

AN ABSTRACT OF THE PROJECT OF

Jenny Thompson for the degree of Master of Science in Marine Resource Management presented on August 9, 2012.

Title: Emerging Impacts Resulting from the Implementation of the United States Pacific Coast Groundfish Trawl Rationalization Program.

Abstract approved:

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Flaxen Conway

On January 11, 2011, the Pacific Fishery Management Council (PFMC) instituted a catch share program for the West Coast groundfish trawl fishery. The program was intended to create a more sustainable fishery and increase economic efficiency through the use of individual fishing quotas and fishing cooperatives. While there are extensive plans to assess the effectiveness of the program over the next several years, there are additional impacts that have emerged that warrant further consideration. This research focuses on areas that were not the primary focus of the PFMC and National Marine Fisheries Service in designing the program, but which may have important effects on other stakeholders of the program. This study sets up a framework that is then used to conduct preliminary analyses on four emerging impacts. The objective of this work is to add to the body of knowledge assessing the catch share program and to further efforts aimed at minimizing negative socioeconomic effects of the program.

Emerging Impacts Resulting from the  
Implementation of the United States Pacific Coast  
Groundfish Trawl Rationalization Program

by  
Jenny Thompson

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APPROVED:

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Jenny Thompson, Author

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## LIST OF ABBREVIATIONS AND GLOSSARY

Abbreviation / Acronym / Term	Definition
ABC	Allowable Biological Catch. Represents a maximum bound based on science-based estimates.
AMP	Adaptive Management Program. A 10% set aside of groundfish optimal yield. Starting in 2013, the set aside will be allocated to groups that are deemed negatively affected by the trawl rationalization program
CDFG	California Department of Fish and Game
EDC	Economic Data Collection Program, a mandatory program managed by the Northwest Fisheries Science Center requiring economic data to be submitted annually
EFIN	Fisheries Economics Data Program. Managed by the Pacific States Marine Fisheries Commission
FEIS	Final Environmental Impact Statement. Required by the Environmental Protection Agency under the National Environmental Protection Act of 1969.
FOIA	Freedom of Information Act
FMP	Fishery Management Plan. Required under the MSA.
FRAM	Fishery Resource Analysis and Monitoring Division, a division of the Northwest Fisheries Science Center
IFQ	Individual Fishing Quota
Issue	An issue is a problem that has already occurred
IT	Information technology
LE	Limited Entry
MSA	The Magnuson-Stevens Fishery and Conservation Management Act
MSC	Marine Stewardship Council. A body that reviews and certifies fisheries as sustainable.
N/A	Not Applicable
NEPA	National Environmental Protection Act
NGO	Non-Governmental Agency
NMFS	National Marine Fisheries Service, National Oceanic and Atmospheric Administration
NOAA	National Oceanic and Atmospheric Administration, United States Department of Commerce
NWFSC	Northwest Fisheries Science Center, National Marine Fisheries Service
NWFSC Social Study	Pacific Coast Groundfish Fishery Social Study Survey, a voluntary survey managed by the Northwest Fisheries Science Center
NWR	Northwest Regional Office, National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
OY	Optimum Yield
Pacific States	Pacific States Marine Fisheries Commission

<b>Abbreviation / Acronym / Term</b>	<b>Definition</b>
PacFIN	Pacific Fishery Information Network system. Managed by the Pacific States Marine Fisheries Commission.
PFMC	Pacific Fishery Management Council
QSM	Quota Species Monitoring. Refers to the QSM PFMC Best Estimate Report
Quota Pounds	The number of pounds of catch allocated on a given year, calculated based on the optimum yield and the number of quota shares owned.
RecFIN	Recreational Fishery Information Network. Managed by the Pacific States Marine Fisheries Commission.
Risk	A risk is defined here as a possible problem that has not occurred yet.
Stakeholder	An individual who is or will be affected by a decision or who has an interest in a decision.
TIQC	Groundfish Trawl Individual Quota Committee, an ad hoc committee of the Pacific Fishery Management Council
Trawl Rationalization Program	References the West Coast Groundfish Trawl Rationalization Program
WCGOP	West Coast Groundfish Observer Program, administered by the Northwest Fisheries Science Center
WDFW	Washington Department of Fish and Wildlife

# Emerging Impacts Resulting from the Implementation of the United States Pacific Coast Groundfish Trawl Rationalization Program

## CHAPTER 1: INTRODUCTION

Fisheries management requires prioritizing many short-term, long-term, and often-competing goals. Some of the challenges that fishery managers face include protecting stocks from overfishing, helping overfished stocks to rebuild, and protecting essential fish habitat, while also weighing the impact of regulations on communities and providing for economically viable fisheries. With these goals in mind, in January of 2011, the Pacific Fishery Management Council (PFMC) instituted the Pacific Coast Groundfish Trawl Rationalization Program (trawl rationalization program). The trawl rationalization program was intended to create a more sustainable fishery and increase economic efficiency through the use of individual fishing quotas (IFQs) – with the exception of the at-sea whiting sector, which continued on as a cooperative. A potential issue arises in that the new program specifically targets trawling, leaving the existing management structure of other groundfish fisheries and state-managed fisheries in place. Changing the regulations affecting one fishery can result in spillover effects on other fisheries and unplanned consequences for other fishing participants. Data from the first year of the trawl rationalization program suggest that evaluating how the regulation changes affected other West Coast fisheries and fishery participants would be warranted.

Primary goals of this research are to further scientific research analyzing the effects of the trawl rationalization program on West Coast fisheries as a whole and to reinforce a holistic view of the fisheries in discussions on and evaluation of the programs' performance. The emerging impacts included in this document evaluate how the trawl rationalization program may have affected other stakeholder groups that were not the primary focus during the development of the program (PFMC and NMFS 2010b). The analysis also incorporates how the program may have affected trawlers.

An internship at the Pacific States Marine Fisheries Commission (Pacific States) in the summer of 2011 led to the development of this research. The experience working at Pacific States provided an excellent opportunity to learn from some of the key resources involved in the management of West Coast fishery data, to acquire hands-on knowledge of the fishery data, and to gain insight about regional and state fishery management processes. This was gained through working with data in the existing commercial fishing Pacific Information Network (PacFIN), as well as working with new systems that were added as a part of the trawl rationalization program. The deeper understanding of the data afforded the ability to assess what research questions about the new program might be possible to explore early on in the program.

## **1.1. ORGANIZATION OF THIS DOCUMENT**

The document is organized into six chapters. The rest of Chapter 1 outlines what is included in the document and describes how the document can be utilized. The subsequent chapters include:

- Chapter 2 provides background on fisheries management in the United States, West Coast fisheries, and the trawl rationalization program implemented.
- Chapter 3 describes the methodology used for this research, including the criteria for selecting emerging impacts and the framework used to evaluate the impacts.
- Chapter 4 walks through analyses of each of the four emerging impacts, which include:
  - Emerging Impact 1: Changes to the Price of Sablefish and the Type of Gear Used to Target Sablefish
  - Emerging Impact 2: Effects of Increased Participation of Trawlers on Other Fisheries

- Emerging Impact 3: Potential Differences in Achieving Harvest Guidelines Due to Differences in Regulations
- Emerging Impact 4: Changes to the Structure of the Groundfish Fleet
- Chapter 5 begins with a discussion of the lessons learned while completing this study, such as difficulties associated with data access restrictions. Following this, recommendations and next steps are discussed. The chapter concludes with general thoughts on the trawl rationalization program.
- Chapter 6 lists the references cited in this document.
- Appendix A includes figures showing relationships between port groups, counties, and cities.
- Appendix B includes a consolidated table of the data sources included in Chapter 4, along with additional data sources.

## **1.2. NEED FOR THIS ANALYSIS**

With the implementation of the trawl rationalization program, there is a need to evaluate how the program has fared so far and how it affected both environmental and human dimensions. Multiple groups, including governmental agencies, commercial fishing associations, non-governmental organizations (NGO's), and academic researchers are conducting analyses of the program. This study is meant to complement the body of work already underway by focusing on how the program affected other fishery participants, other fisheries, and the communities that are dependent on those fisheries. These groups were not the primary focus when the trawl rationalization program was developed (PFMC and NMFS 2010b).<sup>1</sup>

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<sup>1</sup> As the rationalization program was put in place for the trawl sector, this is to be expected.



This study is intended to provide value to specific groups of interested parties in the following ways:

**Academics and Other Researchers** – Each of the impacts reviewed includes an analysis that can be used to evaluate the feasibility of conducting further research on the impact. Data recommendations are provided to assist researchers with identifying what data may be available, what difficulties might be involved in obtaining access to data, and to document potential challenges and limitations associated with the available data.

**Management Agencies** – The impact areas included in this analysis are topics that would be valuable for government regulators and scientists to assess. Supplementary evaluations of the trawl rationalization program, conducted by external researchers, will also help management agencies to analyze the effects of the trawl rationalization program on multiple stakeholder groups.

**Fishermen and Commercial Fishing Associations** – The impacts analyzed in this document can lead to future work to mitigate negative effects that may be affecting fishermen. Future analysis on the impacts could indicate positive or negative results of the trawl rationalization program on trawlers, nontrawlers, and other subgroups. Having substantiated data would help to either raise to the PFMC that assistance is needed or could indicate that there is no evidence to support some of the concerns raised about the program. Alleviating misperceptions could allow for fishermen to shift their focus to other important challenges that they are facing. If negative effects on groups are found, further analysis could help lead to action plans to support those most impacted.

**Communities and Community Representatives** – The effects on fishing participants that are described and analyzed in this work can be extended to review and assess effects on fishing-dependent communities.

## CHAPTER 2: BACKGROUND AND RATIONALE

This chapter provides background information on fisheries management and the trawl rationalization program in order to set the historical, socioeconomic, and policy context for this research. The chapter is divided into four sections. The first section gives a brief synopsis of the United States legal framework governing fisheries management. The next section provides a primer on West Coast fisheries. The third section outlines the trawl rationalization solution that was implemented and goes on to describe key agencies involved with the program, key data elements of the program, and how the program will be evaluated. The section also includes criticisms of catch share programs in general and of the trawl rationalization program specifically. The chapter concludes with a brief summary.

The United States is a country where private property is institutionalized, as is reflected in the United States Constitution. However, the seas and the living resources within the seas are dynamic and shared, not allowing for an easy assignment of ownership. In 1953, economist H. Scott Gordon described open access to common pool resources as leading to a situation where, "...everybody's property is nobody's property. Wealth that is free for all is valued by none...the fish in the sea are valueless to the fisherman, because there is no assurance that they will be there for him tomorrow if they are left behind today". Garrett Hardin later coined a similar concept as the *Tragedy of the Commons* (1968). The concepts suggest that, without private ownership, individuals will have the incentive to use or take more of a resource than is sustainable. This leads to a less efficient allocation of resources, to the point where the total value to the participants is less than if they were to harvest or take less of the resource. According to Gordon (1954), "Common-property natural resources are free goods for the individual and scarce goods for society. Under unregulated private exploitation, they can yield no [economic] rent; ...". In other words, under an open access system, the average fisherman will not earn a profit.

The failures of open access systems, though, do not imply that fisheries must be fully privatized to be sustainable (Ostrom et al. 1999, Clark et al. 2010). Through cooperation and a focus on long-term goals, there are examples of groups that have coordinated to reduce harvest, but increase value overall. Prior to the implementation of the trawl rationalization program, the Pacific whiting sector had already formed the Pacific Whiting Conservation Cooperative in 1997. Although the fishery was also regulated as a limited entry program with regulations imposed by the PFMC, members of the cooperative had already established their own agreements to distribute their sector's allocation amongst themselves.<sup>2</sup>

Not long ago academics in the conservation biology field believed commercial fishing would remain environmentally unsustainable (Myers and Worm 2003<sup>3</sup>, Pauly 2006). However, at least in the case of commercial fisheries in developed countries, there has been a coming together of conservation biologists and fishery scientists towards a more optimistic view of the long-term sustainability of fisheries (Worm et al. 2009). Environmental NGO's have also come out in support of well-managed fisheries. The Environmental Defense Fund has created a design manual for catch share programs, supporting usage of the programs (Bonzon et al. 2010). The NGO also fought alongside trawlers to ensure that the trawl rationalization program would be implemented and filed legal briefs in support of the program (see *Pacific Coast Federation of Fishermen's Association, et al., v. Gary Locke, et al.*). On land, there has been a movement towards sustainable agricultural practices in place of mass production and efficiency at considerable cost (Pollan 2006). The same can also be said in relation to the harvesting of fish. Well-managed fisheries targeting wild populations can also be regarded as more

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<sup>2</sup> These cooperatives still represent a privatization, but the shares are distributed by group consensus (Clark et al. 2010).

<sup>3</sup> The validity of Myers and Worm's meta-analysis was refuted (Hampton et al. 2005, Hilborn 2007).

sustainable than practices with lower input costs, but where externalities are not incorporated into the costs (Hilborn 2012).

## **2.1. FISHERIES MANAGEMENT**

Fisheries management is not an exact science. It incorporates scientific, social, and political processes; decision-making requires evaluating many different possible solutions and working collaboratively to make choices that best match the needs, laws, and priorities of the region and nation. What works well for one fishery or one region may not work elsewhere, in part, due to differing stakeholder priorities and institutions.

### **2.1.1. The Magnuson-Stevens Fishery and Conservation Management Act**

In 1976, the United States Congress passed the Magnuson-Stevens Fishery and Conservation Management Act (MSA). Significant amendments to the Act were passed in 1996 and 2005 when the MSA was reauthorized. The MSA governs the regulations of federally managed waters, which generally extend from state-managed waters (up to 3 nautical miles offshore<sup>4</sup>) to the end of the United States' Exclusive Economic Zone (200 nautical miles offshore). Under the MSA, regional management councils must develop preliminary fishery management plans (FMPs) through a public process (16 U.S.C. 1852 MSA § 302). The Secretary of Commerce must then approve these plans before they take effect.

The MSA allows for limited entry programs, but also requires that social, economic, and cultural needs all be considered when developing these programs. In defining how limited access programs are provisioned, the MSA specifies that planning "...consider

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<sup>4</sup> In the case of Texas and the Gulf Coast of Florida, the state manages up to 9 nautical miles offshore.

the basic cultural and social framework of the fishery” by developing “...policies to promote the sustained participation of small owner-operated fishing vessels and fishing communities that depend on the fisheries” and, “include measures to assist, when necessary and appropriate, entry-level and small vessel owner-operators, captains, crew, and fishing communities through set-asides of harvesting allocations, including providing privileges, which may include set-asides or allocations of harvesting privileges, or economic assistance in the purchase of limited access privileges” (16 U.S.C. 1853a MSA § 303A). For example, the North Pacific Fishery Management Council, which manages federal fisheries in Alaska, implemented a community development quota program in Bering Sea and Aleutian Island fisheries to achieve this goal.

### **National Standards of the MSA**

There are ten national standards included in the MSA. Three of these standards are particularly relevant when considering the effects of the trawl rationalization program on other fishery participants.

**National Standard 4** focuses on the allocation of fishing opportunities. The standard dictates that, “An allocation of fishing privileges may impose a hardship on one group if it is outweighed by the total benefits received by another group or groups. An allocation need not preserve the status quo in the fishery to qualify as “fair and equitable” if a restructuring of fishing privileges would maximize overall benefits” (§ 600.325). What constitutes maximized benefits is open for interpretation. The standard does state that how the allocation affects native populations must follow other federal regulations. National Standard 4 goes on to stipulate that:

“In designing an allocation scheme, a Council should consider other factors relevant to the FMP's objectives. Examples are economic and social consequences of the scheme, ..., dependence on the fishery by present participants and coastal communities,...

transferability of effort to and impact on other fisheries, opportunity for new participants to enter the fishery, ..." (§ 600.325).

**National Standard 5** focuses on maximizing efficiency, an objective that may be at odds with social goals. For example, economic efficiency can result in job losses as tasks become automated. While the standard states that efficiency cannot be the "sole purpose" of a measure, it does prioritize economic efficiency in fisheries management. The standard defines efficiency in a fishery as:

"... [harvesting] the OY [optimal yield] with the minimum use of economic inputs such as labor, capital, interest, and fuel. Efficiency in terms of aggregate costs then becomes a conservation objective, where "conservation" constitutes wise use of all resources involved in the fishery, not just fish stocks" (§ 600.345).

**National Standard 8** focuses on communities. The standard stipulates that measures, "...take into account the importance of fishery resources to fishing communities". It also requires that measures "Provide for the sustained participation" and, "To the extent practicable, minimize adverse economic impacts on such communities" (§600.345). How councils seek to achieve this objective is left to their discretion. National Standard 8 also states that entities should not be allowed to accumulate an "excessive share" of the catch. The determination of what constitutes "excessive" is also left up to the fishery management councils to determine.

### **Confidentiality Requirements with Fisheries Data**

Multiple regulations apply to the confidentiality of fisheries data. The Freedom of Information Act (FOIA), which generally applies to government records, does not make all fisheries data freely available. Exemptions Three and Four of the FOIA are particularly relevant here in that the data is restricted by other statutes (e.g. the MSA) and the data can contain "trade secrets and commercial or financial information obtained from a person [that is] privileged or confidential" (5 U.S.C. 552(b)). Releasing confidential

fisheries information or accessing it without authorization is prohibited under federal and National Oceanic and Atmospheric Administration (NOAA) regulations.

To be made public, fishery data must be aggregated and released in summary form. No information that would allow an individual to be identified can be made public. Requests can be made to access non-aggregated data. These requests may be approved if there is a benefit seen in granting access and if the individual signs confidentiality agreements. For those who are not employed or contracted by a government agency, the following MSA conditions factor into whether or not approval will be given to access confidential information:<sup>5</sup>

- “(1) The specific types of data required.
- (2) The relevance of the data to conservation and management issues.
- (3) The duration of time access will be required: continuous, infrequent, or one-time.
- (4) An explanation of why the availability of aggregate or non-confidential summaries of data from other sources would not satisfy the requested needs” (§ 600.415).

For data submitted to state agencies, state regulations also apply.

### **2.1.2. Other Key Laws and Executive Orders**

In addition to the MSA, there are other important federal provisions that apply to fisheries and can be far reaching in how they affect fishery decision-making, even if they may appear disconnected from a topic. Two of these key laws with significant implications are the Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972. Regulations created by the executive branch can also affect fishery management. For example, in 1994, President Clinton signed the “Executive Order on

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<sup>5</sup> NMFS has proposed a rule that would update the confidentiality requirements under the MSA. In part, the updates are to ensure the MSA is consistent throughout in regards to handling confidential information.

