regimes to justify the complexity.

C. Results

The ratio estimator was applied to the measured habitat areas within the marine reserve sites to determine the estimated REI for commercial fisheries (Table G.3) and REI for recreational fisheries in 2009 (Table G.4). The Redfish Rocks Marine Reserve (RRMR) modeled results showed a potential displaced REI impact of $67 thousand total personal income. An interpretation of this estimate is that it might be high for both the commercial fishing sector and the recreational fishing sector. The reference area used for developing the commercial fishing ratio estimators included open fishing grounds shoreward of the RCA boundary extending from Cape Blanco to the Oregon-California border. This area includes long commuting distances for fleets from the three ports that primarily utilize these fishing grounds for the included target fisheries. The disbursed area harvesting may have higher CPUE than the more easily accessed MR site. The Port Orford fleet vessels facing inclement weather conditions or wanting to keep steaming costs low would fish closer to the port and may cause local depletions. An analysis of

the nearshore logbook program records for Year 2009 did find actual harvests to be lower for some species than the predicted harvests. Overall, the actual was 18 percent less than predicted harvest using the study ratio estimator for the species analyzed (Figures G.1 and G.2). (Other marine reserve site target fisheries applicable species assemblages were not analyzed.) The referenced area used for the recreational angling was approximately 15 miles north and south of Brookings. Many charter service and private boats use these fishing grounds. On the other hand, private boat launching at the Port of Brookings is inconvenient and expensive which hinders access to the MR site. There are charter service boats that depart from Gold Beach which do travel north and fish the Port Orford area. However, a Brookings reference area ratio estimator probably is high for the MR site application.

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 to fishing in that familiar area could cause costs to increase, such as from a longer commuting distance to fishing grounds, or because of congestion from other fishers, catch per unit effort to decrease. This is likely to have some impact on the net returns earned by commercial fishers and recreational angler satisfaction.

Marine reserve harvest management rules may affect local governments and economies of each community of place, because they derive revenues from ocean uses. Fishing operations utilizing the sites would be expected to adjust to the marine reserve restrictions by fishing in other areas, and this will likely lessen some of the negative effects from having to avoid fishing at the reserve sites. If adjustments do not occur, then there would be possible reductions or redistribution of fishing revenues that ends up as revenue for local governments and economies.

Increased uses at marine reserve site such as for 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 reserve sites 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 reserve sites around the world, and determining the spillover effects and economic impacts associated with this effect is a suggested future research project. (See Appendix F for a discussion of this type of economic modeling.)

Table G.1
Fishery Data Characteristics Related to Marine Reserve Site Use

Source	Spatial Resolution	Owner
Commercial Use		
• Fish tickets	No	ODFW
• Logbook crab, nearshore groundfish, trawl groundfish, shrimp, sardine, sea urchin, and shellfish	Yes	ODFW
• Salmon troll	Yes	CROOS Program
• Interviews with impacted fishermen	Yes	Fishermen
Recreational Use		
• ORBS ocean	No	ODFW
• MRFSS ocean bank and estuary boat and bank	old data	PSMFC
• Sport Observer Program	No	ODFW
• Interviews with charter and recreational fishermen	Yes	ODFW
Habitat		
• OSU West Coast Surficial Geologic Habitat Maps	Yes	OSU
• Special studies		
• Experiential knowledge		

Source: TRG and GMC (2012).

