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# Supporting the Oregon TSP Revision

## Oregon Fishing Community Mapping Project

Prepared by Ecotrust
On behalf of Oregon Wave Energy Trust

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Oregon Wave Energy Trust (OWET) is a nonprofit public-private partnership funded by the Oregon Innovation Council. Its mission is to support the responsible development of wave energy in Oregon. OWET emphasizes an inclusive, collaborative model to ensure that Oregon maintains its competitive advantage and maximizes the economic development and environmental potential of this emerging industry. Our work includes stakeholder outreach and education, policy development, environmental assessment, applied research and market development.

# Supporting the Oregon Territorial Sea Plan Revision: Oregon Fishing Community Mapping Project

The David & Lucile Packard Foundation
Oregon Department of Land Conservation and Development
Oregon Wave Energy Trust
Oregon Coastal Zone Management Association

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# 1 Introduction

The state of Oregon is developing a comprehensive plan to guide the potential siting of renewable ocean energy projects in Oregon's Territorial Sea. To this end, the state is revising its Territorial Sea Plan (TSP), and has begun collecting information on the spatial extent of human uses that provide economic and socio-cultural benefits. One data gap identified was the distribution and spatial extent of commercial, charter, and recreational fisheries. Ecotrust and others engaged in collecting relevant information on these use activities. In the near term, the resulting data set forms the basis for siting decisions for energy projects that minimize impacts to the marine ecosystem and existing human uses. Longer term, these data are also useful for other marine spatial planning processes and form a baseline for subsequent monitoring and evaluation research of management measures.

Our research team developed and deployed an interactive, custom computer interview instrument, Open OceanMap, to collect geo-referenced information from commercial, charter, and recreational fishermen about the extent and relative importance of Oregon marine waters. Data collection occurred in two stages: March-May 2009 and December 2009–September 2010. We compiled these data in a geographic information system (GIS) that we delivered to the Oregon Department of Land Conservation and Development (DLCD). This report, which details the approach and methods we used to collect, compile, and analyze the data collected, completes our deliverables.

Conducting research in coastal communities is as challenging as it is rewarding. We have learned a tremendous amount from the commercial, charter, and recreational fishermen who participated in this study as well as the countless other community members and observers of this project.

We are deeply grateful to the 244 commercial fishermen, 63 charter operators/owners, and 237 recreational fishermen who participated in this project for making time in their busy schedules, overcoming sometimes considerable reservations, and sharing their knowledge and experience with us. We would also like to thank our project partner, Onno Husing, at the Oregon Coastal Zone Management Association (OCZMA), for his commitment to facilitating outreach efforts and collaboration with Oregon's fishing community and for playing a vital role in accomplishing our project goals.

Funding for this effort was provided by The David & Lucile Packard Foundation, the Department of Land Conservation and Development (DLCD), and the Oregon Wave Energy Trust (OWET).
Collectively, the resulting data, analyses, and tools will form a valuable basis not only for informing the potential siting of renewable ocean energy projects off Oregon, but also in supporting marine spatial planning processes more broadly.

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# 2 Project Goals and Objectives

The overarching goal of this project was to compile the first-ever comprehensive map (or series of maps) illustrating the commercial, charter, and recreational fishing use patterns and values along the entire Oregon coast, from Astoria to Brookings, capturing the expert knowledge of fishermen.

The three core elements of our project were as follows:

I. Commercial Fishing Grounds Mapping
The first was to conduct a comprehensive commercial fishing grounds mapping effort for all major commercial fishing ports on the Oregon coast, from Astoria to Brookings, using the expert knowledge of fishermen. The methodologies followed the approach developed by Ecotrust in support of California's MLPA Initiative (Scholz et al. 2006; 2008; 2010; in press).

II. Charter Fishing Grounds Mapping
Similar to the previous element, the second was to conduct a comprehensive charter fishing mapping effort for all charter fishing operations on the Oregon coast.

III. Recreational Fishing Grounds Mapping
The third element was to conduct a recreational fishing grounds mapping effort. The work included the completion and deployment of an online tool for surveying private-vessel recreational fishermen and in-person interviews with key recreational fishermen in each port community. In addition to spatial data, the survey also solicited spending data to inform future analyses of the economic contribution of recreational fishing to the Oregon coastal economy.

The completion of all three elements resulted in high-resolution, spatially explicit information on the extent and relative importance of ocean areas off Oregon for commercial, charter, and recreational fishing.

The objectives of this project were five-fold:

1. Comprehensively describe Oregon's commercial, charter, and recreational fishing community and incorporate fishermen's knowledge into the deliberations of the Oregon Coastal Management Program and Ocean Policy Advisory Council on the development of future amendments to the Oregon Territorial Sea Plan;
2. Develop accurate maps depicting the extent of the local fishing grounds and their stated and economic importance to the local fleets (just stated importance for the recreational fishing fleet);
3. Analyze areas of high or valuable use in relation to existing or prospective alternative ocean uses;
4. Collect baseline data for future analyses of economic contribution of the recreational fishing sector to the coastal economy;
5. Integrate data into Oregon's Coastal Atlas and Oregon MarineMap to inform the Territorial Sea Plan revisions and other marine spatial planning processes.

# 3 Methods

In this project, we built on methods developed in previous projects on the West Coast of the United States (Scholz et al. 2004; 2005; 2006a; 2008; in press). More specifically, we used a computer

interface to collect information from fishermen and analyzed the responses in a geographic information system (GIS).

As in our previous work, a key innovation of this project was working with Oregon Department of Fish and Wildlife (ODFW) staff, the Oregon fishing community, The Research Group, and regional experts to define the state's fisheries in terms of how they are managed. To that end, we differentiated fisheries in terms of practices and/or species (group)-gear configurations and used port groups to classify participants and design a representative sample.

While the use of GIS technology and analysis in marine and fishery management has expanded steadily over the past decade (Meaden 1996; Kruse et al. 2001; Breman 2002; Valavanis 2002; Fisher and Rahel 2004), its use for socioeconomic research is still somewhat limited. Many of the applications reviewed in the recent literature focus on urban populations or natural resource use in developing countries (Gimblett 2002; Goodchild and Janelle 2004; Anselin et al. 2004). Nevertheless, a growing body of literature has examined GIS-enabled approaches to community-based MPA design (Aswani and Lauer 2006; Hall and Close 2006; St. Martin et al. 2007; Ban et al. 2009) and there are several good examples to build on for improving the spatial specificity of the West Coast knowledge base and data landscape.

Some of the most pertinent applications of GIS technology to socioeconomic questions in fisheries concern the spatial extent of fishing effort and intensity (Caddy and Carocci 1999; Green and King 2003) and use participatory methods similar to the ones employed here (Wedell et al. 2005; St. Martin 2004; 2005; 2006). We built on these approaches and adapted them for the Oregon context, following best practices for the use of participatory GIS in natural resource management (Quan et al. 2001), as described in the remainder of this section.

## 3.1 Study Region

The Oregon coast, from the Washington border south to California, supports a variety of commercial, charter, and recreational fisheries. In addition to differentiating fishermen by sector (i.e. commercial, charter, and recreational), gear-type and fisheries, we also summarize the reported information at the port/port group level.

Based on ODFW landings data, port groups were defined (from north to south) as Astoria, Pacific City, Garibaldi, Depoe Bay, Newport, Florence, Winchester Bay/Reedsport, Coos Bay/Charleston/Bandon, Port Orford, Gold Beach, and Brookings. Our analysis included data from the same port groups for commercial fisheries, with the exclusion of Pacific City[1]. Charter port fisheries analysis also used the same port groups as commercial with the further exclusion of Garibaldi and Port Orford[2]. Recreational fisheries analysis included the same port groups as commercial with the addition of Salmon River. It should be noted that not all user groups or fisheries are represented in all ports.

## 3.2 Fishery Names

An initial list of fisheries was developed using commercial and recreational landings data provided by the Pacific Fisheries Information Network (PacFIN) and Oregon Department of Fish and Wildlife (ODFW). During the survey design period, key fishermen and fishermen groups were consulted to

[1] No information on Pacific City is included in this report as no interviews occurred in this port.
[2] The Garibaldi port group charter operators declined to participate in the survey. Port Orford is not represented as there were no charter operations in this port at the time of the survey.

review these fisheries lists for their respective sector. Specifically, fisheries lists were reviewed by members of the groups: Fishermen Interested in Natural Energy (FINE) of Newport, Southern Oregon Ocean Resource Coalition (SOORC), Port Orford Ocean Resource Team (POORT), Nearshore Action Team (NSAT) of Depoe Bay, and the Oregon Trawl Commission. The target commercial, charter, and recreational fisheries are listed in Table 1 below.