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”. Under Executive Order 12898, “Each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the National Environmental Policy Act of 1969”.

### **2.1.3. Management Agencies**

#### **The Pacific Fishery Management Council**

Fisheries management in the United States is unique in that fisheries are primarily managed regionally. Under the MSA, eight regional fisheries management councils were established. The PFMC’s region is comprised of Washington, Oregon, California, and Idaho. Fourteen voting and five nonvoting representatives serve on the PFMC, which includes a representative from each of the four states, a tribal representative, and eight members from the public who serve as representatives for various groups (PFMC 2007).

Councils are required to create fishery management plans for each fishery under their supervision. A new requirement went into effect in 2011 requiring regional management councils to set annual catch limits for all federally managed fisheries.

#### **State-Managed Fisheries**

While there are some exceptions, individual states typically manage fisheries within three nautical miles of their shores. Fisheries on the West Coast are managed by the Washington Department of Fish and Wildlife (WDFW), the Oregon Department of Fish and Wildlife (ODFW), and the California Department of Fish and Game (CDFG). The Dungeness crab and pink shrimp fisheries are examples of state-managed fisheries. These are also examples of fisheries that can extend beyond three miles from shore.



## **2.2. BACKGROUND ON FISHERIES**

### **2.2.1. Commercial Fishery Participant and Owner Relationships**

To understand the trawl rationalization solution that was implemented, it is helpful to understand some basic relationships that exist between different fishing groups. As participants in one fishery also take part in others, changes to employment within the trawl fishery warrant consideration when analyzing the program's effects on the broader picture of West Coast fisheries. It is common practice for fishermen who participate in one fishery to also participate in other fisheries (Figure 2.1). In 2004, the revenue for West Coast groundfish trawl vessels came from, on average, 64% groundfish revenue,<sup>6</sup> 27% from crab, and the remaining 9% from other species (Lian 2010).<sup>7</sup> As fisheries become more restricted, fishermen may enter other fisheries as they look to increase their earnings and fishing time.

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<sup>6</sup> Revenue calculations included active trawl vessels with limited entry trawl endorsed permits associated with them. Groundfish revenue was not broken out by gear type, i.e. any groundfish revenue from fixed gear was not listed separately.

<sup>7</sup> The calculation of the percentages includes revenue from fisheries outside of the West Coast (e.g. Alaska).

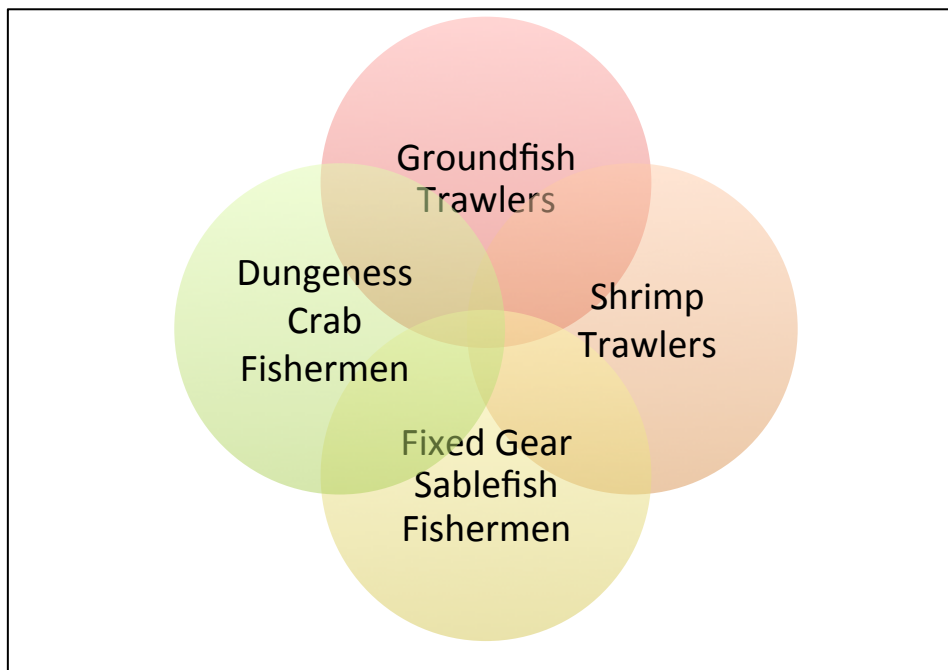


Figure 2.1. Example of overlap in fishery participation by West Coast fishermen.

To understand the program, it is also helpful to understand how different roles held by primary fishing participants relate to one another. Permit holders, vessel owners, captains, and crew are key fishing participants under limited access programs. While individuals may fulfill multiple roles, there is no requisite that they do so<sup>8</sup> – e.g. a captain does not need to own his or her own vessel (Figure 2.2). Key characteristics about these fishing participants include:

- Permit Holder:

A permit holder owns a limited entry permit for a particular fishery or fisheries. Permit holders are not necessarily the people fishing with the permit. Also, permit holders may or may not own their own vessels. In the case of fleet consolidation,

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<sup>8</sup> Vessels and permits can also be owned by entities. However, this research references single participants as individuals.

permit holders may join with other fishermen to fish their quota or they may lease or sell their quota. Some fisheries have owner-on-board requirements to protect fishermen from outside ownership (not depicted in Figure 2.2). For this scenario, the permit holder would need to be captain or crew on a vessel while catching fish with his or her permit.

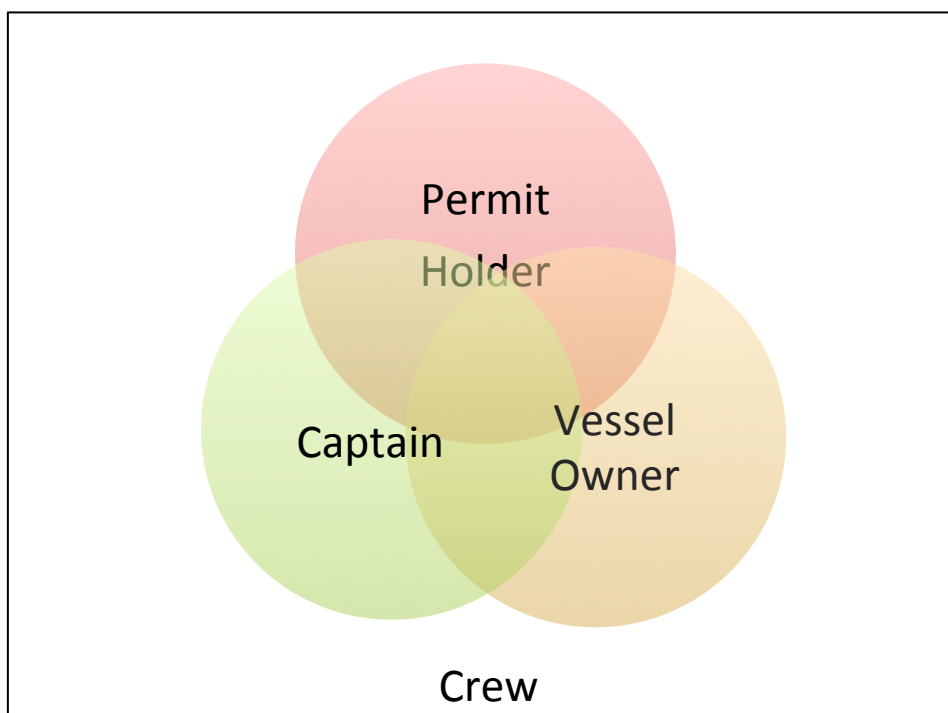


Figure 2.2. Relationship diagram for fishing participants and owners on a given fishing trip.

- Vessel Owner

A vessel owner owns a fishing vessel or multiple fishing vessels. The owner may participate in a fishery, but this is not a requirement.

- Captain

A captain may own a vessel, a permit, or both. Alternatively, a captain may be hired to run a vessel owned by someone else, using a permit that may be owned by someone else. The results from a 2004 survey distributed to vessel owners with West Coast limited entry trawl permits found that 85% of non-whiting trawlers captained their vessels and 60% of whiting vessel owners captained their vessels (Lian 2010).

- Crewmember

A member of the crew does not typically own the vessel or the permit. However, it is possible that a vessel owner, permit holder, or captain of another vessel would work as crew for another captain. The number of people working as crew on the West Coast has not been documented consistently. In the Final Environmental Impact Statement (FEIS) for the trawl rationalization program, there was minimal data about the number of crew in the trawl fishery or in other West Coast fisheries (PFMC and NMFS 2010b). Using the organizational structure seen in companies, crew would represent entry-level positions up through the second in command of a company. A captain who owns his own vessel and his own permit would be the business owner.

### **2.2.2. West Coast Fisheries and Fishing Communities**

Fishing income and the breakdown across fisheries is highly variable by county (Figure 2.3, see Appendix A for relationships between county, port area, and city). Fishing revenue from the landings in a port do not give a full picture of how dependent a community is on commercial fishing revenue. There is a multiplier effect as, for example, fishery participants spend their earnings in port. The FEIS for the trawl rationalization program references a 2006 PFMC study that analyzed how dependent specific fishing

communities were on fisheries (PFMC and NMFS 2010, PFMCb 2006).<sup>9</sup> The 2006 study defined “vulnerable areas” as “communities that are both ‘highly engaged’ or ‘highly dependent’ and have relatively ‘low resilience’”. The trawl rationalization program’s FEIS lists 32 communities as vulnerable, 13 of which are classified as “groundfish trawl communities” (PFMC and NMFS 2010b).<sup>10</sup> It is also worth noting that the commercial fishing revenue for each county consists of more than groundfish fisheries alone (Figure 2.3). In fact, for all of the counties with at least \$600,000 in fishing revenue, groundfish was not the largest source of commercial fishing revenue when state-managed fisheries were included.

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<sup>9</sup> Figure 2.3 and Figure 2.4 are broken down by county, while the 2006 PFMC analysis was broken down by city.

<sup>10</sup> The FEIS added an additional 6 communities as vulnerable to groundfish trawl. However, these are not included in the totals as communities dependent on other commercial fisheries were not also added with this analysis.

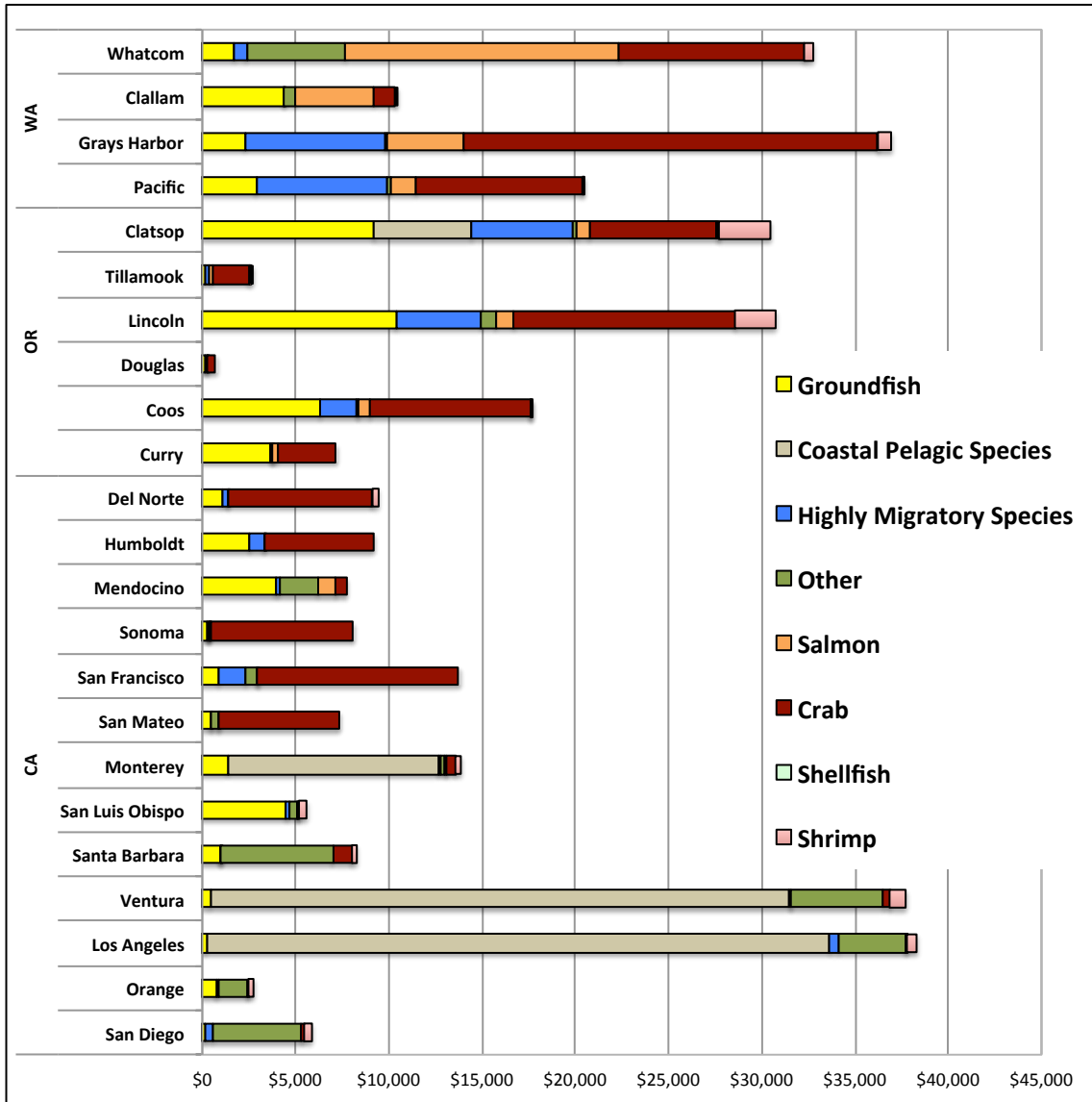


Figure 2.3. 2010 commercial fishing revenue for West Coast counties,<sup>11</sup> by management group (in \$1,000s) (Source: PacFIN Washington Oregon and California (W-O-C) All Species Report, Catch by County-SPID. Accessed: July 27, 2012).

<sup>11</sup> Only counties with at least \$100,000 in groundfish revenue are displayed.

### **2.2.3. West Coast Groundfish Fisheries**

Allocations, based on scientific estimates and a region's needs, are defined in FMP's. For groundfish, both limited entry and open access groundfish fisheries exist and are allocated catch each year. Limited entry fisheries require a permit to participate, restricting the number of vessels participating in the fishery, as there are a limited number of permits available. Additional restrictions may be placed on specific stocks or complexes. For example, fishing in the fixed gear limited entry sablefish fishery requires an endorsement, limiting the total pounds that can be caught annually. Open access fisheries do not require permits. However, there are very restrictive limits placed on the fishery, typically through restrictions on the number of pounds that can be caught over a period of time, such as daily limits (PFMC and NMFS 2011). The trawl sector is assigned a percentage of the optimum yield for the year minus allocations to other groups. A portion of the annual groundfish catch is also set aside for tribal catch. The tribal fishery includes both trawl and nontrawl gear. For example, in the case of sablefish, 10% of the total catch is allocated for tribal catch. Outside of the commercial sector, additional set-asides include allocations for recreational catch and to account for mortality from scientific research (PFMC and NMFS 2011).

To understand what makes up West Coast groundfish fisheries, it is helpful to consider both the revenue breakdown and the total catch breakdown, as they are quite different. In 2010, trawling accounted for roughly 64% of the total West Coast groundfish revenue and fixed gear fisheries accounted for the remaining 36% of total revenue (Source: PacFIN, Figure 2.4). However, by weight, the groundfish trawl fishery accounted for over 97% of the catch, with less than 3% of the landed weight coming from fixed gears (Source: PacFIN, Figure 2.5). The difference arises because of higher prices paid for the target species in the fixed gear fisheries – namely for sablefish – and the fact that fixed gear catch is higher quality.

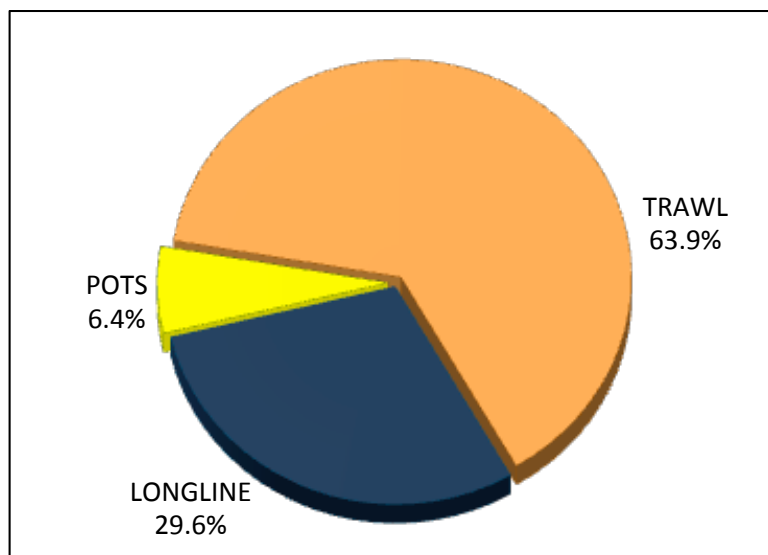


Figure 2.4. 2010 Revenue from West Coast Commercial Groundfish Catch by Gear Type (Source: PacFIN PFMC Report 074, Accessed: April 28, 2012).<sup>12</sup>

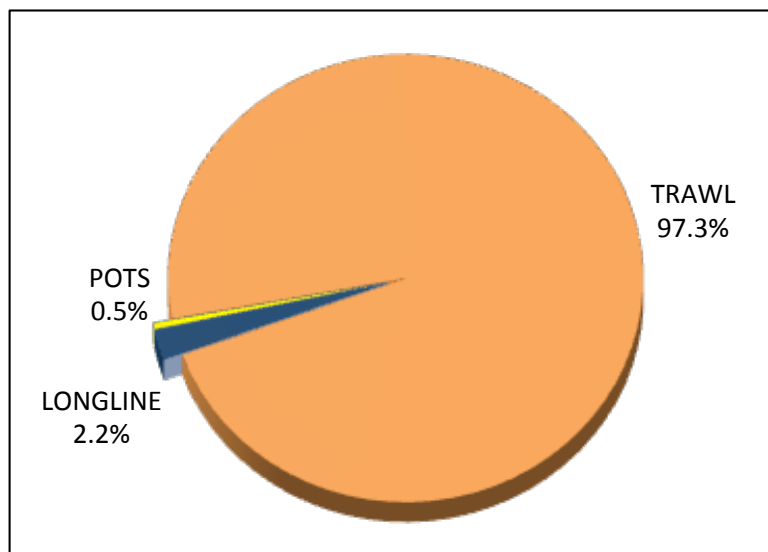


Figure 2.5. 2010 Landed Weight of West Coast Commercial Groundfish Catch by Gear Type (Source: PacFIN PFMC Report 009, Accessed: June 9, 2012).<sup>13</sup>

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<sup>12</sup> Other gears represent less than 0.001% and are not displayed.