Table G.2
Habitat Type Area Size for Territorial Sea and Marine Reserve Sites

		Share of	Habitat Type			
	Size (sq km)	Territorial Sea	Rocky	Gravel	Unconsolidated	Total
Territorial Sea	3,252.90	100.0%	6.5%	0.6%	92.9%	100.0%
North Regime	2,296.26	100.0%	4.1%	0.8%	95.1%	100.0%
South Regime	956.63	100.0%	12.2%	0.2%	87.6%	100.0%
Marine Reserve Sites						
Cape Falcon	55.20	1.6%	1.2%	0.0%	98.8%	100.0%
MPA	22.40	0.6%	0.0%	0.0%	100.0%	100.0%
MR	32.80	1.0%	1.9%	0.0%	98.1%	100.0%
Cascade Head	90.70	2.7%	18.8%	0.4%	80.8%	100.0%
MPA	60.80	1.9%	21.0%	0.5%	78.5%	100.0%
MR	29.90	0.8%	13.6%	0.3%	86.1%	100.0%
Otter Rock	3.35	0.1%	29.4%	0.0%	70.6%	100.0%
MPA						
MR	3.35	0.1%	29.4%	0.0%	70.6%	100.0%
Cape Perpetua	144.90	4.5%	0.8%	0.1%	99.1%	100.0%
MPA	108.10	3.3%	0.6%	0.0%	99.4%	100.0%
MR	36.80	1.1%	1.3%	0.2%	98.5%	100.0%
Redfish Rocks	21.70	0.6%	14.8%	0.1%	85.1%	100.0%
MPA	14.92	0.4%	3.3%	0.0%	96.7%	100.0%
MR	6.78	0.2%	37.1%	0.3%	62.6%	100.0%
Total marine reserve sites	315.85	9.4%	7.2%	0.1%	92.7%	100.0%
MPA	206.22	6.2%	6.9%	0.1%	93.0%	100.0%
MR	109.63	3.2%	7.7%	0.2%	92.2%	100.0%

Sources: Habitat areas are from Oregon State University Active Tectonics and Seafloor Mapping Lab Surficial Geologic Habitat Maps Version 3.0.

Table G.3
Regional Economic Impacts From Assessed Commercial Fisheries at Marine Reserve Sites, Territorial Sea, and All Onshore Landed Fisheries 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).

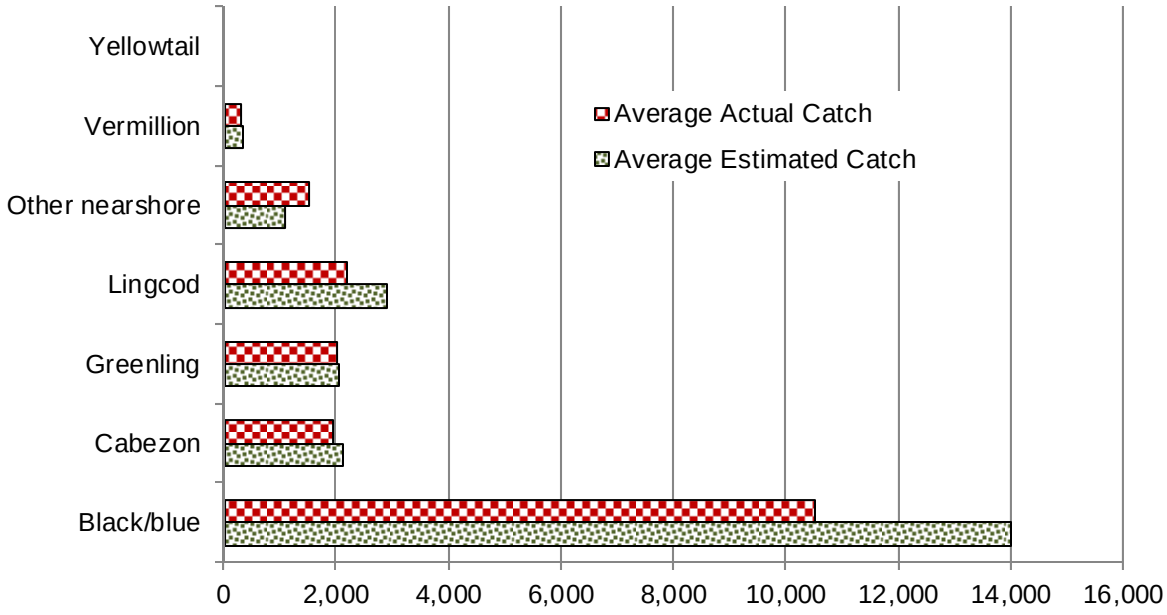
Table G.4
Regional Economic Impacts From Recreational Angling at Marine Reserve Sites, Territorial Sea, and Coastwide Ocean and Bay Fishing Areas in 2009

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 are 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).