**Table 1: Study fisheries by user group**

| Commercial (Species - Gear Type) | Charter | Recreational |
|---|---|---|
| Dungeness Crab - Trap | Albacore Tuna | *Private Vessel & Kayak* |
| Hagfish - Trap | Dungeness Crab | Dungeness Crab |
| Pacific Halibut - Longline | Pacific Halibut | Pacific Halibut |
| Petrale Sole - Bottom Trawl | Rockfish | Rockfish/Bottomfish |
| Pink Shrimp - Trawl | Salmon | Salmon |
| Rockfish - Hook and Line (dead) | | Flatfish |
| Rockfish - Hook and Line (live) | | |
| Rockfish - Longline (dead) | | *Dive* |
| Rockfish - Longline (live) | | Dungeness Crab |
| Rockfish - Trap | | Rockfish/Bottomfish |
| Sablefish - Longline | | Flatfish |
| Sablefish - Trap | | Abalone |
| Salmon - Troll | | Scallops |
| Sardine - Net (Seine) | | Clams |
| Seaward RCA Trawl | | Other shellfish |
| Shelf Bottom Trawl | | |
| Tuna - Troll | | |
| Urchin – Dive | | |
| Whiting - Midwater Trawl | | |

## 3.3 Survey Methods

Funding availability necessitated that data collection was staggered both by port and by user group. Ecotrust conducted outreach meetings with key fishing community members and fishing organizations/associations (i.e., SOORC, FACT, Oregon Trawl Commission, Dungeness Crab Commission, POORT, NSAT, and FACT) prior to beginning interviews. The objectives of these meetings were to provide a project overview, answer questions, raise general awareness, and solicit potential interview participants. Several members of the fishing community served as community liaisons, communicating the project to other fishermen and providing Ecotrust with additional contacts.

In addition, Ecotrust staff made follow-up phone calls to key individuals identified during outreach efforts and provided information (i.e., handouts, map examples, and Frequently Asked Questions [FAQs]) for fishing groups to use at meetings and/or post on websites, send out to email lists, newsletters, and discussion boards. We also described the project on a webpage (http://www.ecotrust.org/tsp), which included a FAQ page and a link to the DLCD Territorial Sea Plan website (http://www.oregon.gov/LCD/OCMP/Ocean_TSP.shtml).

Given the expert nature of the information needed for this project, the use of a random sample for the commercial fisheries was not the most desirable sampling method. Instead, we constructed a purposive, proportional quota sample designed to be representative of the spatial value of commercial fisheries overall. To create our sample, we used PacFIN ex-vessel revenue landings data

to identify fishermen in each target commercial fishery so that respondents for each fishery would represent (by port and region wide):

- At least 50% of the total landings and/or ex-vessel revenue from 2004–2008; and
- At least five fishermen, except in cases where the sample population was fewer than five.

After target commercial fishermen were identified, port liaisons and Ecotrust staff initiated contact with individual fishermen to ask for their participation in the process and to schedule interview times. During the interviews, commercial fishermen were asked if they knew other commercial fishermen who they felt either should be interviewed or would be interested in being interviewed.

Ecotrust identified charter operators by networking in each port. Because of advertising and marketing, charter operations are often highly visible in a harbor and widely known. Using this method, Ecotrust field staff compiled a list of charter operations in each port, and later confirmed and added to this list as each charter operator was interviewed. Because the charter owner/operator population is small, we were able to interview almost 100% of the state-wide coastal charter fleet.

Within the recreational sector, Ecotrust staff networked with port communities to interview recreational fishermen within three recreational sub-sectors: 1) motorized, powered private vessel ("sport boats"); 2) kayak fishing; and 3) dive. In addition to these in-person interviews, Ecotrust also launched an online tool designed to collect data from recreational fishermen across the entire state of Oregon. This is a supplementary strategy we added to our project in order to reach out to the large population of recreational fishermen not able to participate in face-to-face interviews in coastal towns.

To conduct outreach for in-person interviews and the online survey tool, Ecotrust staff conducted a series of outreach meetings, worked with key leaders in the recreational community, met with port and sector liaisons, posted information to online fishing forums, contributed to fishing association newsletters such as the Coastal Conservation Association, sent information to email listservs, and disseminated flyers at bait-and-tackle stores and ODFW field offices, etc.

To further reach out to the coastal recreational fishing community, Ecotrust conducted a mailing to 3,253 individuals. This list of individuals was created by obtaining two sets of contact data. One set was obtained from ODFW, which listed the contact information of individuals who bought an annual recreational fishing permit in 2009. The other dataset was obtained from the Oregon Marine Board, which lists the contact data of all individuals who have a registered boating vessel in Oregon. Cross-referencing these two datasets, Ecotrust created a list of individuals who both had an annual recreational fishing permit and own a boat. This list was then further stratified by zip codes into regions: coastal, valley/coastal, valley, and east of the cascades. In order to target coastal recreational fishermen, we sent mailings to 100% of the individuals who had coastal zip codes, 75% of those who had valley/coastal zip codes, and 50% of those who had valley zip codes.

Given that the same fishing license and boat registration process is used by the state for individuals who fish in freshwater or salt water, we included a preaddressed, stamped postcard with each mailing asking the recipient to mail it back after checking one of the following options:

- ▫ I plan to participate in the Oregon Recreational Fishing Survey.
- ▫ I plan to participate in the survey, but prefer to do it either in person or over the phone. Please contact me about one of these options at this phone number: _____
- ▫ I do not recreationally fish (private vessel, dive, or kayak) in Oregon coastal waters.
- ▫ I do recreationally fish in Oregon coastal waters, but am not interested in participating in the survey because _____

Of the 2,926 information packets sent out, only 232 individuals (7.9%) returned the response card. Of those responding, the rate of intent to participate in the survey was greatest from respondents in coastal counties (64.3%), then coastal/valley counties (50.0%), and finally valley counties (32.8%). These rates of intent generally corresponded with levels of participation in saltwater fishing by geographic region—the region with the highest rate of participation in saltwater fishing had the highest intent to participate. Table 2 also shows the percentage of respondents who fish in coastal waters by geographic area of residence.

**Table 2: Summary of responses**

| | Fish in coastal waters | Don't fish in coastal waters |
|---|---|---|
| Coastal | 82.1% | 17.9% |
| Valley | 54.8% | 45.2% |
| Valley/coastal | 44.3% | 55.7% |
| East of Cascades | — | — |
| Total | 58.6% | 41.4% |

A number of factors, such as the time constraints imposed on the project and the unknown overall size of the Oregon coastal recreational fishing community by mode, geography, and demographics made the use of this sampling methodology the most practical.

The interview process varied by sector; commercial fishermen were interviewed in person using a desktop version of a custom-built Geographic Information System (GIS) application known as Open OceanMap[3], as were charter operators. Interviews with recreational fishermen were done either in person or using a web-based version of Open OceanMap (http://oregonfishing.ecotrust.org). The majority of surveys with recreational fishermen were completed in person with field staff; approximately 31% of the surveys were completed online (see Table 3).

**Table 3: Recreational survey participation**

| User Group | Online | In person | Total |
|---|---|---|---|
| Private vessel | 63 | 145 | 208 |
| Kayak | 8 | 10 | 18 |
| Dive | 3 | 8 | 11 |
| Total | 74 | 163 | 237 |

Interviews were conducted in person using one-on-one or small group formats. Field staff used Open OceanMap to map areas representing participants' fishing grounds and collect other non-spatial

[3] For more information on Open OceanMap, see http://www.ecotrust.org/ocean/OpenOceanMap.html.

attributes, including demographics, basic operations (gear types, crew size/composition, operating costs and revenues), and other descriptive characteristics.

All interview data were entered directly into a spatially enabled, Open Source GIS database using Open OceanMap, which is programmed to allow fishermen to draw fishing areas in their natural sizes (polygons) rather than confining responses to a statistical grid or to political boundaries. We are then able to standardize this information across respondents or fisheries. Although data are later summarized to a variety of different raster outputs for the subsequent analysis, the raw data are entered in natural shapes and at a spatial scale that makes sense to respondents. Base information (nautical charts, 1:185,236) are used to guide their responses.

All interviews followed a shared protocol:

1. Maximum extent: Using electronic and paper nautical charts of the area, fishermen are asked to identify, by fishery, the maximum extent north, south, east, and west that they would forage or target a species.
2. Scaling: They are then asked to identify, within this maximum forage area, which areas are of critical economic importance, over their cumulative fishing experience, and to rank these using a weighted percentage—an imaginary "bag of 100 pennies" that they distribute over the fishing grounds.
3. Non-spatial information pertaining to demographics and basic operations was also collected.

The first step establishes the maximum extent of the fleet in each fishery. This differs for all fisheries, some of which range far along the entire West Coast, while others are confined to inshore waters. In the subsequent analysis this allows us to distinguish between fisheries that take place wholly in the Oregon Territorial Sea from others that take place both inside and outside. When respondents provide the extent of their fishing grounds they are not constrained to just state waters or any other political or management boundary. This allows for further analysis regarding which fisheries occur wholly or partially in a given area regardless of its designation.

The second step serves to scale respondents' reporting of the relative importance of the fishing grounds to a common scale. This is important for making inter- and intra-fishery comparisons. We chose 100 pennies as an intuitive common sum scale for scoring the relative importance of subareas identified within the larger fishing grounds. It also provides us with a convenient accounting unit for aggregating the stated importance per unit area in the intermediary steps of the various analyses performed.

The non-spatial information related to demographics and basic operations is helpful in creating summary statistics and estimating basic operating costs.