#### 2.2.4. Trawling

As a fishing method, trawling is unique in its economic efficiency and environmental effect. From an economic perspective, trawling can be viewed as more efficient and more productive than other fishing methods (i.e. more fish can be caught by fewer people). Efficiency and productivity gains, though, do not necessarily result in achieving the principal priorities of a population. For example, trawl gear is not selective and can result in significant bycatch (Branch 2006a, Branch 2006b). In the case of bottom trawling, the gear can be damaging to fish habitat as nets are dragged along the seafloor (Morgan and Chuenpagdee 2003). The quality of trawl-caught fish is also lower compared to fish caught with more selective gear (Parker et al. 2003). On the other hand, the Pacific whiting trawl fishery is often cited as a well managed and sustainable fishery, in part due to its low bycatch rates in relation to catch of target species (MSC 2009).<sup>14</sup> Prior to the trawl rationalization program, the fishery was already a co-op and under full observer coverage (PFMC and NMFS 2010b). As Pacific whiting is pelagic, the likelihood of habitat damage is limited.

There are benefits and disadvantages associated with each type of fishing gear. No single fishing gear is better or worse than another gear when social, economic, and environmental effects are all considered. Benefits and costs that a fishery brings to a community and region warrant consideration - including how many workers are employed in the fishery and the costs associated, including externalities. There are also technological improvements that can be and are being used to help reduce negative environmental effects associated with a gear type. For example, to reduce the amount of

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<sup>13</sup> The troll and net fisheries accounted for less than 0.02% of the total groundfish catch and are not displayed.

<sup>14</sup> The Oregon Pink Shrimp fishery, a trawl fishery, has also been certified by the MSC.

bycatch, excluder devices are added to nets, minimum mesh sizes are used to allow juvenile fish to escape, and streamers are attached to hook and line gear.

### **2.2.5. Catch Share Programs in the United States**

As of 2011, fifteen catch share programs were in place in the United States (NOAA 2011). Both quota-based systems and fishing cooperatives are considered catch share programs. Under quota-based programs, vessels that own quota shares of a species are allocated a total number of quota pounds for the year. The number of pounds is calculated using the number of quota shares owned, with shares representing a percentage of the total allocation to a fishery.

Legislatively, catch share programs have been controversial. Regional management councils have been prevented from developing or implementing new catch share programs in the past, including with the 1996 MSA reauthorization. In 2012, the U.S. House of Representatives voted to block funding for the creation and implementation of additional limited access privilege programs for fisheries managed by the New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico fishery management councils (H.R. 5326, Commerce, Justice, Science, and Related Agencies Appropriations Act of 2013). Prior to this, an appropriations bill was signed into law that prohibited Atlantic and Gulf of Mexico fishery management councils from using fiscal year 2011 funds to approve any new limited access privilege programs (H.R. 1473, Department of Defense and Full-Year Continuing Appropriations Act, 2011).

## **2.3. THE CATCH SHARE SOLUTION IMPLEMENTED FOR THE WEST COAST**

Significant declines in the groundfish catch and the resulting drop in revenues led the Secretary of Commerce to declare the West Coast groundfish fishery a disaster in 2000

(NOAA News Release 2000). In response to this announcement, an effort was undertaken in 2003 to reduce the capacity of the trawl fleet to provide for a more economically viable fishery by purchasing vessels and permits from fishermen (NOAA Press Release 2000-R103 2000). The PFMC also initiated work developing a catch share program for the West Coast trawl fishery in 2003. Under its previous management structure, the West Coast limited entry trawl fishery was considered “economically unsustainable” (PFMC and NMFS 2010b).

The details of the trawl rationalization program are explained in an environmental impact statement, a requirement of the National Environmental Protection Act of 1969 (NEPA). The FEIS for Amendment 20 (the trawl rationalization program) contains an abundance of information about the program, along with analyses that went into the creation of the program. As a requirement of NEPA, along with the preferred version of the program being recommended, alternatives must be considered. These alternatives are described in detail in the FEIS (PFMC and NMFS 2010b). The regulations as approved by the United States Secretary of Commerce are documented in Amendment 20 to the Pacific Coast groundfish FMP (PFMC and NMFS 2010a).

### **2.3.1. Objectives of the Trawl Rationalization Program**

The FEIS describes the central goal of the trawl rationalization program as being to:

“Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch” (PFMC and NMFS 2010b).

At a more detailed level, eight supplemental objectives were defined. Of these objectives, four are particularly relevant to this work. These include:

“1. Provide a mechanism for total catch accounting” (PFMC and NMFS 2010b).

New data capture requirements and full observer coverage contribute to achieving this objective. The additional data provides additional opportunities for data analysis.

“2. Provide for a viable, profitable, and efficient groundfish fishery” (PFMC 2010).

The objective implies that it focuses on the groundfish fishery as a whole. Particularly in the case of sablefish, it is possible that the program has had negative effects on trawlers and nontrawlers.

“4. Increase operational flexibility” (PFMC and NMFS 2010b).

This objective could increase effects on other fisheries, as the trawl fleet is able to move into other fisheries more easily.

“5. Minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical” (PFMC and NMFS 2010b).

At the most basic level, changes tied to fisheries as a whole directly tie to the communities where these fishery participants are based. Spillover effects go much farther, as do cultural and social effects on the communities affected (Langdon 2008, Carothers 2008).

These objectives largely fall within the requirements laid out in the National Standards of the MSA.

There are many mechanisms incorporated into the program that are expected to lead to a more sustainable fishery. For sectors operating under the IFQ fishery, limits on both target and non-target species are specific to each quota share owner. Individuals have more accountability for what they catch due to financial disincentives, which can lead to reduced bycatch if fishermen are able to modify behavior to avoid particular species. Additionally, the program requires full accountability for catch, as well as for discards made at sea. This is, in part, achieved by requiring all vessels to carry an observer when fishing for catch allocated under the rationalization program.

The distribution of quota shares for the non-whiting, the at-sea whiting, and the shoreside whiting sectors were each allocated in a different manner. For the nonwhiting sector, initial allocations for non-overfished species were based on vessels' historical catch from 1994 to 2003, with the three worst years of a permit holders' catch history dropped from the calculation (PFMC and NMFS 2010a). For overfished species, trawl logbook and observer data from the 2003-2006 seasons were used to allocate quota shares. Permit holders were the only recipients of nonwhiting quota shares. However, only 90% of quota shares were allocated to permit holders, with the remaining 10% left unallocated. The at-sea whiting fishery remained in a cooperative. For shoreside whiting, 80% of the quota shares were allocated to permit holders based on their catch history from 1994 to 2003, with the worst two years removed from the calculation. The remaining 20% of quota shares were allocated to shoreside whiting processors based on their processing history.

Many stakeholder protections were considered for inclusion in the program. The protections determined to be the most essential were included in the program (PFMC and NMFS 2010a, PFMC and NMFS2010b). For example, maximum ownership restrictions were put in place to reduce the likelihood of ownership being consolidated to only a few vessels or lenders. These maximums vary by species for the maximum quota share and quota pounds that may be owned (PFMC and NMFS 2010a). To protect owners from selling quota prematurely, a moratorium was placed on selling quota shares until 2013. Until that time, quota pounds can be leased to others. Both of these protections stemmed from negative effects witnessed in other catch share programs, such as in the Mid-Atlantic Surf Clam and Ocean Quahog fishery, the first IFQ managed fishery in the United States, and in New Zealand and Australian fisheries (Walden 2011, Dewees 2008, Geen et al. 1993).

### **2.3.2. The Adaptive Management Program**

In the non-whiting sector, 10% of the quota shares were set-aside for an Adaptive Management Program (AMP; PFMC and NMFS 2010a). Though development of how the program will function is still in progress, the stated purpose of the AMP is to, “(A) mitigate against the effects of the program on adversely impacted communities, (B) provide incentives to use habitat and bycatch friendly gear, and (C) to mitigate against adverse effects of the program on processors” and, “...to address such objectives as community and processor stability, new entry, conservation, and other unidentified/unforeseen adverse consequences” (PFMC and NMFS 2010a).

The AMP is not scheduled to go into effect until the third year of the trawl rationalization program. The reason for this was to allow for time to develop the program further and time to evaluate the issue areas to target with the program (PFMC and NMFS 2010b).

### **2.3.3. Key Data Sources**

There is a significant amount of fisheries data available, including historical data. There is also new data being collected specific to the trawl rationalization program.

#### **Pacific States Marine Fisheries Commission**

Pacific States, one of three interstate commissions formed by the U.S. Congress, supports the sustainable management of West Coast and Alaska fisheries. The commission is responsible for maintaining consolidated multistate commercial fishing catch data for the West Coast and Alaska. For the West Coast, data managed by Pacific States includes the following:

- **Catch Data**

PacFIN and the Recreational Fishery Information Network (RecFIN) store consolidated data about commercial and recreational catch, respectively. For commercial catch, state fish ticket data is interfaced to PacFIN from state agencies. Trawl logbook data is also consolidated in PacFIN. The frequency of the data submissions varies by state from a weekly to a monthly basis. A subset of catch data is also keyed in on a weekly basis for an inseason management report. Numerous summary reports are publicly available on the PacFIN website (Appendix B).

When the trawl rationalization program went into effect, one of the requirements of the program was that catch information be electronically reported by first receivers (generally processors) within 24 hours of landing. A system first implemented in 2008 for the whiting fishery, the West Coast Electronic Fish Ticket Reporting and Compliance Monitoring Program (E-Ticket), was updated and is managed by Pacific States. The E-Ticket system is a mandatory reporting requirement for all commercial catch landed under the trawl rationalization program. Data submitted by first receivers is fed into the Vessel Account system nightly.

- **Shoreside Compliance Monitor Data**

When catch from a fishing trip is offloaded, a compliance monitor also records landed weights.<sup>15</sup> The compliance monitor, which is often a role performed by a fishery observer, later enters this data into a system, along with any additional

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<sup>15</sup> This role is typically performed by the observer

comments they have about the data. The data from these records is electronically submitted and stored in tables along with the E-Ticket data.

### **Northwest Regional Office (NWR), National Marine Fisheries Service**

The NWR holds both management and analysis roles. One of their responsibilities is to develop and update harvest specifications and management measures. The office is also responsible for issuing permits to individuals and entities to take federally managed fish. For the trawl rationalization program, the NWR has been involved in the development of the program, in regulation setting, and in ongoing management activities of the program. The office derived the initial catch share allocations and manages the vessel account system.

- **Initial Permit Holder Allocations**

Quota share allocations were based on limited entry trawl permit holders' historical catch during the 1994-2003 seasons. Quota for bycatch was allocated using a model that was based on estimates for catch in the area being fished (based on years after 2003) against historical roll-up data.

- **Quota Share and Vessel Accounts**

Quota pounds are deposited into owners' quota share accounts. These pounds must then be transferred into vessel accounts for fish caught under the program. Current balances for both accounts, as well as a roll-up view for the program as a whole, are publicly available via this site. Historical allocations and balances are not publicly available.

Prior to 2012, vessel account balances were not visible to external viewers. While historical account balances are not available, viewing current balances can give insight into the types of data available at a specific point in time.



**Northwest Fisheries Science Center (NWFSC), National Marine Fisheries Service**

The NWFSC is one of six regional centers in the United States that conducts scientific, economic, and social data collection and analysis for NMFS. Much of the mandatory and voluntary economic and social data about the trawl rationalization program is being administered by the NWFSC.

Within the NWFSC, the following teams have notable roles in relationship to the trawl rationalization program:

**Fishery Resource Analysis and Monitoring Division (FRAM)**

The FRAM team is responsible for data collection and scientific analysis of West Coast groundfish stocks.

- **Economics: Economic Data Collection Program (EDC)**

Annual economic data for vessels fishing in the trawl rationalization program must be submitted by September for the preceding year (50 CFR 660.114). Catch share recipients were also required to submit data for the 2009 and 2010 fishing seasons, the two years prior to the trawl rationalization program. Access to the survey data is restricted to economists employed at or contracted by the NWFSC (NWFSC 2012).

- **Groundfish Monitoring: Discards**

The West Coast Groundfish Observer Program (WCGOP) is administered by the NWFSC. Observer data for IFQ trips are fed into the Pacific States system

weekly. While the data are interfaced at that time, the data submitted may be from prior weeks.<sup>16</sup>

- **Groundfish Analysis Program: Status of Stocks**

Stock assessments for all federally managed stocks in the region, as well as rebuilding analyses, fall under the groundfish team.

### **Conservation Biology Division**

The Conservation Biology Division is largely focused on studying ecology of the region, but also includes the NWFSC's Human Dimensions group, which focuses on social science research.

- **Ecosystems Science Program, Human Dimensions: Pacific Coast Groundfish Fishery Social Study Survey (NWFSC Social Study)**

An extensive social study was created to assess the social and cultural effects of the program on a wide range of impacted parties, such as fishermen and their wives, processors and processor employees, and industry suppliers. Gathering of the data will facilitate NMFS to evaluate if legal requirements, such as National Standard 8 of the MSA and Executive Order 12898, are being met. Data for the study was collected during the year the year prior to the implementation of the trawl rationalization program and is also being collected for the second year post-implementation of the program through survey responses, in person interviews, and meetings (NMFS 2010). Survey participation is voluntary and the method for selecting participants was not random. Since gathering baseline data, the study's participant group has expanded. The study now incorporates additional fishermen

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<sup>16</sup> Though data is interfaced weekly, there are not enforced requirements on the timeliness of data submission.

from outside of the West Coast groundfish trawl fishery (S. Russell, 2012 personal communication, unreferenced).

### **Additional Notes on the Data Available**

The wealth of documents produced by governmental agencies on the trawl rationalization program creates both opportunities and challenges. The 2010 FEIS contains over 700 pages, making it difficult to navigate the abundance of information in the document. Appendices to the document, which are accessed separately from the chapters of the FEIS, add several hundred more pages. The length of the document, including its appendices, make it difficult to review in its entirety, limiting most users to targeted searches to review the document or utilize its content. Even with targeted searches, it is possible that dependencies that are already documented in the FEIS may be overlooked. The document may prove confusing for those unfamiliar with the NEPA, as well. Environmental Impact Statement's are required to contain alternatives to a proposed action. However, the inclusion of multiple options and the possibility for program updates after the document is finalized can create challenges.

### **2.3.4. Planned Evaluation of the Program by the PFMC and NMFS**

When the trawl rationalization program was implemented, there were specific open areas that could not be answered prior to the program's implementation deadline, which became trailing actions (PFMC and NMFS 2010b). The Trawl Rationalization Regulatory Review Committee was formed to provide input on regulatory matters that arose after the program's implementation.

The data sources listed in section 2.3.3, Key Data Sources, represent some of the source data that enables analysis of the trawl rationalization program. The EDC and NWFSC Social Study are two of the targeted datasets that will be used by the NWFSC to evaluate economic and social effects on those most directly affected by the program. In

developing the AMP, the PFMC has committed to evaluating the program's effects on an expansive group of impacted stakeholders (PFMC and NMFS 2010b). Under Amendment 20, the PFMC is required to complete a review of the program within the first five years from the program's start date (PFMC and NMFS 2010a). After the initial review, formal reviews will be conducted every four years that the program remains in effect. Based on the outcome of reviews, the trawl rationalization program may be amended or discontinued.

### **2.3.5. Selected Criticisms of the Program**

There are multiple criticisms of catch share programs in general and of the trawl rationalization program specifically. The concerns described here generally focus on social criticisms of the program, particularly criticisms that result from the initial allocation of quota shares. It also should be reiterated that when the program was implemented, a number of trailing actions remained to be addressed by the PFMC and committees within the PFMC (PFMC and NMFS 2010b). Criticisms of the program may be, in part, mitigated as a result of these trailing actions.

In 2003, an Ad Hoc Groundfish Trawl Individual Quota Committee (TIQC) was set up to make initial recommendations about implementing a catch share program. The committee membership did not originally include representatives from nontrawl fishing groups or communities. In addition to a non-advocacy chair, the rest of the membership consisted of commercial trawl interests, along with representatives for tribal, conservation, and enforcement interests (Table 2.1). Initial recommendations of the TIQC released in 2004 did not include provisions for allocating shares to captains, to crew, or to communities (PFMC 2004). Allocations for vessel owners, current permit holders, and processors were recommended for further analysis.

Interest Group Represented	Committee Members
Trawl representatives, whiting and nonwhiting	8
Processors	3
Conservation groups	1
Tribal	1
Enforcement	1

Table 2.1. Membership of the 2003 Ad Hoc Groundfish Trawl Individual Quota Committee (PFMC New Release 2003)

Another social criticism of the program was that an owner-on-board requirement was not put into effect. Owner-on-board requirements are, in part, meant to ensure that fishermen have more advancement opportunities and can switch from being a waged worker, if they have that goal (Tamm et al. 2010). In the case of the trawl rationalization program, the reason given for not incorporating this protection was because it would not help the program achieve the objective of consolidating the fleet (PFMC 2010).

Findings about the effects of catch share programs on captain and crew opportunities vary. One of the recurring impacts across catch share programs in Alaska was a reduction in the number of crew (Olson 2011). One study on the British Columbia catch share program estimated that the number of crewmembers employed in the groundfish fisheries declined by over 30% after the program went into effect (Casey et al. 1995).