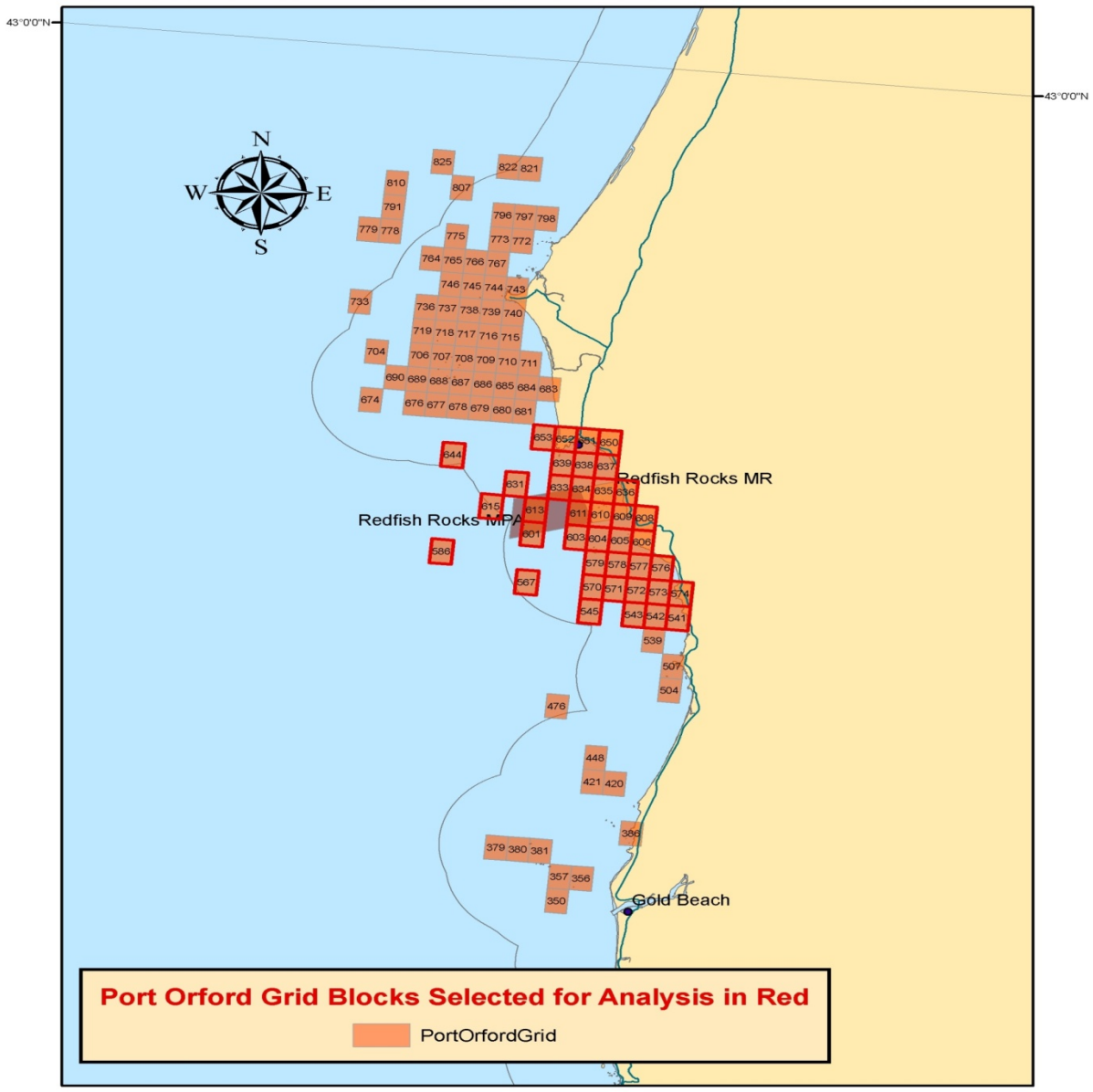
Figure G.1
Redfish Rocks Marine Reserve Actual Versus Estimated Harvest for Selected Species



Note: 1. Actual is from nearshore logbook program data.
2. The average is for the years 2004 through 2009.
3. The harvest is for the marine reserve portion of the marine reserve site.