Throughout the project, strict measures were taken to ensure and protect the confidentiality of the information provided by fishermen. Interviews were conducted under individual non-disclosure and consent forms. Measures also included data collection and analysis protocols that mask all names and identifying characteristics of an individual's fishing grounds, as well as new functions in Open OceanMap used to conduct the interviews. In line with this effort, data for ports or fisheries with three or fewer respondents have been withheld from publication to protect the confidentiality of the

survey respondents[4]. Fishermen own the original knowledge (fishing trade secrets) as protected under the non-disclosure agreement documents.
Quality assurance and quality control (QAQC) involved a four-step process:

1) editing of spatial data by Ecotrust staff based on notes from interviews and when required to standardize the data (e.g. clipping a shape to the shoreline);
2) review by each participant of his/her individual maps and information;
3) review by fishing communities, through group meetings, to verify aggregated results; and
4) coordination with fishing communities to ensure confidentiality of any publicly displayed information.

### 3.4 Data Analysis Methods

The analysis of the fishing grounds information was broadly comprised of two components: determination of the fishing grounds and determination of relative (economic) importance. It should be noted that the fishing grounds of respondents for commercial and charter fisheries are weighted by ex-vessel value and gross income respectively, while recreational fisheries' areas are weighted equally across all respondents. For additional details on the data analysis methods, please see Scholz et al. (In Press).

## 4 Summary Statistics

Project results and deliverables can be broadly categorized as summary statistics and map products (geodatabases). This section focuses on the summary statistics, which are presented by user group.

### 4.1 Commercial Fisheries

Overall, we reached and often exceeded our sampling goal of representing at least 50% of the total landings revenue from 2004–2008 for each landing port/fishery combination.

Statewide, we met our sampling goal for nearly 75% of all examined fisheries, falling short in just five fisheries: rockfish–hook and line (dead) (41%), rockfish–longline (dead) (34%), salmon–troll (27%), tuna–troll (15%), and sardine–net (seine). Notably, despite interviewing 113 salmon–troll fishermen and 109 tuna-troll fishermen, the second and third most interviewed fisheries in our study, we achieved only 27% and 15% representation, respectively. This is due to the hundreds of fishermen who are involved in these fisheries statewide.

Table 4 captures the percentage of landings revenue (2004-2008) that our sample represents for each fishery in each landing port. Of the fisheries with three or more respondents, the overall representation for the study region was highest for pink shrimp–trawl (75%), sablefish–trap (75%), and urchin–dive (73%). For the Dungeness crab fishery, we exceeded our sampling goal by representing more than 50% of the landings revenue within each port and statewide (59%). Given its economic value and potential for conflict with sites for current wave energy technologies, this is an important achievement. By port, we met or exceeded our sampling goals for every fishery in Depoe

[4] An asterisk denotes such instances in the following summary statistics tables, and should not be confused with the dash, which indicates "no data collected". Data may be unavailable because either a particular fishery does not occur in a particular port, or because survey respondents declined to answer. A double asterisk appears in Table 2 only and indicates that while the data are withheld for confidentiality reasons, the survey representation met or surpassed our 50% sampling goal.

Bay and Florence. The remaining ports, except for Astoria and Garibaldi, were only slightly deficient in three fisheries or fewer overall.

Table 5 displays the number of fishermen interviewed per fishery by "home" port, or primary port of operation. Because one fisherman may participate in multiple fisheries, out of 244 individual commercial fishermen, the total number of responses per home port, per fishery is 751. The ports with the largest number of respondents were Coos Bay and Charleston (197), Newport (144), Port Orford (108), and Astoria (96). The fisheries with the highest number of interviews were Dungeness crab (159), salmon–troll (113), tuna–troll (109), and sablefish–longline (56). Tuna–troll fisheries have not been included in spatial analyses due to the extent of the fishery, but are included here in the non-spatial analysis, as this is an important commercial fishery.

Table 4: Percentage of landings revenue represented in each landing port/fishery

| Fishery | Astoria | Garibaldi | Depoe Bay | Newport | Florence | Winchester Bay | Coos Bay/ Charleston | Port Orford | Gold Beach | Brookings | Oregon |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dungeness Crab - Trap | 53% | 64% | 70% | 57% | 55% | 79% | 60% | 59% | 100% | 63% | **59%** |
| Hagfish - Trap | — | ** | — | 84% | — | — | 55% | * | — | — | **52%** |
| Pacific Halibut - Longline | 71% | 44% | — | 58% | ** | 58% | 43% | 19% | — | — | **56%** |
| Petrale Sole - Bottom Trawl | 54% | — | — | 95% | — | ** | 73% | — | — | 50% | **65%** |
| Pink Shrimp - Trawl | 59% | 76% | — | 83% | — | — | 80% | — | — | 88% | **75%** |
| Rockfish - Hook and Line (dead) | — | * | 80% | 54% | — | — | 59% | 60% | 39% | 49% | **41%** |
| Rockfish - Hook and Line (live) | — | ** | ** | ** | — | — | 88% | 59% | 60% | 73% | **62%** |
| Rockfish - Longline (dead) | — | — | — | — | — | — | 31% | 54% | — | — | **34%** |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | 67% | — | — | **67%** |
| Rockfish - Trap | — | ** | — | — | — | — | — | — | — | — | **** |
| Sablefish - Longline | 47% | * | — | 72% | ** | 74% | 66% | 71% | — | 100% | **69%** |
| Sablefish - Trap | 55% | 34% | — | 89% | — | ** | 71% | — | — | ** | **75%** |
| Salmon - Troll | 21% | 15% | 55% | 20% | 49% | 31% | 32% | 55% | 53% | 42% | **27%** |
| Sardine - Net (Seine) | * | — | — | * | — | — | — | — | — | — | ** |
| Seaward RCA Trawl | 50% | * | — | 71% | ** | — | 66% | — | — | 91% | **63%** |
| Shelf Bottom Trawl | 48% | ** | — | 96% | — | — | 78% | — | — | — | **56%** |
| Tuna - Troll | 5% | * | — | 16% | 34% | 43% | 24% | 70% | 74% | 53% | 15% |
| Urchin - Dive | — | — | ** | — | — | — | ** | ** | ** | — | **73%** |
| Whiting - Midwater Trawl | 62% | — | — | 57% | — | — | ** | — | — | — | **59%** |

*— indicates that the fishery was not sampled in a particular port*
** indicates data were collected but cannot be shown due to confidentiality constraints*
*** indicates data were collected and met or surpassed the 50% goal, but cannot be shown due to confidentiality constraints*

Table 5: Number of fishermen interviewed by home port/fishery

| Fishery | Astoria | Garibaldi | Depoe Bay | Newport | Florence | Winchester Bay | Coos Bay/ Charleston | Port Orford | Gold Beach | Brookings | Oregon |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dungeness Crab - Trap | 26 | 8 | 3 | 30 | 5 | 10 | 37 | 15 | 3 | 22 | **159** |
| Hagfish - Trap | — | 1 | — | 2 | 1 | 1 | 3 | 1 | — | — | **9** |
| Pacific Halibut - Longline | 5 | 4 | 3 | 11 | 1 | 5 | 10 | 5 | — | 1 | **45** |
| Petrale Sole - Bottom Trawl | 9 | — | — | 8 | — | — | 10 | — | — | 3 | **30** |
| Pink Shrimp - Trawl | 9 | 2 | — | 9 | — | 2 | 10 | — | — | 5 | **37** |
| Rockfish - Hook and Line (dead) | — | 1 | 3 | 4 | — | — | 16 | 13 | 2 | 7 | **46** |
| Rockfish - Hook and Line (live) | — | 1 | 2 | 1 | — | — | 2 | 15 | 4 | 7 | **32** |
| Rockfish - Longline (dead) | — | 1 | — | — | — | — | 2 | 8 | — | 1 | **12** |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | 13 | 2 | 1 | **16** |
| Rockfish - Trap | — | 1 | — | — | — | — | — | — | — | — | **1** |
| Sablefish - Longline | 5 | — | — | 8 | 1 | 5 | 18 | 15 | — | 4 | **56** |
| Sablefish - Trap | 2 | 2 | — | 5 | 2 | 1 | 1 | — | — | 1 | **14** |
| Salmon - Troll | 8 | 6 | 3 | 16 | 4 | 9 | 39 | 10 | 3 | 15 | **113** |
| Sardine - Net (Seine) | — | — | — | 1 | — | — | — | — | — | — | **1** |
| Seaward RCA - Trawl | 12 | — | — | 10 | — | — | 8 | — | — | 4 | **34** |
| Shelf Bottom - Trawl | 9 | — | — | 6 | — | — | 4 | — | — | — | **19** |
| Tuna - Troll | 8 | 1 | — | 25 | 2 | 10 | 34 | 11 | 5 | 13 | 109 |
| Urchin - Dive | — | — | — | — | — | — | 1 | 2 | 1 | — | 4 |
| Whiting - Midwater Trawl | 3 | — | — | 8 | — | — | 2 | — | — | 1 | 14 |
| **Total**[5] | **96** | **28** | **14** | **144** | **16** | **43** | **197** | **108** | **20** | **85** | **751** |

[5] Note: Because one fisherman may participate in multiple fisheries, out of 244 individual commercial fishermen interviewed, the total number of responses per home port or state-wide will be greater than the actual number of fishermen interviewed.