Opportunities for crew may also be reduced when catch share owners choose to fish on other vessels, in effect reducing the number of crew positions available (Carothers 2008). This results in crew positions being reduced because of fewer vessels participating in fisheries and fewer crew positions on the remaining vessels. Reductions in the number of crew positions available would have effects across fisheries and across communities. Using an efficiency frame, the role of crew is viewed as an input cost (Carothers 2008). However, framed differently, the cost of crew wages could also be viewed as a benefit to

a community, as those crew wages are likely to be spent in the community (Lakoff 2011). While reductions in the number of crew are expected because of fleet consolidation, crew who remain in the fisheries may receive higher wages. It is possible that the total crew compensation across a fishery would be minimally affected (Casey et al. 1995). Due to limited data about the number of crew employed and their earnings, it can be difficult to quantify the effects of catch share programs on crew.

One of the concerns expressed in implementing the trawl rationalization program was that ownership would be consolidated to fewer people, with workers receiving lower wages (PFMC and NMFS 2010b, Tamm et al. 2010). In answer to public comments, the PFMC responded that the “Initial allocation of QS [quota shares] to communities and to captain and crew was considered in the development of the alternatives but rejected from further consideration” (PFMC and NMFS 2010b). The PFMC also writes that, “With respect to crew members, an initial allocation is difficult because there is limited historic information on the identity of crew members who have fished on trawl vessels.” For those not allocated quota shares, the expense of leasing quota can also put a serious strain on fishery participants. Restricting entry into the fishery by new captains was also a topic raised (Tamm et al. 2010). Under National Standard 4, the ability for new participants to join a fishery must also be considered.

Outside of what is being collected on the trawl fishery under the EDC, data is limited about crew participation. The number of crew participating on individual fishing trips is not tracked. The number of crew participating would be valuable in understanding fishing effort and calculating changes to the number of crew employed for specific fisheries. Previous work has recommended improved tracking of crew and captain participation in fisheries, such as through a registry, to better enable making allocations in catch share programs (National Research Council 1999).

The fact that community allocations were not included in the trawl rationalization program as implemented in 2011 and the lack of community participation opportunities in some of the committee membership, has been raised as an issue (see *Pacific Coast Federation of Fishermen's Association (PCFFA) v. Gary Locke*, No. C 10–04790 CRB (N.D. Cal. 2011)). Programs to allocate quota to communities do exist, such as Alaska's Community Development Quota Program in the Bering Sea and Aleutian Islands. In response to a public comment, the PFMC responded that the two-year moratorium on the sale of catch shares was “in part intended to slow the movement of QS [quota share] holdings out of communities during a time when the trailing action for CFAs can be developed and implemented in a considered fashion” (PFMC and NMFS 2010b).

Allocating quota shares based on catch history from 1994 to 2003 presented another issue for communities dependent on trawl income. Ports where trawl landings increased since 2004 could be more affected due to allocations not being based on more recent catch history (see *Pacific Dawn, LLC v. John Bryson*, No. C10-4829 TEH (N.D. Cal.)).

### **Legal Challenges to the Trawl Rationalization Program**

Lawsuits challenging the program or components of the program have had mixed results. In *Pacific Coast Federation of Fishermen's Association (PCFFA) v. Gary Locke*, No. C 10–04790 CRB (N.D. Cal. 2011), a U.S. district court in California ruled against the PCFFA. The PCFFA represented a unified group of port and commercial fishing associations, along with other groups<sup>17</sup> who joined the suit. In all of the charges filed, the court found that NMFS had fulfilled its obligations. In the case of *Pacific Dawn, LLC v. John Bryson*, No. C10-4829 TEH (N.D. Cal.), the court agreed the plaintiffs' argument that the allocation of shoreside whiting catch shares had been arbitrary and capricious.

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<sup>17</sup> Other plaintiffs included the Port Orford Ocean Resource Team and the San Francisco Crab Boat Owners Association. The Food and Water Watch organization, U.S. Representative for Oregon Peter Defazio, and U.S. Representative for California Mike Thompson filed briefs in support of the plaintiffs.

The plaintiff's argument hinged on a difference between how permit holders and processors allocations were calculated. Permit holders' allocations were calculated using historical catch data from 1994 to 2003, while processors' calculations also included 2004. The court ruled that allocations to the shorebased whiting sector needed to be reconsidered. Because of this judgment, the moratorium on sales of quota may be extended through the end of 2014 for shoreside whiting (PFMC and NMFS 2012).

## **2.4. SUMMARY**

Compared to other management approaches, the trawl rationalization program represents progress towards meeting the objectives of multiple stakeholder groups. The point of this study is not to test the effectiveness of the trawl rationalization program in meeting the program's objectives. Implications and potential consequences of the trawl rationalization program on other fisheries do not indicate whether or not the changes made to the groundfish trawl fishery were necessary to ensure a viable and more sustainable fishery. Due to the complexity of fisheries management and the trawl rationalization program, specifically, the goal of the study is to identify emerging impacts that warrant consideration in order to assess how the rationalization program has affected different stakeholder groups. To evaluate the feasibility of continued research, four emerging impacts were reviewed with findings about the impacts documented.



## CHAPTER 3: METHODOLOGY

This chapter explains the basis for the methodology used in this research and defines terminology that will be used in Chapter 4. The sections included for each impact are directed towards individuals and groups interested in researching the impacts.

The methodology used to evaluate the emerging impacts was adapted from project management and information technology (IT) practices utilized when new systems are implemented. This methodology was chosen due to similarities between the needs in assessing the trawl rationalization program and in implementing new IT systems. Timely analysis of the trawl rationalization program requires evaluating changes that are in progress or have recently occurred. Similarly, working with technology requires successful adaption to a rapidly changing environment. Also, the relationships between stakeholder groups affected by the trawl rationalization program and the environmental factors that affect fisheries are dynamic and interconnected. Correspondingly, systems implementations require significant flexibility due to the dynamic nature of businesses and organizations.

The framework used to evaluate each emerging impact was developed based on processes and deliverables used during the definition and analysis phases of the systems development life cycle (Chief Administrative Officer 1999). In these phases, system implementations require assessing an organization's needs, identifying and documenting the available resources, determining key stakeholder groups and the project's effects on these groups, and evaluating project issues and risks. Systems implementations incorporate reusable processes that can be utilized across industries and organizations, processes that can also be applied in order to analyze the trawl rationalization program's effects.

### **3.1. SELECTION OF IMPACTS**

The four emerging impacts were selected in order to assess potential social and economic effects resulting from the implementation of the trawl rationalization program. The analyses of the impacts indicate how management decisions may have impacted stakeholders involved with fisheries outside of the Pacific Coast groundfish trawl fishery.<sup>18</sup> To keep the scope of the impacts manageable, the analyses primarily focus on fishermen. However, the results of this analysis can be applied to a wider group of stakeholders.

Initial ideas about which impacts to include in the analysis were reviewed with knowledge experts at Pacific States to discuss the feasibility and value of the topics. Consultations were also made with NMFS resources in the NWFSC and NWR, which helped to solidify the selection of impacts to include.

### **3.2. SECTIONS REVIEWED FOR EACH EMERGING IMPACT**

The analysis of each impact will include five broad sections: Background, Impact Overview, Significance of the Impact, Data Recommendations, and Research Planning Considerations.

#### **3.2.1. Background**

Where appropriate, additional background information will be provided to offer clarification and context, such as additional details about a particular fishery prior to the trawl rationalization program going into effect.

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<sup>18</sup> Impacts of the trawl rationalization program that focus solely on the trawl fleet (i.e. current quota share owners) were not included, as there is extensive work that has been completed and is currently underway by NMFS and other researchers focused specifically on the trawl fleet.

### **3.2.2. Impact Overview**

The impact overview section will provide a definition of the impact. Relevant regulatory information about the trawl rationalization program or initial results from the program suggesting the impact is occurring will also be included in this section.

### **3.2.3. Significance of the Impact**

#### **1. Key Groups Affected**

To evaluate the significance of an impact, it is important to consider the stakeholders that are most directly tied to the impact. For each impact, key stakeholders directly affected by the impact will be identified. The groups listed are not meant to be an all-inclusive list. For example, boat builders and fishing equipment suppliers could be affected considerably by an impact, but the effect would come as a result of an indirect impact through other stakeholders.

#### **2. Implications of the Impact**

Potential implications associated with each impact will be described in this section. For the key stakeholder groups identified, this section will include how the groups may be affected.

### **3.2.4. Data Recommendations**

For each impact, the data recommendations section provides suggestions about data sources, approvals that may be required to obtain the data, and considerations for data analysis.

## 1. Data Sources Available

For each impact, a table will be provided that defines key data sources that may be accessible in order to conduct research on the impact. The table includes the following columns:

- **Data or Report** – A basic title for the data or report(s) available.
- **Owner/Manager** – The group responsible for the data or a group that can be approached to request the data, assuming the necessary approvals are obtained.
- **Dates** – Lists the year when an individual report was released or the range of years available in a database or collection of reports. ‘Present’ is used for data in the current year; however, it does not mean that data is real-time or that all reports or database tables are current.
- **Description** – A more detailed description of the data.
- **Approvals Required** – Agencies that may need to give approval for the data to be accessed or provided to a researcher. To obtain approval, the agencies will likely require a description of how the data will be used. For publicly accessible data (largely summary reports), Not Applicable (N/A) is listed.
- **Links** – Addresses for websites where the data can be obtained or where additional information about the data source can be found. These links are subject to change.

## 2. Additional Resources

A second table with additional data sources will be provided that may be helpful in researching the impact. This second table, depending on the goals of the researcher, may be less relevant, but still useful for continued research. The same columns that are used in the ‘Data Resources Available’ section are included in the table.

### **3. Limitations and Missing Data**

For each impact, known issues with the available data or impediments to obtaining access to data will be provided. Data that could be valuable in conducting this research, but that may not be tracked, is included. There may be opportunities to begin tracking this data in the future.

#### **3.2.5. Research Planning Considerations**

In this section of the impact analysis, external factors that may affect research of an impact or the quality of results from further analysis of an impact are reviewed.

##### **1. Dependencies**

The dependencies sections lists external factors that would affect analysis of an impact, but that are not the specific focus of the analysis and are beyond the scope of the analysis. For example, the annual catch for a fishery depends on environmental conditions for the year in question. Another dependency would be how much allocations to sectors changed in a given year.

##### **2. Considerations for Determining When Data Can Be Analyzed**

Each of the impacts has known challenges that may influence when the data can be analyzed. Considerations on the timing of when to analyze an impact will be reviewed in this section.

##### **3. Issues and Risks with Analyzing**

This section includes a table that identifies key issues and risks for researchers to consider when deciding whether or not to conduct an analysis of each impact. Project managers utilize risk management processes to identify, track, and mitigate problems that

jeopardize the on-time completion of a project. One of the techniques that these managers may utilize for managing issues and risks is a risk and issue log (Milosevic 2003, Garton and McCulloch 2011, Morris and Pinto 2004).

The issues and risks included for each impact are based on a literature review and discussions with subject matter experts about the trawl rationalization program. NMFS and PFMC documents, such as the FEIS, were also utilized in identifying items for this section of the analysis (NMFS and PFMC 2010b).

The table is displayed in a log format with the following columns:

- **Type** - The type defines whether or not the item in the table is classified as an issue or a risk. An issue represents a problem that has already occurred. A risk represents a possible problem that has not occurred yet.<sup>19</sup> With a risk, steps can be taken to mitigate the risk of the problem occurring. A risk may become an issue if the problem occurs.

A simple analogy can be used to better describe the difference between an issue and a risk. A risk can be viewed as an egg that is balanced on a table. There is a risk that this egg will roll onto the floor. Steps can be taken to lessen the likelihood that the egg will fall off of the table. With an issue, the egg has already fallen onto the floor. Steps now must be taken to deal with a problem that has already occurred.

In the context of describing the emerging impacts, issues and risks were differentiated using the following criteria:

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<sup>19</sup> A risk may also indicate an item where insufficient information is known or has been collected to classify the item as an issue or a risk.

- A risk represents a confounding factor that may influence the results of an analysis. Items requiring additional analysis to determine if they are an issue or a risk are labeled as risks.
- An issue represents a complexity that needs to be assessed and documented.
- **Severity** – The severity of an item indicates how significant the issue or risk may be in trying to study the impact. Issues and risks with higher severities require more timely action. Severity is rated on a scale of Low, Medium, High, and Critical (Milosevic 2003, Project Management Institute 2000).
  - For risks, the severity assigned was determined based on the degree to which the risk may affect the project timeline, the quality of the results, or the scope of the research if the risk is realized (Schwalbe 2000, Milosevic 2003, Project Management Institute 2000). An increase in the scope of the research would require that, in order to complete research on the impact, additional topics be analyzed that were not a part of the original proposal.
    - **Critical** – If the risk materializes and becomes a critical issue, the validity of the research will likely be in jeopardy, the estimated timeline to complete the research will increase beyond what is manageable. A clear mitigation plan should be in place before beginning the study.
    - **High** – If the risk materializes and becomes an issue, there is a high probability that the estimated timeline or the validity of the results may be affected. It is highly advisable that a clear mitigation plan be in place before beginning the study.
    - **Medium** – It is less likely that if the risk is realized it will affect the timeline or results, but a mitigation plan should still be put in place early on in the study.

- Low – The risk is not expected to impact the validity of the results or the timeline, but the risk should be considered while conducting research. There should also be a mitigation plan in place, but the plan may be implemented after research has begun.
- For issues, the severity assigned was determined based on the degree to which the issue may affect the timeline, how significantly the quality of the results may be affected, and how the project scope may be impacted if an issue is not managed appropriately (Milosevic 2003).
  - Critical – A ‘Critical’ issue indicates that there is an expectation that the results will not be valid unless the issue is addressed. If not already in place, a mitigation strategy should be put into action as soon as possible.
  - High – A ‘High’ issue indicates that addressing the issue is likely required to ensure the validity of the results or to keeping the timeline. A mitigation strategy should be initiated.
  - Medium – A ‘Medium’ issue should be evaluated early on and kept in mind as research progresses, but it may be sufficient to document the issue in the research without fully accounting for it. A mitigation strategy should be decided upon, but higher priority issues would take precedence.
  - Low – A ‘Low’ issue indicates a topic that should be noted and evaluated. However, the issue is not expected to derail the research or pose a significant threat to the validity of the work or the timeline.
- **Risk Likelihood** – (Only applies to risks) The Risk Likelihood estimates the probability that a risk will be realized, meaning that the risk will become an issue. The likelihood is ranked on a scale of Low, Medium, High, and Very High (Gray



and Larson 2000). Assignments were made based on literature reviews and discussions with subject matter experts. The likelihood of a risk becoming an issue can be interpreted with a probability of occurrence:

- Very High: > 75% chance – There are two possible reasons for this designation:
  - There is evidence of the item occurring as an issue in an existing, similar fishery and initial results suggest that the risk may be occurring since the trawl rationalization program was implemented.
  - There is substantial evidence to suggest that the risk has been realized as it relates to the implementation of the trawl rationalization program, but additional research is required to make that confirmation.
- High: 50-75% chance - There are two possible reasons for this designation:
  - There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.
  - There is evidence to suggest that the risk has been realized due to the implementation of the trawl rationalization program.
- Medium: 25-50% chance –
  - There are documented concerns of the item occurring as an issue in an existing, similar fishery or with the trawl rationalization program, but there is limited data to confirm the issue exists.
  - Additional research is needed to fully assess the likelihood. The risk is being documented, but will require further analysis.

- Low: 10-25% chance<sup>20</sup> –
  - There is minimal documentation of the item occurring in an existing, similar fishery and there are documented concerns of the item occurring in relation to the trawl rationalization program, but limited evidence to support the concerns.
- **Description** – The description gives a high-level summary of the issue or risk.
- **Concern** – The concern details why the issue or risk is a problem or why it is a potential problem.
- **Mitigation Options** – For a risk, the mitigation options detail ways to reduce the likelihood that a risk will become an issue. For an issue, the mitigation options suggest ways to deal with the issue and to mitigate its effect on the results.

### 3.3. RECURRING THEMES WITHIN AND ACROSS IMPACTS

The topics included in each section are not intended to be all-inclusive, but to highlight key topics to increase awareness and to initiate further investigation. There is overlap across the sections reviewed for each of the impacts. For example, data limitations may also pose risks to analyzing the impact. Topics were included in the section that represented the best fit. For this reason, the observations and analysis included in each section of the impact should not be viewed independently; the impact should be viewed as a whole.

There are also recurring topics that apply to two or more of the impacts. For topics identified as being significant to multiple impacts, the topic are covered in each of the affected impacts. Topics not considered critical to assessing a particular impact are not included.

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<sup>20</sup> Risks with an estimated likelihood below 10% are not listed.

## **CHAPTER 4: ANALYSES OF FOUR EMERGING IMPACTS**

This chapter applies the methodology described in Chapter 4 to analyze four emerging impacts associated with the trawl rationalization program. Historical background and an overview of each impact is provided, followed by a review of the impact's significance to different stakeholder groups. The next section describes data opportunities and challenges associated with the data. Each impact concludes with tabular information on issues and risks associated continued analysis of the topics and how challenges can be mitigated.

### **4.1. EMERGING IMPACT 1: CHANGES TO THE PRICE OF SABLEFISH AND THE TYPE OF GEAR USED TO TARGET SABLEFISH**

#### **4.1.1. Background**

Sablefish, also known as black cod, are a high value target species on the West Coast. In 2001, the fixed gear sablefish fishery became a limited entry program. Each permit is endorsed to one of three tiers. Similar to a catch share program, the poundage associated with each tier is determined annually based on management recommendations, calculated with a ratio that relates the three tiers. Up to three of these tiered permits can be registered to a vessel (called stacking).

The year prior to the trawl rationalization program's implementation, sablefish accounted for over 40% of West Coast groundfish revenue (Source: PacFIN PFMC Report 020W 2010, Accessed: May 2012). Over 60% of the sablefish catch in 2010 came from the fixed gear fishery, with longlining and pots making up 50% and 13% of the catch respectively. Trawl-caught sablefish accounted for an additional 37% of the commercial catch.

Fixed gear caught sablefish is generally of a higher quality when compared with trawl caught sablefish.<sup>21</sup> The quality difference yields a higher price for fixed gear caught sablefish. In 2010, the average price per pound for fixed gear sablefish was 36% higher than trawl caught sablefish, \$2.64, per-pound versus \$1.94 per pound (Source: PacFIN PFMC Report 082 for 2010, Accessed: April 28, 2012).