Source: Jim Golden, personal communication, April 2012.

Figure G.2
Port Orford Nearshore Logbook Program Grid Blocks Selected for Determining Actual Harvest



Notes: 1. Actual catch determined from using average catch per area in selected grid blocks and the marine reserve sites total area.
Source: Jim Golden, personal communication, April 2012.

Appendix H: Ecosystem-Based Management

The finding that human activities are increasingly compromising the marine ecosystem's ability to sustainably provide the vital ecosystem services that humans depend on has inspired the transition to ecosystem-based management (Mcleod et al. 2005; CEQ 2010).[1] This integrated form of management encompasses the entire ecosystem, including humans and generally takes into consideration economic costs and benefits to stakeholders (Lester et al. 2012, Freeman 2012).

A main objective of the Ecosystem-Based Management (EBM) approach is to protect the ecosystem in a way that it is able to sustainably provide a wide variety of ecosystem services for years to come (Mcleod et al. 2005). In order for managers to be able to utilize information on the supply and delivery of ecosystem services for management decision-making, it is important to be able to assign socio-cultural and economic values to these ecosystem services (Lester et al. 2010). It is also important to differentiate which ecosystem services are applicable to different stakeholder group in order to assess associated costs and benefits and tradeoffs between stakeholder groups.

Some ecosystem services associated with marine areas in Oregon can be assigned market values for use in trade-off decision-making, as was the intention for valuing the ecosystem service of the provision of science and research opportunities associated with marine reserves in this study. However, the study focus of the provision of science and research opportunities is unique in this case, because traditionally most ecosystem services are non-marketed and difficult to value (Heal et al. 2005; McLeod et al. 2005).

Oregon State University (OSU) researchers Peter Freeman, Randall Rosenberger, Gil Sylvia, Selina Heppell, and Michael Harte sought to come up with an innovative approach to valuing these non-marketed ecosystem services for Oregon Marine Reserves in a study sponsored by Oregon Sea Grant and ODFW. These researchers asked focus groups comprised of local marine reserve ocean stakeholders to identify benefits and related ecosystem services that they derived from their local marine environment. Identified ecosystem services were later translated into items that could be utilized in a stated-preference survey. Focus group members were then asked to rank their preferences for the different survey items, results are presented below.

The ranking of survey items in the non-grouped, aggregate sample illustrate a few potential patterns with regard to the benefits that marine ecosystem services provide. These patterns have implications for efforts to set state or region-wide priorities in 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 system processes and fish populations.

1. Ecosystem services can be defined as the benefits gained by humans from healthy and functioning ecosystems. Ecosystem services fall into four main categories: provisioning (example: food), regulating (example: pollination), supporting (example: seed dispersal), and cultural (example: discovery) (ODFW 2012).

This study also accounted for the fact that tradeoffs may occur between ecosystem services for different stakeholder groups. Focus group participants were recruited based on their known activity in the ocean planning process, their participation on the marine reserve community teams, or their affiliation to the eight ocean stakeholder categories stipulated in Oregon House Bill 3013. These stakeholder groups included members of the local government, recreationalists, the commercial fishing industry, and marine and avian scientists among others (Oregon State Legislative Assembly 2009). It is especially important to evaluate tradeoffs between ecosystem services, because stakeholder groups may benefit from or utilize a variety of services from the same ecosystem in different ways, which creates possibilities for competing and complementary uses. Figure H.1 illustrates how this inclusion of different categories of stakeholder groups may participate in EBM development and adaptation.