It should also be noted that, while all commercial fishermen provided spatial data, a small amount of this data could not be used in the spatial analysis of this study because there were no landings associated with that fishery for that person at that port[6]. Since landings values form the basis for weighing an individual fisherman's fishing grounds in the aggregated fishing grounds analysis, those without landings information would effectively decrease the value of the aggregated grounds; however, information for these individuals is still included in the non-spatial summary statistics in this report.

By port group, Coos Bay and Charleston had the largest number of individual commercial fishermen interviewed (65), while Gold Beach had the fewest (6). The average commercial respondent is a 53-year-old male with 31 years of fishing experience who derives 90% of his annual income from commercial fishing. It should be noted, however, that these are the average values, and that the vast majority of respondents in each port cited 100% dependence on commercial fishing as their source of income. Table 6 displays more port-specific details on commercial respondents' demographics by home port group.

**Table 6: Respondent demographics by home port group**

| Home port | # sampled | Average | | |
|---|---|---|---|---|
| | | Age | Years experience | Income from fishing (%) |
| Astoria | 39 | 51 | 34 | 93% |
| Garibaldi | 11 | 60 | 27 | 80% |
| Depoe Bay | 6 | 60 | 38 | 61% |
| Newport | 46 | 51 | 32 | 95% |
| Florence | 6 | 63 | 26 | 96% |
| Winchester Bay | 12 | 54 | 27 | 91% |
| Coos Bay/Charleston | 65 | 55 | 33 | 91% |
| Port Orford | 20 | 52 | 23 | 91% |
| Gold Beach | 6 | 50 | 27 | 72% |
| Brookings | 33 | 51 | 29 | 86% |
| **Total** | **244** | **53** | **31** | **90%** |

Table 7 displays survey responses on demographics, fishery-related income, and vessel information broken out by commercial fishery. In regards to average income from a specific fishery, urchin divers reported the highest average income (68%), followed by Dungeness crab trap fishermen (65%). Rockfish–longline (dead) accounted for only 0.25% of respondents' total average income, which may be attributed to reductions in the quota allocated to rockfish permit holders and the increased spatial restrictions on longline gear.

Respondents who participate in the salmon fishery have the most years of experience in a particular fishery, with 28 years, on average, while respondents who participate in the hagfish fishery have the lowest average years of experience (4).

Seaward RCA trawl respondents spend the highest average number of days fishing: 105 days per year. Pacific halibut longline respondents, conversely, spend the fewest average number of days fishing per year (9). Data for fisheries with only three respondents or fewer are withheld from Table 7 for confidentiality purposes. Tables 8–17 display the port-specific survey responses by gear type and by fishery. In all tables, an "*" indicates data were collected, but cannot be shown due to confidentiality constraints.

[6] Exact cause or reason for a given fisherman's information not present in the landing receipts is unknown. Possible reasons may include: they are retired or haven't made landings in the time period we considered, they do not target and/or make landings for a fishery they provided information for, or information is misreported in landings receipts.

Table 7: Oregon – Respondent demographics/characteristics by fishery and gear type

| Fishery | # sampled | # male | Age | Averages | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 159 | 157 | 52 | 30 | 94% | 24 | 65% | 69 |
| Hagfish - Trap | 9 | 9 | 51 | 29 | 98% | 4 | 15% | 84 |
| Pacific Halibut - Longline | 45 | 44 | 53 | 28 | 97% | 18 | 4% | 9 |
| Petrale Sole - Bottom Trawl | 30 | 30 | 51 | 34 | 99% | 25 | 12% | 46 |
| Pink Shrimp - Trawl | 37 | 37 | 50 | 32 | 97% | 23 | 42% | 83 |
| Rockfish - Hook and Line (dead) | 46 | 45 | 56 | 24 | 76% | 15 | 15% | 62 |
| Rockfish - Hook and Line (live) | 32 | 31 | 52 | 24 | 84% | 16 | 44% | 66 |
| Rockfish - Longline (dead) | 12 | 12 | 55 | 23 | 91% | 16 | 0% | 54 |
| Rockfish - Longline (live) | 16 | 16 | 52 | 24 | 97% | 16 | 4% | 63 |
| Rockfish - Trap | 1 | * | * | * | * | * | * | * |
| Sablefish - Longline | 56 | 55 | 52 | 29 | 97% | 20 | 23% | 36 |
| Sablefish - Trap | 14 | 14 | 49 | 31 | 100% | 17 | 19% | 22 |
| Salmon - Troll | 113 | 113 | 55 | 30 | 90% | 28 | 36% | 48 |
| Sardine - Net (Seine) | 1 | * | * | * | * | * | * | * |
| Seaward RCA Trawl | 34 | 34 | 50 | 33 | 98% | 25 | 38% | 105 |
| Shelf Bottom Trawl | 19 | 19 | 51 | 34 | 99% | 25 | 19% | 53 |
| Tuna - Troll | 109 | 108 | 51 | 29 | 89% | 21 | 20% | 40 |
| Urchin - Dive | 4 | 4 | 53 | 25 | 86% | 14 | 68% | 80 |
| Whiting - Midwater Trawl | 14 | 14 | 48 | 34 | 98% | 25 | 49% | 44 |
| **Total** | **244** | **241** | **53** | **31** | **90%** | **—** | **—** | **—** |

** indicates data were collected but cannot be shown due to confidentiality constraints*

Table 8: Astoria – Respondent demographics/characteristics by fishery and gear type

| Fishery | # sampled | # male | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| | | | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 26 | 26 | 52 | 34 | 92% | 28 | 74% | 75 |
| Hagfish - Trap | — | — | — | — | — | — | — | — |
| Pacific Halibut - Longline | 5 | 5 | 48 | 33 | 100% | 27 | 5% | 2 |
| Petrale Sole - Bottom Trawl | 9 | 9 | 48 | 29 | 97% | 22 | 15% | 19 |
| Pink Shrimp - Trawl | 9 | 9 | 51 | 31 | 97% | 22 | 53% | 71 |
| Rockfish - Hook and Line (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (live) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | 5 | 5 | 53 | 36 | 93% | 26 | 27% | 32 |
| Sablefish - Trap | * | * | * | * | * | * | * | * |
| Salmon - Troll | 8 | 8 | 52 | 33 | 75% | 27 | 47% | 64 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | 11 | 11 | 49 | 30 | 98% | 24 | 42% | 100 |
| Shelf Bottom Trawl | 9 | 9 | 48 | 30 | 97% | 23 | 24% | 54 |
| Tuna - Troll | 8 | 8 | 50 | 32 | 78% | 22 | 28% | 60 |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | 3 | 3 | 50 | 32 | 100% | 13 | 29% | 42 |

Table 9: Garibaldi – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 8 | 7 | 58 | 30 | 87% | 25 | 83% | 94 |
| Hagfish - Trap | * | * | * | * | * | * | * | * |
| Pacific Halibut - Longline | 4 | 4 | 62 | 31 | 93% | 14 | 1% | 3 |
| Petrale Sole - Bottom Trawl | — | — | — | — | — | — | — | — |
| Pink Shrimp - Trawl | * | * | * | * | * | * | * | * |
| Rockfish - Hook and Line (dead) | * | * | * | * | * | * | * | * |
| Rockfish - Hook and Line (live) | * | * | * | * | * | * | * | * |
| Rockfish - Longline (dead) | * | * | * | * | * | * | — | * |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | * | * | * | — | * | * | * | * |
| Sablefish - Longline | — | — | — | — | — | — | — | — |
| Sablefish - Trap | * | * | * | * | * | * | * | * |
| Salmon - Troll | 6 | 6 | 59 | 26 | 84% | 28 | 14% | 40 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | — | — | — | — | — | — | — | — |
| Shelf Bottom Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | * | * | * | * | * | * | * | * |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | — | — | — | — | — | — | — | — |

Table 10: Depoe Bay – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 3 | 3 | 56 | 35 | 70% | 25 | 92% | 79 |
| Hagfish - Trap | — | — | — | — | — | — | — | — |
| Pacific Halibut - Longline | 3 | 3 | 63 | 32 | 87% | 20 | — | 31 |
| Petrale Sole - Bottom Trawl | — | — | — | — | — | — | — | — |
| Pink Shrimp - Trawl | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (dead) | 3 | 3 | 63 | 31 | 83% | 22 | 18% | 35 |
| Rockfish - Hook and Line (live) | * | * | * | * | * | * | * | * |
| Rockfish - Longline (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | — | — | — | — | — | — | — | — |
| Sablefish - Trap | — | — | — | — | — | — | — | — |
| Salmon - Troll | 3 | 3 | 63 | 31 | 83% | 32 | 46% | 70 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | — | — | — | — | — | — | — | — |
| Shelf Bottom Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | — | — | — | — | — | — | — | — |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | — | — | — | — | — | — | — | — |

Table 11: Newport – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 30 | 30 | 50 | 33 | 96% | 27 | 54% | 53 |
| Hagfish - Trap | * | * | * | * | * | * | * | * |
| Pacific Halibut - Longline | 11 | 11 | 53 | 31 | 98% | 16 | 5% | 2 |
| Petrale Sole - Bottom Trawl | 8 | 8 | 52 | 33 | 100% | 27 | 11% | 40 |
| Pink Shrimp - Trawl | * | * | * | * | * | * | * | * |
| Rockfish - Hook and Line (dead) | 4 | 4 | 53 | 20 | 60% | 7 | 50% | 11 |
| Rockfish - Hook and Line (live) | * | * | * | * | — | * | * | — |
| Rockfish - Longline (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | 8 | 8 | 46 | 30 | 99% | 20 | 25% | 33 |
| Sablefish - Trap | 5 | 5 | 48 | 32 | 99% | 26 | 34% | 26 |
| Salmon - Troll | 16 | 16 | 54 | 32 | 93% | 29 | 27% | 58 |
| Sardine - Net (Seine) | * | * | * | * | * | * | * | * |
| Seaward RCA Trawl | 10 | 10 | 51 | 34 | 98% | 25 | 38% | 100 |
| Shelf Bottom Trawl | 6 | 6 | 52 | 35 | 100% | 27 | 11% | 50 |
| Tuna - Troll | 25 | 25 | 50 | 31 | 88% | 23 | 13% | 36 |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | 8 | 8 | 45 | 32 | 97% | 32 | 60% | 47 |

Table 12: Florence – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 5 | 5 | 55 | 23 | 95% | 14 | 68% | 119 |
| Hagfish - Trap | * | * | * | * | * | * | * | * |
| Pacific Halibut - Longline | * | * | — | * | * | * | * | * |
| Petrale Sole - Bottom Trawl | — | — | — | — | — | — | — | — |
| Pink Shrimp - Trawl | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (live) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | * | * | — | * | * | * | * | * |
| Sablefish - Trap | * | * | * | * | * | * | * | * |
| Salmon - Troll | 4 | 4 | 78 | 31 | 100% | 28 | 33% | 26 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | — | — | — | — | — | — | — | — |
| Shelf Bottom Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | * | * | — | * | * | * | * | * |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | — | — | — | — | — | — | — | — |

Table 13: Winchester Bay – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 10 | 10 | 51 | 30 | 95% | — | 60% | — |
| Hagfish - Trap | * | * | * | * | * | — | * | — |
| Pacific Halibut - Longline | 5 | 5 | 47 | 25 | 99% | — | 3% | — |
| Petrale Sole - Bottom Trawl | — | — | — | — | — | — | — | — |
| Pink Shrimp - Trawl | * | * | * | * | * | — | — | — |
| Rockfish - Hook and Line (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (live) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | 5 | 5 | 46 | 27 | 100% | — | 9% | — |
| Sablefish - Trap | * | * | * | * | * | — | * | — |
| Salmon - Troll | 9 | 9 | 54 | 26 | 88% | — | 36% | — |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | — | — | — | — | — | — | — | — |
| Shelf Bottom Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | 10 | 10 | 50 | 28 | 82% | — | 28% | — |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | — | — | — | — | — | — | — | — |

Table 14: Charleston/Coos Bay – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 37 | 37 | 53 | 34 | 98% | — | 66% | — |
| Hagfish - Trap | 3 | 3 | 56 | 34 | 100% | — | 31% | — |
| Pacific Halibut - Longline | 10 | 10 | 51 | 24 | 100% | — | 6% | — |
| Petrale Sole - Bottom Trawl | 10 | 10 | — | — | — | — | 14% | — |
| Pink Shrimp - Trawl | 10 | 10 | 51 | 35 | 100% | — | 27% | — |
| Rockfish - Hook and Line (dead) | 16 | 16 | — | — | — | — | 14% | — |
| Rockfish - Hook and Line (live) | * | * | — | — | — | — | * | — |
| Rockfish - Longline (dead) | * | * | — | — | — | — | * | — |
| Rockfish - Longline (live) | — | — | — | — | — | — | — | — |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | 18 | 18 | 54 | 29 | 96% | — | 19% | — |
| Sablefish - Trap | * | * | * | * | * | — | * | — |
| Salmon - Troll | 39 | 39 | 54 | 31 | 90% | — | 43% | — |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | 8 | 8 | — | — | — | — | 35% | — |
| Shelf Bottom Trawl | 4 | 4 | — | — | — | — | 15% | — |
| Tuna - Troll | 34 | 34 | 53 | 29 | 95% | — | 23% | — |
| Urchin - Dive | * | * | — | — | — | — | — | — |
| Whiting - Midwater Trawl | * | * | — | — | — | — | * | — |

Table 15: Port Orford – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 15 | 15 | 52 | 24 | 96% | 24 | 53% | 69 |
| Hagfish - Trap | * | * | * | * | * | * | — | * |
| Pacific Halibut - Longline | 5 | 5 | 54 | 26 | 98% | 19 | 1% | 19 |
| Petrale Sole - Bottom Trawl | — | — | — | — | — | — | — | — |
| Pink Shrimp - Trawl | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (dead) | 13 | 13 | 52 | 20 | 95% | 14 | 1% | 54 |
| Rockfish - Hook and Line (live) | 15 | 15 | 52 | 21 | 95% | 14 | 33% | 49 |
| Rockfish - Longline (dead) | 8 | 8 | 57 | 23 | 95% | 15 | 0% | 61 |
| Rockfish - Longline (live) | 13 | 13 | 53 | 23 | 97% | 15 | 4% | 57 |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | 15 | 15 | 52 | 24 | 98% | 19 | 28% | 44 |
| Sablefish - Trap | — | — | — | — | — | — | — | — |
| Salmon - Troll | 10 | 10 | 52 | 27 | 92% | 27 | 26% | 23 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA Trawl | — | — | — | — | — | — | — | — |
| Shelf Bottom Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | 11 | 11 | 52 | 26 | 94% | 19 | 1% | 16 |
| Urchin - Dive | * | * | * | * | * | * | * | * |
| Whiting - Midwater Trawl | — | — | — | — | — | — | — | — |

Table 16: Gold Beach – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 3 | 3 | — | 26 | 81% | 18 | 59% | 45 |
| Hagfish - Trap | — | — | — | — | — | — | — | — |
| Pacific Halibut - Longline | — | — | — | — | — | — | — | — |
| Petrale Sole - Bottom Trawl | — | — | — | — | — | — | — | — |
| Pink Shrimp - Trawl | — | — | — | — | — | — | — | — |
| Rockfish - Hook and Line (dead) | * | * | * | * | * | * | * | * |
| Rockfish - Hook and Line (live) | 4 | 4 | 48 | 23 | 83% | 18 | 68% | 90 |
| Rockfish - Longline (dead) | — | — | — | — | — | — | — | — |
| Rockfish - Longline (live) | * | * | * | * | * | * | — | * |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | — | — | — | — | — | — | — | — |
| Sablefish - Trap | — | — | — | — | — | — | — | — |
| Salmon - Troll | 3 | 3 | 53 | 35 | 78% | 35 | 42% | 50 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA - Trawl | — | — | — | — | — | — | — | — |
| Shelf Bottom - Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | 5 | 5 | 50 | 31 | 67% | 27 | 19% | 20 |
| Urchin - Dive | * | * | * | * | * | * | * | * |
| Whiting - Midwater Trawl | — | — | — | — | — | — | — | — |

Table 17: Brookings – Respondent demographics/characteristics by fishery and gear type

| | | | Averages | | | Fishery-specific averages | | |
|---|---|---|---|---|---|---|---|---|
| Fishery | # sampled | # male | Age | Years experience | Income from fishing (%) | Years experience | Income from fishery (%) | # of days fishing |
| Dungeness Crab - Trap | 22 | 21 | 50 | 27 | 95% | 19 | 70% | 72 |
| Hagfish - Trap | — | — | — | — | — | — | — | — |
| Pacific Halibut - Longline | * | — | — | * | * | * | * | * |
| Petrale Sole - Bottom Trawl | 3 | 3 | 52 | 37 | 98% | 29 | 2% | 112 |
| Pink Shrimp - Trawl | 5 | 5 | 44 | 35 | 96% | 24 | 30% | 100 |
| Rockfish - Hook and Line (dead) | 7 | 6 | 60 | 23 | 46% | 17 | 28% | 120 |
| Rockfish - Hook and Line (live) | 7 | 6 | 55 | 28 | 78% | 23 | 81% | 101 |
| Rockfish - Longline (dead) | * | * | * | * | * | * | * | * |
| Rockfish - Longline (live) | * | * | * | * | * | * | * | * |
| Rockfish - Trap | — | — | — | — | — | — | — | — |
| Sablefish - Longline | 4 | 3 | — | 33 | 100% | 16 | 29% | 18 |
| Sablefish - Trap | * | * | * | * | * | * | * | * |
| Salmon - Troll | 15 | 15 | 52 | 28 | 96% | 27 | 33% | 58 |
| Sardine - Net (Seine) | — | — | — | — | — | — | — | — |
| Seaward RCA - Trawl | 4 | 4 | 43 | 35 | 99% | 31 | 36% | 141 |
| Shelf Bottom - Trawl | — | — | — | — | — | — | — | — |
| Tuna - Troll | 13 | 12 | 50 | 26 | 91% | 17 | 36% | 60 |
| Urchin - Dive | — | — | — | — | — | — | — | — |
| Whiting - Midwater Trawl | * | * | * | * | * | * | * | * |

## 4.2 Charter Fisheries

Field staff interviewed a total of 63 charter operators/owners. By port group, Astoria comprised the highest number of respondents (37%), including 23 charter owners and operators from Ilwaco, Astoria, Warrenton, and Hammond. Depoe Bay (13) and Newport (11) both had a large number of respondents as well, while the remaining ports had five or fewer respondents each. Garibaldi is not represented in this section as these ports' charter operators declined to participate in the survey. Port Orford is not represented in this section as there were no charter operations in this port at the time of the survey.