#### **4.1.2. Impact Overview**

If trawlers are able to adapt their fishing behavior to avoid catching sablefish while trawling, they can either switch gears to target sablefish with fixed gear (i.e. longline or pots) or they can lease their quota (or sell their quota after the two year moratorium) to fixed gear fishermen. It is also possible that trawl permit holders were allocated sablefish quota shares that they will not be using (e.g. they have exited the fishery since 2004 or they typically catch less sablefish than they were allocated). These quota share owners are also able to lease their quota pounds to other fishermen.

The possibility of trawlers switching to fixed gear to catch sablefish was included in the 2010 FEIS for the program:

“Other factors may cause harvesters to temporarily use nontrawl gear to prosecute fishing activities during certain times of the year. This may be due to market conditions where there is a noticeable differential in the prices paid for groundfish species caught with one gear versus another. This is particularly the case for sablefish... If the trawl sector harvests 10 percent of the trawl allocation with fixed-gear, this would increase ex-vessel revenues by approximately \$600,000. If

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<sup>21</sup> One factor of the quality rating is the size of the sablefish, with a higher price-per-pound paid for larger fish.

20 percent of the trawl allocation was caught with fixed-gear, ex-vessel revenues may increase by \$1.2 million” (PFMC and NMFS 2010b).

As it would increase the revenue for vessels participating in the trawl rationalization program, gear switching was considered a positive outcome for the trawl sector.

While the percentage of sablefish catch allocated to trawl and nontrawl sectors remained the same for 2010 and 2011, the amount of sablefish caught using fixed gears increased dramatically. The NWR released data for the 2011 season, the first year of the program, showing that 39% of the IFQ-caught sablefish were not caught with trawl gear (Matson 2012). The 2011 season showed significant drops in the amount of trawl-caught sablefish catch when compared with previous years. While the total sablefish catch for all fisheries dropped by 6%, the trawl catch dropped by 47% (Figure 4.1). Sablefish catch from pot gear increased by 37%. The 2010 season had the greatest annual sablefish catch for pot gear since the sablefish tier program went into effect in 1995 and the second lowest annual catch for trawl gear over the same period. Certain ports were also more affected than others. The Columbia River and Eureka areas saw the largest declines, while the Conception area had the largest overall increase in catch.

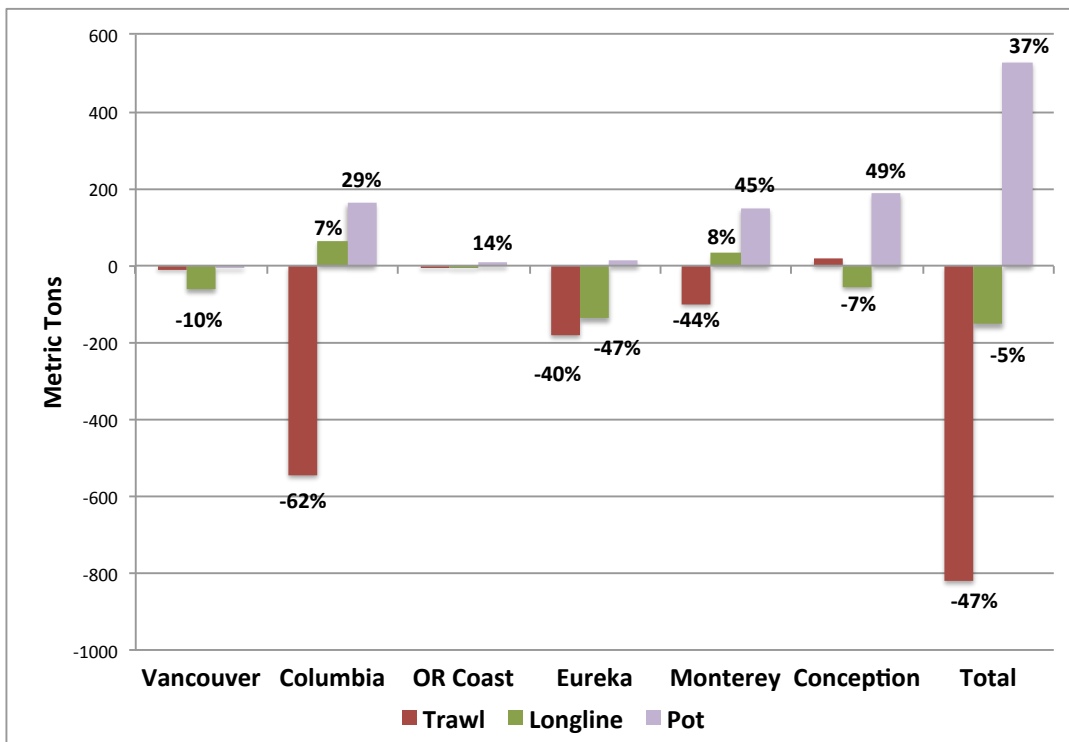


Figure 4.1 - Change in sablefish catch by gear for the West Coast groundfish fleet from 2010 to 2011 with selected annual percentage changes (Source: PacFIN PFMC Report 112twl, 112hkl, and 112pot for 2011 and 2012, Accessed: May 3, 2012).<sup>22</sup>

<sup>22</sup> There were a small number (less than 10 metric tons per gear type) of landings where the area was unknown. These have been excluded.

### **4.1.3. Significance of the Impact**

#### **1. Key Groups Affected**

- Fishermen
  - Fixed gear sablefish fishermen
  - Trawlers
- Processors
  - The impact on processors will vary by port
  - Dependent on the composition of fishermen that sell to the processor

#### **2. Implications of the Impact**

The ways in which fixed gear fishermen may be affected would vary depending on individual fishermen's situations. It is possible that individual fixed gear fishermen would benefit financially from the program due to increased fishing opportunity. However, to target sablefish allocated to the trawl sector, fixed gear fishermen must lease sablefish quota pounds and purchase or lease a limited entry trawl permit (PFMC and NMFS 2010a). If fixed gear fishermen have the funds to lease quota and a trawl permit and they estimate that the revenue for the additional sablefish catch will exceed their fixed and variable expenses, these fishermen could benefit financially. The degree of competition in the fishery also factors into how significantly fixed gear sablefish fishermen are affected. If the added competition from quota share vessels makes it more difficult for fixed gear fishermen to catch their limited entry or open access sablefish pounds, the trawl rationalization program would be imposing a cost to these fishermen (Jenkins and Garrison in press)

The ways in which this impact affects trawlers is also not uniform across the sector. If quota share owners switch to fixed gear for sablefish, the higher price-per-pound for the fish could be an economic benefit for these quota owners, depending on their variable

costs to switch gears. However, trawlers have also expressed concerns about the leasing of quota pounds to fixed gear fishermen. One of the concerns is that fixed gear fishermen may be able to pay a higher price for sablefish quota pounds because they will receive a higher price per pound for the sablefish (Kujala 2012). Trawlers that are leasing quota pounds and who need quota to cover sablefish bycatch may have limited ability to afford leasing or buying sablefish quota, jeopardizing these trawlers' ability to reach their quota for other species. Additionally, vessels designed for trawling may not be economically efficient to switch to fixed gear for targeting sablefish (Kujala 2012).

One option for analyzing this emerging impact is to determine if changes in the price per pound of West Coast sablefish can be attributed to the implementation of the trawl rationalization program. The analysis would seek to draw inferences about costs and benefits to specific groups that have been or are being affected by the program. If the price for sablefish on the West Coast is largely supply driven, the value placed on sablefish quota ownership becomes a cost associated with fishing for IFQ sablefish, which should be factored into the price of the fish.<sup>23</sup> Adding a new market-based system to regulate some of the sablefish catch means that there is an additional cost associated with the quota pounds allocated to the trawl sector (regardless of the gear used to catch this quota).

Part of the analysis would be to determine what groups are catching sablefish quota pounds with fixed gear. Questions for this analysis include:

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<sup>23</sup> The effect of demand on sablefish prices is incorporated into issues and risks for this emerging impact.



- For trawlers who were allocated quota pounds: To what extent are they switching gears to target sablefish with fixed gear?
- For lessees of sablefish quota pounds that are using fixed gear: Were these fishermen participating in the trawl fishery previously or were they primarily fixed gear fishermen?

#### 4.1.4. Data Recommendations

##### 1. Data Sources Available

Table 4.1 – Data Sources Available for Emerging Impact 1: Changes to the Price of Sablefish and the Type of Gear Used to Target Sablefish

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Fish Ticket Data	Pacific States (PacFIN)	1981 - Present	Detailed price and catch information for the West Coast sablefish fishery.	ODFW, CDFG, WDFW	
Summary Reports Based on PFMC and State Data	Pacific States (PacFIN)	1981 - Present	<ul style="list-style-type: none"> <li>• Available to the public via the PacFIN website, which contains a substantial amount of general information.</li> <li>• Additionally, tables, column descriptions, and code mapping data are also available.</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• <a href="http://pacfin.psmfc.org/pacfin_pub/pfmc.php">http://pacfin.psmfc.org/pacfin_pub/pfmc.php</a></li> <li>• <a href="http://pacfin.psmfc.org/pacfin_pub/data.php">http://pacfin.psmfc.org/pacfin_pub/data.php</a></li> </ul>
Sablefish Permit Details	NWR	1998 - Present	<ul style="list-style-type: none"> <li>• Historical records on sablefish endorsements and tiers for the vessels.</li> <li>• In the case of stacked permits, vessels will appear up to three times in the table.</li> </ul>	N/A	History of LE Permits (XLS): <a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a>

Data or Report	Owner/ Manager	Dates	Description	Approvals Required	Links
Quota Share and Vessel Account Data	NWR	Present (publicly available)	<ul style="list-style-type: none"> <li>Information on vessel account and quota share account balance became visible to the general public online starting in 2012.</li> <li>Historical account balances are not visible on the site and would require approval at the federal level to access.</li> </ul>	NWR	<a href="https://www.webapps.nwfsc.noaa.gov/itfq/">https://www.webapps.nwfsc.noaa.gov/itfq/</a>
Groundfish Permit Information	NWR	1993 - Present	Historical records on permit owners for West Coast groundfish fisheries.	N/A	<a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a>

## 2. Additional Resources

Table 4.2 - Additional Resources for Emerging Impact 1: Changes to the Price of Sablefish and the Type of Gear Used to Target Sablefish

Data or Report	Owner/ Manager	Dates	Description	Approvals Required	Links
Fishery Management Plan	PFMC	Biannual	Includes allowable biological catch (ABC)/optimal yield (OY) and recommended allocations for groundfish fisheries.	N/A	<a href="http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/">http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/</a>
Historical Landings and Revenue in Groundfish Fisheries Report and Tables (PFMC 2011)	PFMC	2011	<ul style="list-style-type: none"> <li>Graphical and tabular data about West Coast groundfish landings and catch data</li> <li>Documentation of the criteria used to pull data for the reports from the PacFIN vessel daily summary (vdrfd) table</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wpcontent/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf">http://www.pcouncil.org/wpcontent/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/">http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/</a></li> </ul>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
ODFW Supplemental Reports on the Trawl Rationalization Program	ODFW	2011, 2012	Reports and analysis specific to Oregon on 2011 and 2012 fisheries and ports as they relate to the trawl rationalization program (ODFW 2012).	N/A	<ul style="list-style-type: none"> <li>• <a href="http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf">http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf</a></li> <li>• <a href="http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf</a></li> <li>• <a href="http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf</a></li> </ul>
Alaska Sablefish Reports	Alaska Regional Office	1995 - Present	<ul style="list-style-type: none"> <li>• Summary reports for the Alaska sablefish fishery, including weekly and monthly roll-up information.</li> <li>• Detailed reports are also available, but may not include all relevant years - e.g. the 'Transfer Report - Changes Under Alaska's Sablefish IFQ program 1995 through 2009' includes details ranging from quota share prices to a breakdown of vessel participation by vessel class and quota share ownership by community type</li> </ul>	Required for information not included in the summary reports	<a href="http://www.fakr.noaa.gov/ram/ifqreports.htm">http://www.fakr.noaa.gov/ram/ifqreports.htm</a>
Canada Sablefish Fishery Reports	Fisheries and Oceans Canada	1997 - 2010, Present	<ul style="list-style-type: none"> <li>• Summary reports for the British Columbia fishery (requires user to set up a login account)</li> <li>• Historical assessments on the aquaculture program</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• Sablefish Fishery: <a href="http://www.pac.dfo-mpo.gc.ca/fm-gp/commercial/ground-fond/sable-charbon/index-eng.htm">http://www.pac.dfo-mpo.gc.ca/fm-gp/commercial/ground-fond/sable-charbon/index-eng.htm</a></li> <li>• Aquaculture: <a href="http://www.dfo-mpo.gc.ca/aquaculture/fmfish-poissons/sablefish-morue-eng.htm">http://www.dfo-mpo.gc.ca/aquaculture/fmfish-poissons/sablefish-morue-eng.htm</a></li> </ul>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Marine Stewardship Council (MSC) Certification Reports – North Pacific and Canadian Sablefish	MSC	North Pacific: 2006, 2011 Canada: 2010	Research conducted by the MSC to certify the North Pacific and Canadian sablefish fisheries	N/A	<ul style="list-style-type: none"> <li>• North Pacific: <a href="http://www.msc.org/track-a-fishery/certified/pacific/us-north-pacific-sablefish/reassessment-downloads">http://www.msc.org/track-a-fishery/certified/pacific/us-north-pacific-sablefish/reassessment-downloads</a></li> <li>• Canada: <a href="http://www.msc.org/track-a-fishery/certified/pacific/Canada-sablefish/assessment-downloads">http://www.msc.org/track-a-fishery/certified/pacific/Canada-sablefish/assessment-downloads</a></li> </ul>
PFMC Managed Groundfish Stock Assessments and Rebuilding Plans	PFMC	Typically biannually	<ul style="list-style-type: none"> <li>• Full assessments of the status of stocks, produced every other year for many stocks.</li> <li>• In addition to biological information, they also cover take activities</li> </ul> *Pacific Halibut assessments can be found on the IPHC's website	N/A	<a href="http://www.pcouncil.org/groundfish/stock-assessments/by-species/">http://www.pcouncil.org/groundfish/stock-assessments/by-species/</a>
Alaska Fleet Profiles (Witherell et al. 2012)	North Pacific Fishery Management Council	2012	<ul style="list-style-type: none"> <li>• Report on the Alaska commercial fishing fleet structure.</li> <li>• Includes counts of the vessels participating in federally managed fisheries and the overlap of vessels participating in multiple federally managed fisheries.</li> </ul> * Does not include counts of vessels participating in state-managed fisheries.	N/A	<a href="http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf">http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf</a>

### **3. Limitations and Missing Data**

Comprehensive data on the costs for all leased and, in the future, sold sablefish quota would facilitate the study of this topic. For example, the cost for fixed gear fishermen to lease quota and trawl permits would be valuable in order to calculate the net gain or loss to these lessees. For trawlers fishing with leased quota, the data could be used to evaluate if these permit-holders' sablefish allocations may have been insufficient.

- The NWFSC's EDC survey includes questions asking if catcher vessels lease or sell quota. However, it is expected that the information contained in these surveys will only be accessible to those working for or contracting with the NWFSC. Additionally, this information does not require that each lessor and lessee relationship be documented.
- The vessel account system managed by the NWR does include transfer costs (monetary and other) for the vessels and owners involved in a transfer. However, access to this information is also restricted and may only be available to government agencies or their contractors.

### **4.1.5. Research Planning Considerations**

#### **1. Dependencies**

- West Coast sablefish allocations and changes to sablefish allocations
- Serial dependence on commercial catch in previous years
- Relative performance of other fisheries
- Environmental conditions
- Status of the sablefish stock, particularly changes to stock abundance
- Changes to exchange rates between the United States and its trading partners

## **2. Considerations for Determining When Data Can Be Analyzed**

Due to the two-year moratorium on the sale of quota shares, costs that may be attributable to the program may not be apparent in the first two years. For this reason, the first two years of the program will need to be considered separately from subsequent years of the program.

Additionally, regulators have suggested that fishermen's behavior during the first year of the program may not be reflective of how fishermen will behave after they are more accustomed to the program (CDFG Marine Region 2012).

### 3. Issues and Risks with Analyzing

Table 4.3: Details on Issues and Risks for Emerging Impact 1: Changes to the Price of Sablefish and the Type of Gear Used to Target Sablefish

Type	Severity	Risk Likelihood	Description	Concern	Mitigation Options
Issue	High	N/A	The demand for sablefish is a driver of market price.	<ul style="list-style-type: none"> <li>If prices are largely demand driven, higher prices will be less the result of changes to fishery regulations on the West Coast.</li> <li>If prices are supply driven, we would expect to see a greater increase in prices on the West Coast. This is a risk because it must be performed and should be done before selecting this topic.</li> </ul>	<ul style="list-style-type: none"> <li>Review existing literature on fish prices and market factors.</li> <li>Conduct a comparison of Alaska prices and West Coast prices.<sup>24</sup></li> </ul>
Risk	Medium	Medium	The 2011 Tohoko, Japan earthquake and tsunamis impacted seafood prices significantly.	The first year of the trawl rationalization program is not representative of other years. If this plays a large role, this could push out when data can be analyzed.	<ul style="list-style-type: none"> <li>Evaluate market prices of other species in Japan and compare against historical annual prices.</li> <li>Include more years of data to minimize these concerns.</li> </ul>

<sup>24</sup> Requires that changes to regulations for both regions also be considered.



Type	Severity	Risk Likelihood	Description	Concern	Mitigation Options
Risk	Low	Medium	Prices for other species (i.e. if there are substitute goods) may have impacted sablefish prices.	Changes with regards to substitute goods could impact sablefish prices, such as allocation, catch, demand, etc. Huppert and Best (2004) suggest that sockeye salmon and mero can be considered substitutes for sablefish in the Japanese market, though the fish classified as substitutes have not remained static over time.	<ul style="list-style-type: none"> <li>• Evaluate research on fish prices and on substitute goods (if available).</li> <li>• Review large supply changes and prices for these fisheries to rule out if this is a problem.</li> </ul>
Risk	Medium	Medium	The West Coast is not the only supplier of sablefish.	The prices for wild-caught sablefish in Alaska and British Columbia, Canada, as well as for aquaculture-supplied sablefish, could play a significant role in the price for West Coast sablefish (Huppert and Best 2004, Sonu 2000).	<ul style="list-style-type: none"> <li>• Evaluate market prices of other species in Japan and compare against historical annual prices.</li> <li>• Include more years of data to minimize these concerns.</li> </ul>

Table 4.4: Reference for Issue and Risk Table Definitions

For full definitions, see Section 3.2.5.3 Issues and Risks with Analyzing.