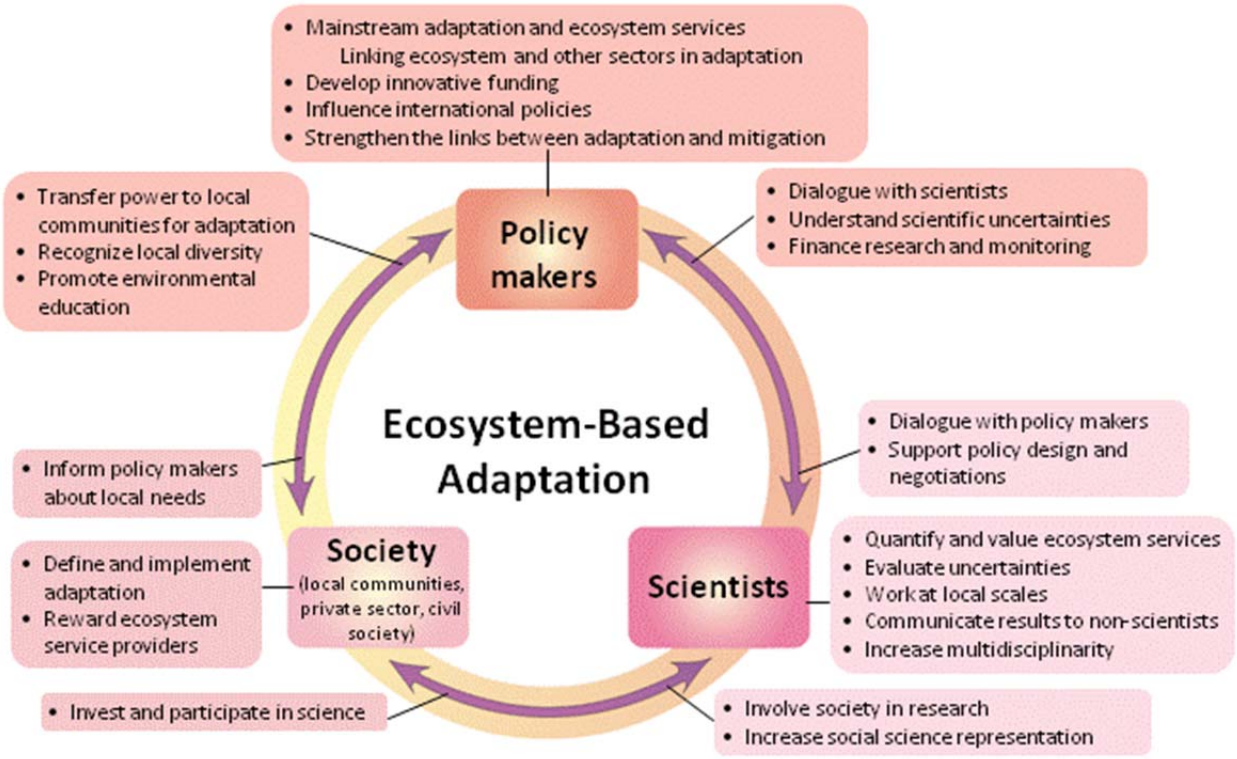
In general, data resulting from this study can be used to inform the management, monitoring and evaluation of marine reserves in Oregon by aiding decision-support, better defining the geographic "market" for various marine ecosystem services, identifying stakeholder groups of interest, and prioritizing biological and socioeconomic indicators related to marine reserve performance (Freeman 2012). This indicator/survey approach can serve to complement more conventional economic approaches to valuation to develop a more complete characterization of the social and economic impacts of marine reserve implementation to the Port Orford community.

Table H.1
Aggregate (Non-Grouped) Preference Weight Rank and Intra-Group Variation

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

Source: Freeman (2012).

Figure H.1
Stakeholder Groups Participation in Ecosystem-Based Management Development and Adaptation



Source: Vignola et al. 2009.

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