Of all 63 respondents, the majority (76%) of charter operators own their own vessel(s). The average charter owner has owned two vessels for 17 years, while the average charter operator operates one vessel and has 23 years of operating experience. The average charter respondent is a 52-year-old male who works with a vessel of 38 feet. The average respondent fishes an average of 117 days per year and has nine passengers and one crewman. More port-specific details are displayed in Table 18.

Charter respondents were asked to identify which fisheries they target on charter trips, how frequently, and the average cost to the charter client(s) per targeted species. Combo trips, where more than one species is fished per outing, are very common. Table 19 averages responses across all respondents and by port group. Across all respondents, the most popular fisheries are salmon, rockfish, and Dungeness crab, constituting an average of 46%, 42%, and 39% of all charter trips, respectively. Both albacore tuna and Pacific halibut are targeted less frequently; additionally, on average, both these fisheries represent the largest costs to charter clients at $273 and $196 dollars per client per trip, respectively. All respondents operate rockfish and salmon trips.

Table 18: Summary of charter response by port

| | Number of respondents | | Average | | | | | Operators | | Owners | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Port | Operators | Owners | Age (years) | Vessel Length (ft.) | Days fishing per year | # of passengers | # of crew | # of vessels operated | # of years operating | # of vessels owned | # of years owned |
| Astoria | 7 | 16 | 50 | 38 | 88 | 8 | 1 | 1 | 19 | 2 | 20 |
| Depoe Bay | 3 | 10 | 54 | 40 | 142 | 11 | 1 | 1 | 38 | 1 | 18 |
| Newport | 5 | 6 | 50 | 41 | 159 | 11 | 1 | 1 | 20 | 2 | 15 |
| Florence | — | 1 | 62 | 31 | 52 | 4 | 1 | — | — | 2 | 4 |
| Winchester Bay/Reedsport | — | 5 | 52 | 31 | 98 | 4 | 0 | — | — | 2 | 11 |
| Coos Bay/Charleston/Bandon | — | 4 | 62 | 43 | 135 | 10 | 1 | — | — | 2 | 17 |
| Gold Beach | — | 3 | 59 | 29 | 125 | 5 | 0 | — | — | 2 | 20 |
| Brookings | — | 3 | 35 | 31 | 100 | 8 | 1 | — | — | 2 | 11 |
| **All respondents** | **15** | **48** | **52** | **38** | **117** | **9** | **1** | **1** | **23** | **2** | **17** |

*Note: All respondents are male*

Table 19: Percentage of trips for each species and average cost to angler

| Fishery | | Astoria | Depoe Bay | Newport | Florence | Winchester Bay/Reedsport | Coos Bay/ Charleston/ Bandon | Gold Beach | Brookings | All respondents |
|---|---|---|---|---|---|---|---|---|---|---|
| Albacore Tuna | # of respondents | 11 | 0 | 9 | 0 | 2 | 4 | 1 | 1 | **28** |
| | Avg. % of trips | 10 | — | 14 | — | — | — | 10 | 5 | **11** |
| | Avg. cost to angler | 323 | — | 212 | — | — | — | 300 | — | **273** |
| Dungeness Crab | # of respondents | 2 | 13 | 10 | 1 | 4 | 4 | 1 | 0 | **35** |
| | Avg. % of trips | 28 | 26 | 56 | 10 | — | — | 83 | — | **39** |
| | Avg. cost to angler | - | 14 | 14 | 30 | — | — | — | — | **14** |
| Pacific Halibut | # of respondents | 9 | 11 | 10 | 1 | 3 | 4 | 1 | 0 | **39** |
| | Avg. % of trips | 6 | 10 | 10 | 35 | — | — | 25 | — | **10** |
| | Avg. cost to angler | 216 | 193 | 188 | 175 | — | — | 225 | — | **196** |
| Rockfish | # of respondents | 13 | 13 | 11 | 1 | 4 | 4 | 3 | 3 | **58** |
| | Avg. % of trips | 8 | 51 | 51 | 6 | — | — | 87 | 73 | **42** |
| | Avg. cost to angler | 138 | 71 | 80 | 70 | — | — | 95 | 80 | **90** |
| Salmon | # of respondents | 23 | 13 | 11 | 1 | 5 | 4 | 3 | 2 | **62** |
| | Avg. % of trips | 67 | 37 | 21 | 35 | — | — | 4 | 50 | **46** |
| | Avg. cost to angler | 118 | 85 | 104 | 145 | — | — | 113 | 130 | **106** |

## 4.3 Recreational Fisheries

The recreational fishing community was stratified into three key user groups:

- Dive anglers;
- Kayak anglers; and
- Private vessel anglers.

Table 20 shows the number of recreational surveys completed by user group. Private vessel respondents were the largest group; out of 237 respondents, 208 (87.8%) completed a private vessel survey. (See Table 3 for details on recreational survey participation.)

**Table 20: Number of respondents for each sector**

| User group | Total surveys |
|---|---|
| Dive | 11 |
| Kayak | 18 |
| Private vessel | 208 |
| Total responses | 237 |

Based on responses provided by survey participants, the average respondent for the private vessel user group is a 53-year-old-male who has operated a vessel for 30 years and owned a vessel for 26 years. On average, private vessel users have 33 years of fishing experience and fish 55 days per year as private vessel anglers.

The average kayak respondent is a 48-year-old male who has 14 years of kayak angling experience and fishes from a kayak 44 days per year. The average diver/spear angler is a 46-year-old male with 20 years experience who dives to fish 52 days per year. In addition, the majority of dive respondents stated that they are SCUBA divers who use a boat as their primary access method. Additional information is provided in Table 21.

**Table 21: Recreational respondent characteristics**

| | Average | | |
|---|---|---|---|
| | Private vessel | Kayak | Dive |
| Age | 53 | 48 | 46 |
| Years experience | 33 | 14 | 20 |
| Average annual number of days active | 55 | 44 | 52 |
| Years operating a private vessel | 30 | — | — |
| Years of vessel ownership | 26 | — | — |
| Vessel length (ft.) | 21 | — | — |
| *Dive access method* | | | |
| - Boat | — | — | 7 |
| - Shore/kayak | — | — | 3 |
| - No response | — | — | 1 |
| Type of trip | | | |
| - SCUBA | — | — | 9 |
| - Free | — | — | 2 |

Table 22: Number of responses for each fishery in each sector and region

| Sector | Fishery | Astoria | Garibaldi | Salmon River | Depoe Bay | Newport | Florence | Winchester Bay/ Reedsport | Coos Bay/ Charleston/ Bandon | Port Orford | Gold Beach | Brookings | Oregon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dive | Dungeness Crab | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 5 |
| | Pacific Halibut | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Rockfish/Bottomfish | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 1 | 1 | 0 | 3 | 11 |
| | Salmon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Flatfish | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Other* | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 2 | 0 | 2 | 9 |
| | **All** | **0** | **0** | **0** | **0** | **14** | **2** | **0** | **1** | **4** | **0** | **5** | **26** |
| Kayak | Dungeness Crab | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 4 | 1 | 0 | 0 | 8 |
| | Pacific Halibut | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 3 |
| | Rockfish/Bottomfish | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 7 | 2 | 0 | 0 | 15 |
| | Salmon | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 6 | 0 | 0 | 0 | 11 |
| | Flatfish | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **All** | **2** | **6** | **0** | **2** | **4** | **1** | **0** | **19** | **3** | **0** | **0** | **37** |
| Private vessel | Dungeness Crab | 16 | 19 | 62 | 5 | 18 | 8 | 6 | 32 | 2 | 3 | 5 | 176 |
| | Pacific Halibut | 8 | 10 | 34 | 5 | 20 | 7 | 2 | 29 | 1 | 0 | 2 | 118 |
| | Rockfish/Bottomfish | 14 | 12 | 55 | 7 | 23 | 7 | 4 | 36 | 2 | 4 | 6 | 170 |
| | Salmon | 19 | 22 | 63 | 8 | 21 | 8 | 6 | 35 | 1 | 3 | 6 | 192 |
| | Flatfish | 3 | 1 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 2 | 10 |
| | **All** | **60** | **64** | **214** | **25** | **85** | **30** | **18** | **133** | **6** | **10** | **21** | **666** |

** Other includes abalone, scallops, clams, and other shellfish*
*Note: Because a respondent may participate in multiple fisheries in multiple ports, the total number of responses per home port or statewide will be greater than the actual 237 number of respondents interviewed.*

Table 22 above displays the number of recreational respondents per port group, per fishery, per recreational activity. Like the survey respondent numbers presented in Table 20, there are more private vessel responses (666) than kayak (37) or dive (26); response numbers are higher overall than the total number of respondents because a respondent may participate in multiple fisheries in multiple ports.

By port group, Salmon River had the highest number of respondents by fishery at 214 respondents. Coos Bay/Charleston/Bandon had 153 respondents by fishery with 133 private vessel respondents, one dive respondent, and the highest number of kayak respondents by fishery and by port at 19. Newport had the greatest number of dive responses by port (14). While all ports had recreational respondents for at least one recreational user group, several ports had no responses for one or two of the user groups. Salmon River, Winchester Bay/Reedsport, and Gold Beach, for example, only had recreational responses by private vessel anglers.