Column	Risk or Issue	Ranking	Definition
Type	Risk		A possible problem that has not occurred yet; a confounding factor that may influence the results of an analysis. Items requiring additional analysis to determine if they are an issue or a risk are labeled as risks.
	Issue		A problem that has already occurred; a complexity that needs to be assessed and documented.
Severity	Risk	Critical	If the risk materializes and becomes a critical issue, the validity of the research will likely be in jeopardy and the estimated timeline to complete the research will increase beyond what is manageable. A clear mitigation plan should be in place before beginning the study.
		High	If the risk materializes and becomes an issue, there is a high probability that the estimated timeline or the validity of the results may be affected. It is highly advisable that a clear mitigation plan be in place before beginning the study.
		Medium	It is less likely that if the risk is realized it will affect the timeline or results, but a mitigation plan should still be put in place early on in the study.
		Low	The risk is not expected to impact the validity of the results or the timeline, but the risk should be considered while conducting research. There should also be a mitigation plan in place, but the plan may be implemented after research has begun.
			The results will not be valid unless the issue is addressed. If not already in place, a mitigation strategy should be put into action as soon as possible.
	Issue	Critical	Addressing the issue is likely required to ensure the validity of the results or to keeping the timeline. A mitigation strategy should be initiated.
		High	The issue should be evaluated early on and kept in mind as research progresses, but it may be sufficient to document the issue in the research without fully accounting for it. A mitigation strategy should be decided upon, but higher priority issues would take precedence.
		Medium	The issue should be noted and evaluated. The issue is not expected to derail the research or pose a significant threat to the validity of the work or the timeline.
		Low	The issue should be noted and evaluated. The issue is not expected to derail the research or pose a significant threat to the validity of the work or the timeline.

Column	Risk or Issue	Ranking	Definition
Risk Likelihood	Risk	Very High	<p>&gt; 75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and initial results suggest that the risk may be occurring since the trawl rationalization program was implemented.</li> <li>· There is substantial evidence to suggest that the risk has been realized as it relates to the implementation of the trawl rationalization program, but additional research is required to make that confirmation.</li> </ul>
		High	<p>50-75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> </ul>
		Medium	<p>25-50% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There are documented concerns of the item occurring as an issue in an existing, similar fishery or with the trawl rationalization program, but there is limited data to confirm the issue exists.</li> <li>· Additional research is needed to fully assess the likelihood. The risk is being documented, but will require further analysis.</li> </ul>
		Low	<p>10-25% chance:</p> <ul style="list-style-type: none"> <li>· There is minimal documentation of the item occurring in an existing, similar fishery and there are documented concerns of the item occurring in relation to the trawl rationalization program, but limited evidence to support the concerns.</li> </ul>
Description			A high-level summary of the issue or risk.
Concern			Why the issue or risk is a problem or why it is a potential problem.
Mitigation	Risk		Details ways to reduce the likelihood that a risk will become an issue.
Options	Issue		Suggests ways to deal with the issue and to mitigate its effect on the results.

## **4.2. EMERGING IMPACT 2: EFFECTS OF INCREASED PARTICIPATION OF TRAWLERS ON OTHER FISHERIES**

### **4.2.1. Background**

Prior to the implementation of the groundfish trawl rationalization program, there were many existing regulations in place for the groundfish trawl fisheries (50 CFR 660). There were time restrictions that applied to individual vessels, such as two-month, cumulative trip limits. Other limits applied to the sectors as a whole, such as allocations for target and bycatch species for the whiting and non-whiting trawl sectors.

From an economic standpoint, using time closures to limit catch in a fishery is considered inefficient.<sup>25</sup> The closures strand capital by potentially leaving vessels at the dock when these vessels could be out fishing. Though the non-whiting trawl fishery was considered year round, it was still possible that higher levels of bycatch in a season or reaching a sector's allocation of a stock ahead of time could and did lead to inseason regulatory changes or could shut down a trawl fishery (PFMC and NMFS 2010b).<sup>26</sup> The non-whiting fishery was not a derby fishery. However, there was still more likely that if fishermen switched to groundfish trawling too late in the season they would face more restrictive management measures or be unable to participate in the fishery.

### **4.2.2. Impact Overview**

With the implementation of the trawl rationalization program, quota share owners are allocated a set number of quota pounds for the year. The FEIS for the trawl

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<sup>25</sup> Time closures can also be used for other purposes, such as to protect rebuilding species at important points in their life history.

<sup>26</sup> Even with the trawl rationalization program, it is still possible that this could occur.

rationalization program documented that spillover of trawlers into other fisheries could negatively affect fishermen outside of the trawl sector. Two of the primary reasons listed in the FEIS were because of consolidation in the trawl fleet and because of increased flexibility for trawlers in determining when to fish for their quota pounds (PFMC and NMFS 2010b). This could result in increased fishing effort by trawlers in other fisheries as these fishermen may choose to enter new fisheries or increase their level of participation in other fisheries.

### **4.2.3. Significance of the Impact**

#### **1. Key Groups Affected**

- Fishermen, including crew
  - Fixed gear groundfish fishermen
  - Groundfish trawlers<sup>27</sup>
  - Crab fishermen
  - Shrimp fishermen
- Processors
  - The impact on processors will vary by port
  - Dependent on the composition of fishermen that sell to the processor

#### **2. Implications of the Impact**

It is possible that the change in regulations for quota share owners (i.e. those with historical trawl catch that were allocated quota) will impact fishermen participating in other fisheries due to increased participation of trawlers in those fisheries. As many

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<sup>27</sup> As noted previously, groundfish trawlers also participate in other fisheries.

trawlers already participate in other fisheries, spillover effects could affect them in a similar manner.

Examples of negative consequences of spillover effects that could result from the trawl rationalization program include:

- Opportunities for crewmembers in other fisheries may become more limited as trawlers and their crew enter into those fisheries or increase their effort in those fisheries.
- If quota share owners increase their fishing effort in other fisheries, competition on the fishing grounds would increase and could reduce the catch of other vessels.
- Revenue gains for quota share owners could result in these owners being more able to upgrade their vessels, making them more competitive and potentially pushing out fishermen with less competitive equipment or vessels.<sup>28</sup>
- More participants spending more time fishing could increase the supply of a stock for sale. The increase in supply could then lower the price-per-pound paid for fish, thus lowering the earnings of fishermen targeting the stock (see 4.1. Emerging Impact 1: Changes to the Price of Sablefish and the Type of Gear Used to Target Sablefish).

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<sup>28</sup> Overcapitalization is one of the issues that the trawl rationalization program seeks to address. The extent to which the quota owners would invest in upgrading their vessels is not addressed in this document.

#### 4.2.4. Data Recommendations

##### 1. Data Sources Available

Table 4.5 – Data Sources Available for Emerging Impact 2: Effects of Increased Participation of Trawlers on Other Fisheries

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Fish Ticket Data	Pacific States (PacFIN)	1981 - Present	Detailed price and catch information for the West Coast sablefish fishery.	ODFW, CDFG, WDFW	
Summary Reports Based on PFMC and State Data	Pacific States (PacFIN)	1981 - Present, Varies	<ul style="list-style-type: none"> <li>Available to the public via the PacFIN website, which contains a substantial amount of general information.</li> <li>Additionally, tables, column descriptions, and code mapping data are also available.</li> <li>The QSM PFMC Best Estimate Reports include groundfish harvest guidelines for many years</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://pacfin.psmfc.org/pacfin_pub/pfmc.php">http://pacfin.psmfc.org/pacfin_pub/pfmc.php</a></li> <li><a href="http://pacfin.psmfc.org/pacfin_pub/data.php">http://pacfin.psmfc.org/pacfin_pub/data.php</a></li> <li>QSM Reports (link available to historical reports, as well): <a href="http://pacfin.psmfc.org/pacfin_pub/qsm.php">http://pacfin.psmfc.org/pacfin_pub/qsm.php</a></li> </ul>
Quota Share and Vessel Account Data	NWR	Present (publicly available)	<ul style="list-style-type: none"> <li>Information on vessel account and quota share account balance became visible to the general public online starting in 2012.</li> <li>* Historical account balances are not visible on the site and would require approval at the federal level to access.</li> </ul>	NWR	<a href="https://www.webapps.nwfsc.noaa.gov/iffq/">https://www.webapps.nwfsc.noaa.gov/iffq/</a>
Groundfish Permit Information	NWR	1993 - Present	Historical records on permit owners for West Coast groundfish fisheries.	N/A	<a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Permit Information for State-Managed Fisheries	Pacific States (PacFIN)	Varies	Historical records on permit owners for West Coast state-managed fisheries, including details such as pot limits for Dungeness crab fisheries.	ODFW, CDFG, WDFW	
Tracking of Alaska and West Coast trawlers (future)	Pacific States	N/A	The program is specifically targeted to review trawlers who participate in Alaska fisheries.	To Be Determined	



## 2. Additional Resources

Table 4.6 - Additional Resources for Emerging Impact 2: Effects of Increased Participation of Trawlers on Other Fisheries

Data or Report		Owner / Manager	Dates	Description	Approvals Required	Links
Vessel Length Information	Pacific States (PacFIN), Coast Guard, or NWR	1993 or earlier - Present	Vessel length information	Not required. If receiving it with other data, may need approval.	<ul style="list-style-type: none"> <li>Endorsed and actual length of vessels with groundfish permits:</li> <li>History of LE Permits (XLS) - <a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a></li> </ul>	
Fishery Management Plan	PFMC	Biannual	Includes ABC/OY and recommended allocations for groundfish fisheries.	N/A	<a href="http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/">http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/</a>	
ODFW Supplemental Reports on the Trawl Rationalization Program	ODFW	2011, 2012	Reports and analysis specific to Oregon on 2011 and 2012 fisheries and ports as they relate to the trawl rationalization program (ODFW 2012).	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf">http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf</a></li> <li><a href="http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf</a></li> </ul>	
Historical Landings and Revenue in Groundfish Fisheries Report and Tables (PFMC 2011)	PFMC	2011	<ul style="list-style-type: none"> <li>Graphical and tabular data about West Coast groundfish landings and catch data</li> <li>Documentation of the criteria used to pull data for the reports from the PacFIN vessel daily summary (vdrfd) table</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wp-content/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/">http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/</a></li> </ul>	

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Inseason Groundfish Regulatory Changes and Announcements	NWR	Historical, Current	Includes changes to regulations made during the year, including trip limit updates and changes to protect overfished species.	N/A	<a href="http://www.nwr.noaa.gov/Groundfish-Habitat/Groundfish-Fishery-Management/Public-Notices/Index.cfm">http://www.nwr.noaa.gov/Groundfish-Habitat/Groundfish-Fishery-Management/Public-Notices/Index.cfm</a>
MSC Certification Report - Oregon Dungeness Crab	MSC	2010	<ul style="list-style-type: none"> <li>• Research conducted by the MSC to certify the crab fishery as sustainable.</li> <li>• Key research papers on the fishery are included in the analysis.</li> <li>• Additionally, the certification stipulated that multiple conditions be met to maintain the certification. More analysis and data tracking should be available as a result of these conditions.</li> </ul>	N/A. May be required for new data collected as a result of certification.	<a href="http://www.msc.org/track-a-fishery/certified/pacific/Oregon-Dungeness-crab/assessment-downloads-1/ODC_V4_Final-Report_27Oct2010.pdf">http://www.msc.org/track-a-fishery/certified/pacific/Oregon-Dungeness-crab/assessment-downloads-1/ODC_V4_Final-Report_27Oct2010.pdf</a>
NMFS Trawl Logbook Data	Pacific States (PacFIN)	CDFG: 1981 - Present, WDFW and ODFW: 1987 - Present	<ul style="list-style-type: none"> <li>• Logbook data includes detailed information about where trawlers fish, thus it is classified as highly confidential.</li> <li>* Having trawl effort data will still not allow comparisons to changes in effort for other gear types.</li> <li>* Records are not complete. The historical shortcomings are described on the PacFIN site. <a href="http://pacfin.psmfc.org/pacfin_pub/usrdoc.php#data">http://pacfin.psmfc.org/pacfin_pub/usrdoc.php#data</a></li> </ul>	ODFW, CDFG, WDFW	
ODFW Fishing Logbook Data	ODFW	2007 - Present	Detailed information about fishing effort for Oregon.	ODFW	

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
CDFG Summary Commercial Catch Reports	CDFG	2000-2010	<ul style="list-style-type: none"> <li>Includes catch details commercially caught species in CA (not just groundfish species).</li> <li>Summary data on state-managed fisheries.</li> <li>* May not be up to current year.</li> </ul>	N/A	<a href="http://www.dfg.ca.gov/marine/research.asp#management">http://www.dfg.ca.gov/marine/research.asp#management</a>
Alaska Fleet Profiles (Witherell et al. 2012)	North Pacific Fishery Management Council	2012	<ul style="list-style-type: none"> <li>Report on the Alaska commercial fishing fleet structure.</li> <li>Includes counts of the vessels participating in federally managed fisheries and the overlap of vessels participating in multiple federally managed fisheries.</li> <li>* Does not include counts of vessels participating in state-managed fisheries.</li> </ul>	N/A	<a href="http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf">http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf</a>

### **3. Limitations and Missing Data**

A consolidated view of allocations, including historical allocations and the timing of changes to allocations would be valuable. Time will need to be spent compiling multiple years of harvest guidelines for the fisheries analyzed. Time will also need to be spent to validate the data compiled to ensure amounts include, for example, inseason updates. One option for validating compiled regulations may be to compare findings against regulations reported in stock assessments for individual species or complexes of species. For groundfish, the Quota Species Monitoring (QSM) inseason management report includes harvest guidelines for several years.

Data on fishing effort would be valuable, but is limited. PacFIN tables have a field for days fished, but this information is no longer being recorded on state fish ticket information (D. Colpo, 2012 personal communication, unreferenced). Trawling effort is available in trawl logbooks. However, trawl logbooks give detailed information on where and how vessels fish, so access to this information may be more restricted.

#### **4.2.5. Research Planning Considerations**

##### **1. Dependencies**

- Serial dependence on the commercial catch in previous years
- Significant changes in expenses could impact participation levels, e.g. significant changes to fuel costs, which are accessible through the Fisheries Economics Data Program (EFIN)

## **2. Considerations for Determining When Data Can Be Analyzed**

- Issues with data from the first year of the trawl rationalization program as fishermen adjusted to the program and modified their behavior based on experience
- The first year of the program was likely unrepresentative and would need to be considered as an outlier.

### 3. Issues and Risks with Analyzing

Table 4.7: Details on Issues and Risks for Emerging Impact 2: Effects of Increased Participation of Trawlers on Other Fisheries

Type	Severity	Risk Likelihood	Description	Concern	Mitigation Options
Issue	Medium to High	N/A	Environmental conditions and biological factors are dynamic.	Fishermen will adapt their fishing approach, in part, based on the performance of a stock on a given year.	<ul style="list-style-type: none"> <li>• These factors should, at a minimum, be documented in the analysis for their potential impact.</li> <li>• Where possible, environmental and biological information should be incorporated into the analysis.</li> </ul>
Risk	Medium	High	Differences in the market price for a species may be the driver of increased participation in those fisheries.	It is difficult to quantify the extent to which market forces drive increased participation in the fishery as opposed to the trawl rationalization solution that was implemented.	<ul style="list-style-type: none"> <li>• Review data against previous years and entry into the fishery.</li> <li>• A review of permit data preceding and following the 2003 trawl buyback could also help to gain additional insight.</li> </ul>
Risk	Medium	High	Fishing vessels move between different management areas.	<ul style="list-style-type: none"> <li>• Vessels may be used to fish in state-managed fisheries and federally managed fisheries on the West Coast.</li> <li>• In addition, vessels may also be used in other fisheries, such as Alaska fisheries.</li> </ul>	<ul style="list-style-type: none"> <li>• Where possible, the movement of vessels and participation in other fisheries should be considered.</li> <li>• When tracking of vessels will not be possible or will be too time intensive, an estimate should be made as to how much of an impact this may have.</li> </ul>

Table 4.8: Reference for Issue and Risk Table Definitions  
 For full definitions, see Section 3.2.5.3 Issues and Risks with Analyzing.

Column	Risk or Issue	Ranking	Definition
Type	Risk		A possible problem that has not occurred yet; a confounding factor that may influence the results of an analysis. Items requiring additional analysis to determine if they are an issue or a risk are labeled as risks.
	Issue		A problem that has already occurred; a complexity that needs to be assessed and documented.
Severity	Risk	Critical	If the risk materializes and becomes a critical issue, the validity of the research will likely be in jeopardy and the estimated timeline to complete the research will increase beyond what is manageable. A clear mitigation plan should be in place before beginning the study.
		High	If the risk materializes and becomes an issue, there is a high probability that the estimated timeline or the validity of the results may be affected. It is highly advisable that a clear mitigation plan be in place before beginning the study.
		Medium	It is less likely that if the risk is realized it will affect the timeline or results, but a mitigation plan should still be put in place early on in the study.
		Low	The risk is not expected to impact the validity of the results or the timeline, but the risk should be considered while conducting research. There should also be a mitigation plan in place, but the plan may be implemented after research has begun.
	Issue	Critical	The results will not be valid unless the issue is addressed. If not already in place, a mitigation strategy should be put into action as soon as possible.
		High	Addressing the issue is likely required to ensure the validity of the results or to keeping the timeline. A mitigation strategy should be initiated.
		Medium	The issue should be evaluated early on and kept in mind as research progresses, but it may be sufficient to document the issue in the research without fully accounting for it. A mitigation strategy should be decided upon, but higher priority issues would take precedence.
		Low	The issue should be noted and evaluated. The issue is not expected to derail the research or pose a significant threat to the validity of the work or the timeline.

Column	Risk or Issue	Ranking	Definition
Risk Likelihood	Risk	Very High	<p>&gt; 75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and initial results suggest that the risk may be occurring since the trawl rationalization program was implemented.</li> <li>· There is substantial evidence to suggest that the risk has been realized as it relates to the implementation of the trawl rationalization program, but additional research is required to make that confirmation.</li> </ul>
		High	<p>50-75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> </ul>
		Medium	<p>25-50% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There are documented concerns of the item occurring as an issue in an existing, similar fishery or with the trawl rationalization program, but there is limited data to confirm the issue exists.</li> <li>· Additional research is needed to fully assess the likelihood. The risk is being documented, but will require further analysis.</li> </ul>
		Low	<p>10-25% chance:</p> <ul style="list-style-type: none"> <li>· There is minimal documentation of the item occurring in an existing, similar fishery and there are documented concerns of the item occurring in relation to the trawl rationalization program, but limited evidence to support the concerns.</li> </ul>
Description			A high-level summary of the issue or risk.
Concern			Why the issue or risk is a problem or why it is a potential problem.
Mitigation Options	Risk		Details ways to reduce the likelihood that a risk will become an issue.
	Issue		Suggests ways to deal with the issue and to mitigate its effect on the results.