Among dive respondents, rockfish/bottomfish was the most popular fishery with 42% (11 out of 26) dive respondents participating in this fishery. Thirty-five percent of dive respondents claimed "other", targeting abalone, scallops, clams, and other shellfish. Kayak respondents also participated mostly in the rockfish/bottomfish (41%) and salmon (30%) fisheries. Among private vessel respondents, salmon (29%), Dungeness crab (26%) and rockfish/bottomfish (26%) were the most popular fisheries.

For more information on the largest recreational response group, private vessel, see Table 23, which displays private vessel respondent details by port group.

Table 23: Private vessel average responses by port

| | Average responses | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Astoria** | **Garibaldi** | **Salmon River** | **Depoe Bay** | **Newport** | **Florence** | **Winchester Bay/ Reedsport** | **Coos Bay/ Charleston/ Bandon** | **Port Orford** | **Gold Beach** | **Brookings** | **Oregon** |
| Count of individuals | **19** | **22** | **70** | **8** | **25** | **8** | **6** | **36** | **2** | **4** | **8** | **208** |
| Age | 55 | 58 | 46 | 52 | 53 | 53 | 61 | 57 | 44 | 67 | 60 | 53 |
| Years experience | 33 | 31 | 29 | 31 | 31 | 29 | 39 | 38 | 21 | 45 | 40 | 33 |
| Average annual number of days fishing in a private vessel | 54 | 31 | 63 | 118 | 47 | 22 | 74 | 49 | 40 | 59 | 72 | 55 |
| Years operating a private vessel | 29 | 30 | 31 | 31 | 30 | 33 | 31 | 36 | 18 | 32 | 32 | 30 |
| Years of vessel ownership | 23 | 24 | 31 | 31 | 24 | 31 | 33 | 31 | 6 | 31 | 27 | 26 |
| Vessel length (ft.) | 22 | 20 | 18 | 20 | 20 | 29 | 20 | 22 | 21 | 18 | 23 | 20 |

Recreational survey participants were asked to list their top launch ports or access points (up to four) based on frequency of usage (see Table 24). Although 30% of private vessel anglers did not answer, the top three launch ports of those who did respond were Depoe Bay, Salmon River, and Siletz River. All kayak anglers answered, with Sunset Lake, Salmon River, and Newport as their top three launching sites.

It should also be noted that the launch/access sites provided by respondents were grouped together. For example, respondents who indicated Knight's Park or Salmon River were all grouped together as Salmon River. Within these areas, kayak launch sites could be boat ramps or an adjacent shore.

Table 24: Private vessel and kayak top launching sites

| Private vessel launch/access site | Total |
|---|---|
| Did not provide | 63 |
| Depoe Bay | 24 |
| Salmon River | 21 |
| Siletz River | 12 |
| Port Orford | 11 |
| Astoria | 10 |
| Newport | 10 |
| Garibaldi/Tillamook | 9 |
| Brookings | 7 |
| Charleston | 7 |
| Winchester Bay | 6 |
| Gold Beach | 5 |
| Siuslaw | 5 |
| Pacific City | 4 |
| Ilwaco | 3 |
| Non-ocean | 3 |
| Hammond | 2 |
| Nestucca Bay | 2 |
| Cannon Beach | 1 |
| Cape Kiwanda | 1 |
| Florence | 1 |
| Waldport | 1 |
| **Total** | **208** |

| Kayak launch/access site | Total |
|---|---|
| Astoria, Sunset Lake Beach | 5 |
| Salmon River | 2 |
| Newport | 2 |
| Port Orford | 2 |
| Charleston | 2 |
| Pacific City | 1 |
| Siuslaw | 1 |
| Depoe Bay | 1 |
| Reedsport | 1 |
| Non-ocean | 1 |
| **Total** | **18** |

# 5 Map Creation

The following is a summary of datasets combined in each port to create the "cross-sector combined value map" products submitted to DLCD and available for viewing on Oregon MarineMap. The cross-sector combined value map is an aggregate of fishing grounds for all three sectors: commercial, charter, and recreational. In addition to the datasets submitted to the state, Appendix A lists the fisheries collected for each sector in a particular port. The additional fisheries collected are primarily conducted outside the territorial sea and therefore were not relevant for this study; however, those fishery datasets are available for consideration, if needed.

- Astoria
  - Commercial: Dungeness Crab-Trap, Salmon-Troll, Shelf Bottom Trawl
  - Charter: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - Recreational: Dungeness Crab, Flatfish, Pacific Halibut, Rockfish, Salmon
  - In addition to a cross-sector combined value map, a charter fishing map that combined all charter fisheries was also submitted.
- Garibaldi
  - Commercial: Dungeness Crab-Trap, Salmon–Troll, Rockfish–Fixed Gear, Shelf Bottom Trawl
  - Charter: N/A
  - Recreational: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
- Salmon River
  - Commercial: N/A
  - Charter: N/A
  - Recreational: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - In addition to a combined value recreational map, individual fishery maps were also submitted.
- Depoe Bay
  - Commercial: Dungeness Crab-Trap, Salmon–Troll, Rockfish–Fixed Gear, Urchin-Dive
  - Charter: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - Recreational: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
- Newport
  - Commercial: Dungeness Crab-Trap, Salmon–Troll, Rockfish–Fixed Gear, Shelf Bottom Trawl
  - Charter: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - Recreational: Dungeness Crab, Flatfish, Pacific Halibut, Rockfish, Salmon
  - In addition to a cross-sector combined value map, a charter and recreational fishing combination map was also submitted.
- Florence
  - Commercial: Dungeness Crab-Trap, Salmon-Troll
  - Charter: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - Recreational: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
- Charleston/Coos Bay/Bandon/Winchester Bay/Reedsport
  - Commercial: Dungeness Crab-Trap, Salmon–Troll, Rockfish–Fixed Gear, Shelf Bottom Trawl
  - Charter: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - Recreational: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
- Port Orford
  - Commercial: Dungeness Crab-Trap, Salmon–Troll, Rockfish–Fixed Gear, Urchin-Dive
  - Charter: N/A
  - Recreational: N/A
- Gold Beach/Brookings
  - Commercial: Dungeness Crab-Trap, Salmon–Troll, Rockfish–Fixed Gear, Urchin-Dive
  - Charter: Dungeness Crab, Pacific Halibut, Rockfish, Salmon
  - Recreational: Dungeness Crab, Pacific Halibut, Rockfish, Salmon

As shown above, some maps products have been merged with other ports at the recommendation of the fishing communities. For Gold Beach and Brookings, the fishing grounds for these two ports are similar and the majority of fishermen who fish out of Gold Beach also fish out of Brookings, making a combined port map a more accurate depiction of the importance of local fishing grounds. We also merged the spatial fishing ground data for Charleston with Coos Bay, Bandon, Winchester Bay, and Reedsport, which are collectively called the Southern Oregon Ocean Resource Coalition (SOORC) ports. These ports also fish similar areas and are socially and politically tied to each other through the SOORC group, so they requested that Ecotrust create one map to represent these ports as a single fishing community.

It should be noted that these are preliminary map products; further discussion and engagement with the Oregon fishing community will be conducted by Ecotrust to explore how these maps will be combined at the state level and also if/how other maps (e.g., fishery maps for a particular sector and sector combined value maps) will be submitted and used in the territorial sea planning process. Consistent with the previous map product submitted by the SOORC group, all map products submitted to the state are considered "social" or stated importance maps, as they give equal weighting to each fishery in a sector and equal weighting to each sector when combined together. As mentioned above in Section 3.4, however, the individual fishery maps for commercial and charter fisheries are weighted by ex-vessel value and gross income respectively, while recreational fisheries' areas are weighted equally across all respondents. Fishery-specific maps for the commercial and charter sectors are thus "economic" maps, yet at the request of the fishing communities, these economic maps were subsequently combined to create the "social" or stated importance cross-sector combined value maps submitted to the state. Because of this, port-level maps should not be combined with each other, and an overlap in fishing areas between maps should not be considered additive, as in order to accurately depict the relative importance of fishing areas, spatial data would need to be generated at the state level for each fishery-sector combination.

# 6 Lessons Learned and Discussion

This section reflects on several methodological and process lessons we learned in the hope of informing future iterations and/or applications of our approach.

## 6.1 Outreach

Outreach efforts to port communities and fishing sector representatives were initiated at the project's inception and continued throughout the project. Building trust and collaborating with fishing communities were important measures of success for our project; however, due to concerns around the project's funding source, a few key community representatives were vocal in their communities, asking fishermen not to participate in the project. This presented a difficult challenge to the project, especially because we rely on representatives from each sector and port community to help spread the word about the project, answer questions, and encourage others to participate. While we were able to address many of these concerns, unfortunately, this negative "press" at the beginning of the project led to reduced participation from the recreational fishing community, the port community of Pacific City, and charter operators in the port of Garibaldi. In the future, these issues of trust may be better addressed up front with strategic joint outreach efforts with funders and responsible state planning agencies.