### **4.3. EMERGING IMPACT 3: POTENTIAL DIFFERENCES IN ACHIEVING HARVEST GUIDELINES DUE TO DIFFERENCES IN REGULATIONS**

#### **4.3.1. Background**

Regulations can impact whether or not the full allocation of a target species will be caught in a given year. For example, trip limits can lengthen the fishing season by reducing the quantity of fish that vessels can land on a given fishing trip. If the season is cut back enough, fishermen may exit a fishery and may switch over to another fishery. Since regulations are set with the goal of achieving multiple objectives, the degree to which recommendations of target species are reached does not make one fishery management approach “more effective” or “more efficient” in all respects. Each goal must be weighed to determine how an approach has performed.

Because of other needs (e.g. to protect overfished species), it is possible that specific regulations will directly impact whether or not harvest guidelines for target species are reached. One of the primary goals of the trawl rationalization program is that the program “provides for full utilization of the trawl sector allocation” (PFMC 2010).

#### **4.3.2. Impact Overview**

One way that allocations are set is at the sector level. It is possible that some of the limits for certain gears make it more difficult for one gear type or fishery to achieve optimum yield than it is for another. The trawl rationalization program moved responsibility onto individuals and scaled back more of the detailed regulations.

The study would be review two or more fisheries, one of which is a part of the trawl rationalization program, to compare how well the fisheries did in reaching their optimum

yields. There are multiple fisheries to compare, but most comparisons would require analyzing different stocks.

### **4.3.3. Significance of the Impact**

#### **1. Key Groups Affected**

- Fishermen, including crew
  - Groundfish trawlers
  - Fishermen participating in the fishery (or fisheries) selected as a comparison
  - If groundfish trawlers also participate in the fishery selected as a comparison, the group should be considered independently, as well.

#### **2. Implications of the Impact**

There are multiple reasons why an analysis in this area could be valuable. When comparing the new trawl rationalization program with a fishery managed using different methods, efficiency gains associated with the new program may become more apparent or may not be found. From an economic perspective, comparing fisheries would help to quantify the value of the transfer made to quota share recipients. By incorporating changes to the number of discards into the comparison, environmental effects can be considered.

#### 4.3.4. Data Recommendations

##### 1. Data Sources Available

Table 4.9 – Data Sources Available for Emerging Impact 3: Fisheries Outside of the Trawl Rationalization Program May be Less Likely to Achieve Harvest Guidelines Due to Differences in Regulations

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Fish Ticket Data	Pacific States (PacFIN)	1981 - Present	Detailed price and catch information for the West Coast sablefish fishery.	ODFW, CDFG, WDFW	
Summary Reports Based on PFMC and State Data	Pacific States (PacFIN)	1981 - Present	<ul style="list-style-type: none"> <li>Available to the public via the PacFIN website, which contains a substantial amount of general information.</li> <li>Additionally, tables, column descriptions, and code mapping data are also available.</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://pacfin.psmfc.org/pacfin_pub/pfmc.php">http://pacfin.psmfc.org/pacfin_pub/pfmc.php</a></li> <li><a href="http://pacfin.psmfc.org/pacfin_pub/data.php">http://pacfin.psmfc.org/pacfin_pub/data.php</a></li> </ul>
Quota Share and Vessel Account Data	NWR	Present (publicly available)	<ul style="list-style-type: none"> <li>Information on vessel account and quota share account balance became visible to the general public online starting in 2012.</li> <li>* Historical account balances are not visible on the site and would require approval at the federal level to access.</li> </ul>	NWR	<a href="https://www.webapps.nwfsc.noaa.gov/itfq/">https://www.webapps.nwfsc.noaa.gov/itfq/</a>
Groundfish Permit Information	NWR	1993 - Present	Historical records on permit owners for West Coast groundfish fisheries.	N/A	<a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Fishery Management Plan	PFMC	Biannual	Includes ABC/OY and recommended allocations for groundfish fisheries.	N/A	<a href="http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/">http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-amendment-16-5/</a>
Code of Federal Regulations for Pacific Coast Groundfish	1996 - Current	1996 - Current	Listing of regulations governing West Coast commercial and recreational fisheries, including updated rules	N/A	<a href="http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR">http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR</a> See Title 50, Chapter VI, Part 660, listed by year Current: <a href="http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Regulations/upload/pink-pgs.pdf">http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Regulations/upload/pink-pgs.pdf</a>
Inseason Groundfish Regulatory Changes and Announcements	NWR	2002 - Current	Includes changes to regulations made during the year, including trip limit updates and changes to protect overfished species.	N/A	<a href="http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Public-Notices/Index.cfm">http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Public-Notices/Index.cfm</a>

## 2. Additional Resources

Table 4.10 - Additional Resources for Emerging Impact 3: Fisheries Outside of the Trawl Rationalization Program May be Less Likely to Achieve Harvest Guidelines Due to Differences in Regulations

Data or Report	Owner/ Manager	Dates	Description	Approvals Required	Links
PFMC Managed Groundfish Stock Assessments and Rebuilding Plans	PFMC	N/A	<ul style="list-style-type: none"> <li>• Full assessments of the status of stocks, produced every other year for many stocks.</li> <li>• In addition to biological information, they also cover take activities</li> <li>• Pacific Halibut assessments can be found on the IPHC's website</li> </ul>	N/A	<a href="http://www.pcouncil.org/groundfish/stock-assessments/by-species/">http://www.pcouncil.org/groundfish/stock-assessments/by-species/</a>
CDFG Summary Commercial Catch Reports	CDFG	2000-2010	<ul style="list-style-type: none"> <li>• Includes catch details commercially caught species in CA (not just groundfish species).</li> <li>• Summary data on state-managed fisheries.</li> <li>* May not be up to current year.</li> </ul>	N/A	<a href="http://www.dfg.ca.gov/marine/research.asp#management">http://www.dfg.ca.gov/marine/research.asp#management</a>
ODFW Supplemental Reports on the Trawl Rationalization Program	ODFW	2011, 2012	Reports and analysis specific to Oregon on 2011 and 2012 fisheries and ports as they relate to the trawl rationalization program (ODFW 2012).	N/A	<ul style="list-style-type: none"> <li>• <a href="http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf">http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf</a></li> <li>• <a href="http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf</a></li> <li>• <a href="http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf</a></li> </ul>

### **3. Limitations and Missing Data**

Approvals for data access may be difficult to obtain or may not be possible for certain data.

There is limited data to gauge and track changes to fishing effort, depending on the fishery selected as a comparison.

#### **4.3.5. Research Planning Considerations**

##### **1. Dependencies**

- The price of a particular species relative to other species that the fisherman can also target
- Significant changes in expenses could impact participation levels (e.g. significant changes to fuel costs, which are accessible through EFIN)
- Serial dependence on the commercial catch in previous years

##### **2. Considerations for Determining When Data Can Be Analyzed**

When deciding how much history is required before an analysis can be conducted, significant regulation changes (outside of the trawl rationalization program) and the effect they would have on the comparison fishery should be considered.

The analysis is dependent on fishermen's participation in other fisheries, so significant price, revenue, or total catch changes would need to be considered in determining how much history is required. A higher price or a more productive year class for one of the fisheries could skew the data or may represent an outlier. For example, 2011 was a record-breaking year for the commercial West Coast Dungeness crab fishery in terms of total revenue, price per pound, and total catch. Comparing the 2011 crabbing effort with

the years prior to the trawl rationalization program would likely be problematic due to the higher price of crab.

### 3. Issues and Risks with Analyzing

Table 4.11: Details on Issues and Risks for Emerging Impact 3: Fisheries Outside of the Trawl Rationalization Program May be Less Likely to Achieve Harvest Guidelines Due to Differences in Regulations

Type	Severity	Risk Likelihood	Description	Concern	Mitigation Options
Issue	Medium to High	N/A	Environmental conditions and biological factors are dynamic.	Fishermen will adapt their fishing approach, in part, based on the performance of a stock on a given year.	<ul style="list-style-type: none"> <li>• These factors should, at a minimum, be documented in the analysis for their potential impact.</li> <li>• Where possible, environmental and biological information should be incorporated into the analysis.</li> </ul>
Risk	Medium	High	Differences in the market price for a species may be the driver of increased participation in those fisheries.	It is difficult to quantify the extent to which market forces drive increased participation in the fishery as opposed to the trawl rationalization solution that was implemented.	<ul style="list-style-type: none"> <li>• Review data against previous years and entry into the fishery.</li> <li>• A review of permit data preceding and following the 2003 trawl buyback could also help to gain additional insight.</li> </ul>



Type		Severity	Risk Likelihood	Description	Concern	Mitigation Options
Issue	High	N/A	Fishery regulations are variable .	<ul style="list-style-type: none"> <li>• Regulations change annually and even inseason, making comparisons even within a fishery difficult to compare with other years of the fishery</li> <li>• There are fisheries where it is known that because of bycatch requirements, fishery managers do not expect maximum catch limits to be reached.</li> <li>• State regulations are not a part of the federal recommendations. Changes to those may impact participation in the federal groundfish fishery.</li> </ul>	<ul style="list-style-type: none"> <li>• A timeline noting significant changes in regulations for the fishery should be created</li> <li>• NMFS' documents that speak to the fact that allocations were adjusted down because vessels have been unable to meet targets because of, for example, limits on overfished species, should be noted.</li> </ul>	
Risk	Medium	Medium	The level of observer coverage is not the same across fisheries.	Depending on the fisheries and the stocks to be compared, the tracking may not be equivalent.	<ul style="list-style-type: none"> <li>• Focus on target species that are not discarded and that are tracked on fish tickets.</li> <li>• Document differences in the level of observer coverage and determine if adjustments need to account for differences.</li> </ul>	
Issue	Medium	N/A	Trawlers and nontrawlers are typically not targeting the same stock.	Comparisons of catch across species are not one-to-one comparisons.	<ul style="list-style-type: none"> <li>• Perform up front work when selecting what stocks and fisheries would make sense to compare.</li> <li>• Evaluate positives and negatives associated with the potential stocks to compare.</li> </ul>	

Table 4.12: Reference for Issue and Risk Table Definitions  
 For full definitions, see Section 3.2.5.3 Issues and Risks with Analyzing.

Column	Risk or Issue	Ranking	Definition
Type	Risk		A possible problem that has not occurred yet; a confounding factor that may influence the results of an analysis. Items requiring additional analysis to determine if they are an issue or a risk are labeled as risks.
	Issue		A problem that has already occurred; a complexity that needs to be assessed and documented.
Severity	Risk	Critical	If the risk materializes and becomes a critical issue, the validity of the research will likely be in jeopardy and the estimated timeline to complete the research will increase beyond what is manageable. A clear mitigation plan should be in place before beginning the study.
		High	If the risk materializes and becomes an issue, there is a high probability that the estimated timeline or the validity of the results may be affected. It is highly advisable that a clear mitigation plan be in place before beginning the study.
		Medium	It is less likely that if the risk is realized it will affect the timeline or results, but a mitigation plan should still be put in place early on in the study.
		Low	The risk is not expected to impact the validity of the results or the timeline, but the risk should be considered while conducting research. There should also be a mitigation plan in place, but the plan may be implemented after research has begun.
	Issue	Critical	The results will not be valid unless the issue is addressed. If not already in place, a mitigation strategy should be put into action as soon as possible.
	High	Addressing the issue is likely required to ensure the validity of the results or to keeping the timeline. A mitigation strategy should be initiated.	
	Medium	The issue should be evaluated early on and kept in mind as research progresses, but it may be sufficient to document the issue in the research without fully accounting for it. A mitigation strategy should be decided upon, but higher priority issues would take precedence.	
	Low	The issue should be noted and evaluated. The issue is not expected to derail the research or pose a significant threat to the validity of the work or the timeline.	

Column	Risk or Issue	Ranking	Definition
Risk Likelihood	Risk	Very High	<p>&gt; 75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and initial results suggest that the risk may be occurring since the trawl rationalization program was implemented.</li> <li>· There is substantial evidence to suggest that the risk has been realized as it relates to the implementation of the trawl rationalization program, but additional research is required to make that confirmation.</li> </ul>
		High	<p>50-75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> </ul>
		Medium	<p>25-50% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There are documented concerns of the item occurring as an issue in an existing, similar fishery or with the trawl rationalization program, but there is limited data to confirm the issue exists.</li> <li>· Additional research is needed to fully assess the likelihood. The risk is being documented, but will require further analysis.</li> </ul>
		Low	<p>10-25% chance:</p> <ul style="list-style-type: none"> <li>· There is minimal documentation of the item occurring in an existing, similar fishery and there are documented concerns of the item occurring in relation to the trawl rationalization program, but limited evidence to support the concerns.</li> </ul>
Description			A high-level summary of the issue or risk.
Concern			Why the issue or risk is a problem or why it is a potential problem.
Mitigation Options	Risk		Details ways to reduce the likelihood that a risk will become an issue.
	Issue		Suggests ways to deal with the issue and to mitigate its effect on the results.

## **4.4. EMERGING IMPACT 4: CHANGES TO THE STRUCTURE OF THE GROUND FISH FLEET**

### **4.4.1. Background**

Efficiency gains achieved through consolidation of the trawl fleet are considered to be desired outcomes of the trawl rationalization program (PFMC 2010). Lian et al. (2010) estimated that 50% or more of the vessels in the trawl fleet would exit the fishery, with greater numbers of small and large vessels exiting.

In 2010, the fixed gear and trawl groundfish fisheries each had over 150 active permit holders. The lengths of the vessels participating in the West Coast groundfish fisheries ranged from under 20 feet to over 350 feet (Source: NWR Permit Data 2010. Accessed: February 9, 2012). Fixed gear endorsed vessels averaged 44 feet, while trawl endorsed vessels averaged 84 feet (Figure 4.2).

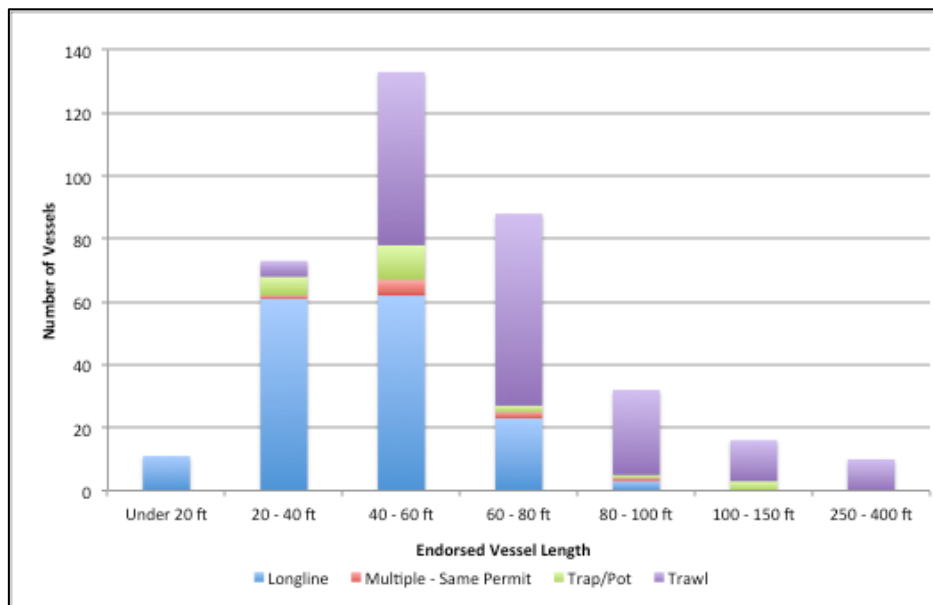


Figure 4.2 –Active 2010 West Coast groundfish permits grouped by endorsed length and fishery (Source: NWR History of LE Permits. Accessed: February 4, 2012).<sup>29</sup>

#### 4.4.2. Impact Overview

Attention is largely paid to consolidation within the trawl fleet. However, the impact on the groundfish fleet as a whole is also of interest. Changes to the number of vessels and the average size of the vessels participating in all of the groundfish fisheries may indicate a greater impact from the rationalization program on other fisheries. While it was expected that the size of the trawl fleet would be reduced, consolidation in other fisheries may also have occurred.

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<sup>29</sup> Whiting and permits owned by The Nature Conservancy are included. With the implementation of the trawl rationalization program, there is an expectation that permits owned by The Nature Conservancy will be used for fishing again (PFMC and NMFS 2010b).

### **4.4.3. Significance of the Impact**

#### **1. Key Groups Affected**

- Fishermen, including crew
  - Grouped by the size of the vessel
  - Irrespective of the fishery
- Processors
  - The impact on processors will vary by port
  - Companies that process a smaller portion of the catch may be more affected
  - Dependent on the composition of fishermen that sell to the processor
- Commercial fishing suppliers

#### **2. Implications of the Impact**

Research on this topic can determine if the number of vessels or the size of the vessels participating in West Coast groundfish fisheries changed significantly after the implementation of the trawl rationalization program. Additionally, a significant reduction in vessel size and length class could indicate a greater impact on other fisheries from what was anticipated by the PFMC and included in the FEIS. The level of consolidation expected in other fisheries was not thoroughly analyzed in the program's plan (PFMC and NMFS 2010). The 2003 trawl buyback program incorporated safeguards to prevent against spillover of retired permits into other fisheries, including state-managed fisheries (Tamm et al. 2010).

It is expected that other groups will be conducting a similar analysis specifically on the trawl fleet. However, there would still be value in comparing the results of this analysis on whether expected consolidation of the trawl fleet occurred or not. This analysis would be of value in reviewing the effects of the program on the trawl fleet, as well.