## 6.2 Map Product Decision Making

A key challenge this project faced was to create a flexible, inclusive, and transparent process for determining which map products would be submitted to the state of Oregon. More specifically, a process was needed that met the requirements of the state and comfort level of the fishermen. Map products submitted to the state could range at the port level from an individual fishery within a sector (e.g., commercial Dungeness crab for Newport) to all fisheries in all sectors aggregated into a cross-sector combined map (e.g., combining all

fisheries in the recreational, charter, and commercial sectors in Newport into one map). Due to the range of potential map products that could be released, considerable discussions across sector representatives were needed in each port community.

Initially, Ecotrust facilitated decision making on map products by convening port community meetings and working with local port fishermen organizations. Individuals interviewed were contacted by mail as well as by phone to communicate the meeting date and time. Unfortunately, attendance at these meetings was low, raising concerns that decisions made might not be representative of the entire port community. At the meetings, questions were raised around a) how data would be used in the Oregon Territorial Sea planning process; b) if and how map products would be released in the future; c) how to protect the review of map products from public inquiry (e.g., several fishermen organizations are entities of their county, such as FINE, FACT, and NSAT, making all maps reviewed during a meeting available for public review); and c) how to coordinate across ports to submit consistent map products.

In response to these concerns, representatives from the Oregon commercial fishing community approached Ecotrust to help create a non-profit fishermen organization entitled Fishermen's Information Service for Housing Confidential Release and Essential Distribution (FISHCRED). The purpose of this organization is to serve as a central entity to guide, review, and approve how fisheries data will be utilized and/or applied in the TSP process, as well as review and approve the release of fisheries' datasets for future uses and applications.

Currently, the FISHCRED board of directors includes representatives from the ports of Florence, Newport, Depoe Bay, Garibaldi, and Astoria. Commercial fishermen interviewed in these ports were asked to sign a supplemental consent agreement to join FISHCRED, in which they agree to designate FISHCRED as the data use decision-making entity acting on their behalf. Creating FISHCRED as a representative of commercial fishing port communities helped to facilitate decision making in a collaborative, consistent, and timely manner, and created a formal entity for Ecotrust and the state to engage with during the Oregon Territorial Sea planning process. Ecotrust and OCZMA, with FISHCRED's support, is now seeking funding to further develop FISHCRED as a statewide organization that would serve as a point of entry for governmental agencies, researchers, and NGOs to begin outreach, discussions, and collaboration on various marine planning issues, either seeking to work with the fishing community and/or access fisheries' datasets.

Because of the issues described at the beginning of this section, the resulting maps currently submitted to the state are highly aggregated. As the planning process continues, it will be important for FISHCRED and the state to coordinate in order to provide the process with additional detail and resolution as needed.

In the future, we believe the development of a similar organized group of representatives at the beginning of a project, particularly around confidentiality/use of data, will address many of the concerns and hesitations fishermen have in providing information to researchers. By integrating this type of community capacity building into future projects, researchers would demonstrate good-faith efforts to develop the infrastructure for long-term collaborative relationships. This builds trust with fishing communities, enabling fishermen to feel more comfortable participating in data collection efforts, while empowering fishermen to play an active role in how data will be integrated and considered in planning or management decisions.

### 6.3 Survey and Sampling Design

We solicited considerable input, review, and feedback on survey and tool design from the Oregon fishing community before interviews began. In addition, as the project progressed, Ecotrust continued to evolve, respond, and adapt to challenges that arose in order to meet both project objectives and the needs of fishing communities. These challenges created key opportunities to learn from this project and improve future work.

First, for similar projects in the future, we will likely design the survey tool to associate spatial data with a specific vessel's landing period. In Oregon, landings data is associated with a particular vessel instead of an individual. It is possible, however, that over a fisherman's career he/she may have fished from several vessels. In order to associate the appropriate landings revenue with an individual, it is necessary to piece together an individual's landings revenue history by obtaining information on the period in which a particular vessel was operated by an individual. To adapt to this arrangement of landings data, Ecotrust collected vessel operating histories via paper notes. To reduce human error and streamline data analysis, future iterations of tools will be designed to capture information from multiple vessels.

Second, due to difficulties in compiling landings data and establishing non-disclosure agreements with neighboring states, Ecotrust was only able to obtain landings data for currently registered vessels and vessels registered in Oregon. This posed a challenge in cases where fishermen indicated they previously fished from a particular vessel that is no longer in commission, as landings from decommissioned boats could not be represented in this study. Also, many out-of-state vessels fish in Oregon waters but land their catch in their home state. By only using Oregon landings data, the value of out-of-state vessels was not represented in this study. This is particularly problematic in the port of Astoria where many Astoria-based vessels fish in Oregon waters and land their catch in Ilwaco, Washington. Since this study was only able to obtain Oregon landings data, landing estimates almost certainly under-represent the dollar value of fishing areas for Oregon-registered vessels. In the future, a complete and comprehensive history of landings data and, if possible, landings data from adjacent states or ports in close proximity to state borders will be obtained before project work begins.

In summary, this project presented many challenges, which served as both opportunities to improve this project and as a means to inform and improve similar efforts in the future. As stated in the introduction, we believe that this project has made a substantial contribution to the marine knowledge base in Oregon, not only by informing marine planning efforts, but also by enhancing the public's and decision makers' understanding of the importance of the coastal ocean to individual fishermen and to coastal fishing communities. Likewise, we hope the engagement of the Oregon fishing community in the marine planning effort is now strengthened through this effort. This strengthened engagement, at a minimum, provides the foundation for future or long-term support for implementation of a marine spatial plan. Through this project, fishermen's collective knowledge can now inform current and future marine planning analyses and discussions where the goal is to better understand and minimize conflict between user groups and optimally accommodate existing and future human uses while maintaining healthy marine habitats and ecosystems.

# 7 Conclusions and Next Steps

Understanding human consumptive use activities is critical for marine spatial planning processes; however, additional information, analyzed in combination with information on human uses, is needed to support a successful marine spatial planning process. For example, human use information can help assess potential impacts of a particular wave energy site, but cannot suggest where a site should be located. Additional data layers on non-consumptive use activities, coastal communities, environmental attributes and wave power potential, among others, are also needed. In addition to this project, Ecotrust is currently involved in two efforts to gather data on coastal human use activities: 1) a study of non-consumptive ocean uses along the Oregon coast; and 2) a shoreside economic study focused on better understanding the relationship between human uses of the ocean and coastal communities.

The MarineMap Consortium, which includes the University of California at Santa Barbara, Ecotrust, and The Nature Conservancy, in partnership with DLCD and ODFW, is currently in the process of developing a web-based coastal and marine spatial planning decision support tool, Oregon MarineMap. In addition to

containing the human use data collected in this project, Oregon MarineMap will also include data layers for describing environmental attributes and wave energy suitability, and will be used by resource managers, scientists, stakeholders, and the public to a) conduct and facilitate participatory coastal and marine spatial planning in the Oregon Territorial Sea and b) assess the compatibility of new and existing uses.

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# 9 Appendix A: Fishery Data Products

| | Port | Dungeness Crab - Trap | Hagfish - Trap | Pacific Halibut - Longline | Petrale Sole - Bottom Trawl | Pink Shrimp - Trawl | Rockfish - Hook &Line (dead) | Rockfish - Hook & Line (live) | Rockfish - Longline (dead) | Rockfish - Longline (live) | Rockfish - Trap | Sablefish - Longline | Sablefish - Trap | Salmon - Troll | Sardine - Net (Seine) | Seaward RCA Trawl | Shelf Bottom Trawl | Tuna - Troll | Urchin - Dive | Whiting - Midwater Trawl | Dungeness Crab | Flatfish | Pacific Halibut | Rockfish | Salmon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Commercial** | Astoria | x | | x | x | x | x | | | | | x | | x | | x | x | x | | x | | | | | |
| | Garibaldi | x | | x | | x | x | x | | | | x | | x | | | x | x | | | | | | | |
| | Depoe Bay | x | | | | | x | x | | | | | | x | | | | | x | | | | | | |
| | Newport | x | x | x | x | x | x | x | | | | x | x | x | | x | x | x | | x | | | | | |
| | Florence | x | | x | | | | | | | | x | x | x | | | | x | | | | | | | |
| | Coos Bay/Charleston/Winchester Bay | x | x | x | x | x | x | x | x | | | x | x | x | | x | x | x | x | x | | | | | |
| | Port Orford | x | x | x | | | x | x | x | x | | x | | x | | | | x | x | | | | | | |
| | Gold Beach/Brookings | x | | | x | x | x | x | x | | | x | x | x | | x | | x | x | | | | | | |
| **Charter** | Astoria | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Depoe Bay | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Newport | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Florence | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Coos Bay/ Charleston/Bandon/ Winchester Bay/Reedsport | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Gold Beach/Brookings | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| **Private vessel** | Astoria | | | | | | | | | | | | | | | | | | | | x | x | x | x | x |
| | Garibaldi | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Salmon River | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Depoe Bay | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Newport | | | | | | | | | | | | | | | | | | | | x | x | x | x | x |
| | Florence | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Coos Bay/Charleston/Bandon/ Winchester Bay/Reedsport | | | | | | | | | | | | | | | | | | | | x | | x | x | x |
| | Gold Beach/Brookings | | | | | | | | | | | | | | | | | | | | x | | | x | x |