#### 4.4.4. Data Recommendations

##### 1. Data Sources Available

Table 4.13 – Data Sources Available for Emerging Impact 4: Changes to the Structure of the Groundfish Fleet

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Fish Ticket Data	Pacific States (PacFIN)	1981 - Present	Detailed price and catch information for the West Coast sablefish fishery.	ODFW, CDFG, WDFW	
Summary Reports Based on PFMC and State Data	Pacific States (PacFIN)	1981 - Present	<ul style="list-style-type: none"> <li>Available to the public via the PacFIN website, which contains a substantial amount of general information.</li> <li>Additionally, tables, column descriptions, and code mapping data are also available.</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://pacfin.psmfc.org/pacfin_pub/pfmc.php">http://pacfin.psmfc.org/pacfin_pub/pfmc.php</a></li> <li><a href="http://pacfin.psmfc.org/pacfin_pub/data.php">http://pacfin.psmfc.org/pacfin_pub/data.php</a></li> </ul>
Quota Share and Vessel Account Data	NWR	Present (publicly available)	<ul style="list-style-type: none"> <li>Information on vessel account and quota share account balance became visible to the general public online starting in 2012.</li> <li>* Historical account balances are not visible on the site and would require approval at the federal level to access.</li> </ul>	NWR	<a href="https://www.webapps.nwfsc.noaa.gov/itfq/">https://www.webapps.nwfsc.noaa.gov/itfq/</a>
Groundfish Permit Information	NWR	1993 - Present	Historical records on permit owners for West Coast groundfish fisheries.	N/A	<a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Permit Information for State-Managed Fisheries	Pacific States (PacFIN)	Varies	Historical records on permit owners for West Coast state-managed fisheries, including details such as pot limits for Dungeness crab fisheries.	ODFW, CDFG, WDFW	
Tracking of Alaska and West Coast trawlers (future)	Pacific States	N/A	The program is specifically targeted to review trawlers who participate in Alaska fisheries.	To Be Determined	
Vessel Length Information	Pacific States (PacFIN), Coast Guard, or NWR	1993 or earlier - Present	Vessel length information	Not required. If receiving it with other data, may need approval.	<ul style="list-style-type: none"> <li>• Endorsed and actual length of vessels with groundfish permits:</li> <li>• History of LE Permits (XLS) - <a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a></li> </ul>
Fishery Management Plan	PFMC	Biannual	Includes ABC/OY and recommended allocations for groundfish fisheries.	N/A	<a href="http://www.pcouncil.org/groundfish/fishery-management-plan/fimp-amendment-16-5/">http://www.pcouncil.org/groundfish/fishery-management-plan/fimp-amendment-16-5/</a>



## 2. Additional Resources

Table 4.14 - Additional Resources for Emerging Impact 4: Changes to the Structure of the Groundfish Fleet

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Historical Landings and Revenue in Groundfish Fisheries Report and Tables (PFMC 2011)	PFMC	2011	<ul style="list-style-type: none"> <li>Graphical and tabular data about West Coast groundfish landings and catch data</li> <li>Documentation of the criteria used to pull data for the reports from the PacFIN vessel daily summary (vdrfd) table</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wp-content/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/">http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/</a></li> </ul>
ODFW Supplemental Reports on the Trawl Rationalization Program	ODFW	2011, 2012	Reports and analysis specific to Oregon on 2011 and 2012 fisheries and ports as they relate to the trawl rationalization program (ODFW 2012).	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf">http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf</a></li> <li><a href="http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf</a></li> </ul>
Description of the U.S. West Coast Commercial Fishing Fleet and Seafood Processors (Radtko and Davis 2000)	Pacific States	2000	Though outdated, the report provides detailed background on West Coast commercial fisheries, as well as the processing sector	N/A	<a href="http://www.psmfc.org/efin/docs/fleetreport.pdf">http://www.psmfc.org/efin/docs/fleetreport.pdf</a>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Groundfish Fleet Restructuring Information and Analysis Project (Scholz 2003)	EcoTrust and the Pacific Marine Conservation Council	2003	Though outdated, the report contains detailed information about the groundfish fleet and policy implications with the vessel buyback program	N/A	<ul style="list-style-type: none"> <li>• <a href="http://www.inforain.org/gfr/gfr_report.pdf">http://www.inforain.org/gfr/gfr_report.pdf</a></li> <li>• <a href="http://www.inforain.org/gfr/">http://www.inforain.org/gfr/</a></li> </ul>
Alaska Fleet Profiles (Witherell et al. 2012)	North Pacific Fishery Management Council	2012	<ul style="list-style-type: none"> <li>• Report on the Alaska commercial fishing fleet structure.</li> <li>• Includes counts of the vessels participating in federally managed fisheries and the overlap of vessels participating in multiple federally managed fisheries.</li> <li>* Does not include counts of vessels participating in state-managed fisheries.</li> </ul>	N/A	<a href="http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf">http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf</a>

### **3. Limitations and Missing Data**

There would still be value in conducting an independent survey focused on the groundfish fleet, sampling from participants involved with each gear type. One concern with conducting a survey would be that there is already a substantial ongoing effort underway to gather information with the NWFSC Social Study. Coordination with the NWFSC would be important to ensure their survey work would not be negatively impacted.

Access to the results included in the NWFSC Social Study would be particularly valuable. However, data from the study will likely not be accessible to external researchers. Also, for fishermen, the study originally targeted trawlers specifically, not other fishermen. Conducting a random sampling of all groundfish fishermen or a targeted survey of fixed gear fishermen may be justified. Prior to conducting any survey, contact with federal and regional agencies should be made to determine if there are other surveys underway that the researcher can collaborate on or that could negate the need to conduct a new survey.

### **4.4.5. Research Planning Considerations**

#### **1. Dependencies**

- Significant changes in expenses could impact participation levels (e.g. significant changes to fuel costs, which are accessible through EFIN).
- Environmental conditions
- Biological factors affecting stocks
- Serial dependence on the commercial catch in previous years
- Market factors play a role in fishery participation

### **3. Limitations and Missing Data**

The end of the two-year moratorium on the sale of quota may show increases in fishermen exiting the fishery. However, as the program does not have an owner-on-board requirement, these owners may have already begun leasing their quota prior to the end of the two-year moratorium.

For vessels that may not have been allocated sufficient quota to remain in the trawl fishery or that were not allocated quota, changes resulting from the program would not necessarily be apparent in the first year.

### 3. Issues and Risks with Analyzing

Table 4.15: Details on Issues and Risks for Emerging Impact 4: Changes to the Structure of the Groundfish Fleet

Type	Severity	Risk Likelihood	Description	Concern	Mitigation Options
Issue	Medium	N/A	Fishermen may leave the fishing industry for any number of reasons.	It will not be possible to infer that the reasons behind changes to the fleet structure are caused by the trawl rationalization program.	<ul style="list-style-type: none"> <li>• Other reasons as to why fishermen leave the industry or have exited a fishery should be considered.</li> <li>• Utilize existing research available on fishermen's reasons for leave fisheries.</li> <li>• Speaking with or surveying fishermen could be a valuable tool to gather insight on the reasons why vessels may have exited as a result of the trawl rationalization program</li> </ul>
Risk	Low	Medium	Fishing vessels move between different management areas.	Vessels may move into other fisheries, including those outside of the West Coast.	<ul style="list-style-type: none"> <li>• Where possible, the movement of vessels and participation in other fisheries should be considered.</li> <li>• Where tracking of vessels will not be possible or will be too time intensive, an estimate should be made as to how much of an impact this may have. These vessels have still chosen to exit the fishery.</li> </ul>

Table 4.16: Reference for Issue and Risk Table Definitions  
 For full definitions, see Section 3.2.5.3 Issues and Risks with Analyzing.

Column	Risk or Issue	Ranking	Definition
Type	Risk		A possible problem that has not occurred yet; a confounding factor that may influence the results of an analysis. Items requiring additional analysis to determine if they are an issue or a risk are labeled as risks.
	Issue		A problem that has already occurred; a complexity that needs to be assessed and documented.
Severity	Risk	Critical	If the risk materializes and becomes a critical issue, the validity of the research will likely be in jeopardy and the estimated timeline to complete the research will increase beyond what is manageable. A clear mitigation plan should be in place before beginning the study.
		High	If the risk materializes and becomes an issue, there is a high probability that the estimated timeline or the validity of the results may be affected. It is highly advisable that a clear mitigation plan be in place before beginning the study.
		Medium	It is less likely that if the risk is realized it will affect the timeline or results, but a mitigation plan should still be put in place early on in the study.
		Low	The risk is not expected to impact the validity of the results or the timeline, but the risk should be considered while conducting research. There should also be a mitigation plan in place, but the plan may be implemented after research has begun.
	Issue	Critical	The results will not be valid unless the issue is addressed. If not already in place, a mitigation strategy should be put into action as soon as possible.
	High	Addressing the issue is likely required to ensure the validity of the results or to keeping the timeline. A mitigation strategy should be initiated.	
	Medium	The issue should be evaluated early on and kept in mind as research progresses, but it may be sufficient to document the issue in the research without fully accounting for it. A mitigation strategy should be decided upon, but higher priority issues would take precedence.	
	Low	The issue should be noted and evaluated. The issue is not expected to derail the research or pose a significant threat to the validity of the work or the timeline.	

Column	Risk or Issue	Ranking	Definition
Risk Likelihood	Risk	Very High	<p>&gt; 75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and initial results suggest that the risk may be occurring since the trawl rationalization program was implemented.</li> <li>· There is substantial evidence to suggest that the risk has been realized as it relates to the implementation of the trawl rationalization program, but additional research is required to make that confirmation.</li> </ul>
		High	<p>50-75% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> <li>· There is evidence of the item occurring as an issue in an existing, similar fishery and there are indications that the item may be occurring since the trawl rationalization program was implemented.</li> </ul>
		Medium	<p>25-50% chance, at least one condition is met:</p> <ul style="list-style-type: none"> <li>· There are documented concerns of the item occurring as an issue in an existing, similar fishery or with the trawl rationalization program, but there is limited data to confirm the issue exists.</li> <li>· Additional research is needed to fully assess the likelihood. The risk is being documented, but will require further analysis.</li> </ul>
		Low	<p>10-25% chance:</p> <ul style="list-style-type: none"> <li>· There is minimal documentation of the item occurring in an existing, similar fishery and there are documented concerns of the item occurring in relation to the trawl rationalization program, but limited evidence to support the concerns.</li> </ul>
Description			A high-level summary of the issue or risk.
Concern			Why the issue or risk is a problem or why it is a potential problem.
Mitigation Options	Risk		Details ways to reduce the likelihood that a risk will become an issue.
	Issue		Suggests ways to deal with the issue and to mitigate its effect on the results.

## **CHAPTER 5: DISCUSSION AND CONCLUSION**

This chapter begins with a description of why early evaluation of the rationalization program is warranted and lessons learned while conducting this study. The next section discusses recommendations and next steps, which includes opportunities for collecting and communicating data and how continued research on the emerging impacts could be incorporated into the PFMC's decision-making process on the trawl rationalization program. The chapter concludes with broad thoughts on the trawl rationalization program.

While the trawl rationalization program includes new data collection components to enable analyzing the social and economic effects of the program, collection and the analysis of the data is a multiyear process. The mandatory EDC and the voluntary NWFSC Social Study are being conducted annually and biannually, respectively. It is also likely that this data will only be available in aggregate form to researchers not employed or contracted by NMFS.

While longer, multiyear evaluations cannot be completed at this time, there is value in considering the potential effects of the trawl rationalization program on local communities and the environment early on to provide initial baseline data for future research. The trawl rationalization program is expected to remain in effect for future years and it impacts how annual catch will be set across fisheries. Additionally, the AMP creates a critical need for analysis of topics, such as the ones covered in this document. Catch recommendations have both environmental and social consequences.



## **5.1. LESSONS LEARNED**

### **5.1.1. Impediments to Completing a Statistical Analysis**

Prior to beginning this study, it was accepted that statistical inferences to fishing populations would not be possible with only one year of catch data for the new program. However, the information organized using qualitative, secondary analyses have proved particularly valuable in laying a foundation for future quantitative studies.

Before the end of the first year of the rationalization program, key risks in analyzing the first year of data were expected to be: environmental conditions, stock assessment and population estimation challenges (natural mortality, fecundity, etc.), and difficulties in comparing bycatch with previous years because observer coverage was not 100% in all fisheries. However, it became clear that the data was more dependent on other factors than originally anticipated, such as market conditions (e.g. the high price for crab and shrimp in 2011) and fishermen's behavior.

Although this research did not yield quantitative results on whether or not the first year of the program had a larger impact on nontrawl fisheries than anticipated, several discoveries to aid with future research were made.

### **5.1.2. The Value of the Emerging Impact Analysis**

Even without conducting a statistical analysis, the preliminary analyses proved valuable in evaluating the feasibility of continuing research on the emerging impacts. Prior to applying the current framework, an analysis of sablefish price changes across gears appeared to be one of the most viable options for assessing the first year of the trawl rationalization program (Emerging Impact 1). Through applying the methodology for this research, complications associated with conducting a statistical analysis on sablefish

price changes became apparent. Documenting the issues and risks associated with the topic indicated that it would be difficult to draw connections between sablefish price changes and the newly implemented trawl rationalization program. Reviewing the significance of the impact by stakeholder group suggested that subgroups within the fixed gear and trawl sectors would be affected in different ways. A determination was made that, given the issues and risks associated with analyzing the data early on, the results from a statistical analysis would have been indeterminate. It was possible to make this assessment by using the results documented in the emerging impact analysis.

### **5.1.3. Locating Data Sources**

In fisheries management, many additional data sources are often available that an individual would not discover without assistance. Searching for data sources independently will likely ensure that valuable sources are overlooked. The data sections included in Chapter 4 are meant to clearly outline some of the key sources available, based on aid received from others and experience working with West Coast fisheries data management.

The 2010 FEIS for the trawl rationalization program, along with updated versions of the document, should be among the first resources reviewed when beginning research and when new topics are added to the research. Though a topic may not have been a central focus of the FEIS, it is still likely that the preparers of the document: addressed the topic; stated why the topic was not being addressed; or were, at a minimum, asked by public commenters about the topic. Based on experience, the FEIS is comprehensive; allocating time to review the document regularly can reduce duplicated work effort and improve quality.

#### **5.1.4. Data Access for Researchers Operating Outside of Federal or State Agencies**

Conducting research from outside of a government agency proved to be a prohibitive factor. However, it was also a valuable lesson about the challenges faced by researchers outside of the government. These challenges limit external researchers' ability to contribute to the body of research on fisheries.

Approval of the data request for this study was still largely the result of assistance from the Pacific States. Resources at the Pacific States provided extensive help in navigating the data request process and in obtaining approval from ODFW. Data access requests and approvals are a multistep process, which may be difficult to navigate. For example, while the ODFW data request form is standardized, both ODFW and the Pacific States identified a need for additional standardization of the access request process and began discussions on the topic.

### **5.2. RECOMMENDATIONS AND NEXT STEPS**

#### **5.2.1. Data Collection and Reporting Opportunities**

The trawl rationalization program represents many opportunities for gathering and disseminating data, as well as some challenges.

To augment the annual and biennial survey data being gathered by the NWFSC, collecting additional socioeconomic data throughout the fishing season would be valuable. For example, collecting fish ticket level data with the number of the crew fishing on a trip and the number of days fished would provide detailed information on the fishing effort involved and how many individuals are participating in the fisheries. While this information would be helpful, some apprehension from fishermen about what the

data would be used for is to be expected. There would also likely be challenges in trying to institute a process for collecting the data. If systems need to be updated to begin capturing the additional information, the change would need to be incorporated into a future system update, to account for the testing required and other reasons. The following data points are recommended to facilitate evaluation of the program:

- **Capturing the number of days fished on each fishing trip, documented at the fish ticket level for all commercially landed fish<sup>30</sup>** – The information would be valuable for evaluating fishing effort. At a minimum, state agencies and first receivers would be required to update their processes to record this additional information. Fishermen would need to agree to this new requirement and begin providing this information when unloading their fish.
- **Capturing the number of crew who participated on each fishing trip, documented at the fish ticket level for all commercially landed fish<sup>31</sup>** – Recording the number of crew would provide valuable information on fishing effort and in evaluating the effects of management changes on a wider grouping of fishing participants. For future changes to limited entry programs or new limited entry programs, this data would increase the likelihood of allocations being made to crew. Consequentially, this would provide opportunities for entry-level fishermen, as some of these crewmembers seek to become captains, vessel owners, and permit holders. Process changes would be required for state agencies, first receivers, and fishermen. Buy-in for this change would also be required of these groups.

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<sup>30</sup> Fishing trip length can be calculated for IFQ-caught fish under the current structure.

<sup>31</sup> There was previously functionality to capture this information. However, as the data was not being recorded, it was eventually removed (D. Colpo, 2012 personal communication, unreferenced).

- **Consolidated and official tracking of the costs associated with limited entry permit sales and leases, documented for each transaction** – Tracking the costs associated with entering or exiting a fishery would enable evaluations on barriers to entering a fishery and the monetary value placed on the right to participate in limited entry fisheries.
- **Aggregate data about quota transfers** – To enable independent research and to add transparency to the trawl rationalization program, aggregate data on the transaction costs to lease quota pounds and to buy and sell quota shares should be made available to the public. At least month-level data should be available to allow for understanding of price changes throughout the year.<sup>32</sup>
- **Summary reports on commercial fishing landings specific to the trawl rationalization program, aggregated from fish ticket data** - Prior to the trawl rationalization program, fixed gear and trawl groundfish catch could be differentiated by management group and gear type. Due to the gear switching component of the trawl rationalization program, static reports grouped by gear type will include fixed gear landings that were caught under the trawl sector's allocation.<sup>33</sup>
- **Summary reports on commercial fishing landings by fishery sector, aggregated from fish ticket data**
- **Additional summary reports incorporating both state-managed and federally managed fisheries, aggregated from fish ticket data**

It must be noted that there are an infinite number of requests that can be made for additional reports. Reporting requests vary based on what individual groups intend to do with the data. Because of this, reporting requests are prioritized to determine what are the

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<sup>32</sup> Assumes enough transactions were recorded to meet confidentiality requirements.

<sup>33</sup> The open access also cannot be differentiated by gear type. This was not changed by the implementation of the trawl rationalization program.

most critical needs. The level of effort required to add new reports is also dependent on the current system's functionality.

The potential opportunity areas for data collection and reporting have been reviewed with Pacific States.

### **5.2.2. Suggestions for Locating and Accessing Data**

While the data sections covered in the emerging impacts contain a broad range of key data sources, it would never be possible for the tables to be all-inclusive. Contacting a wide array of knowledge experts will help to ensure that other key data sources are not overlooked. Fisheries data is collected by many different groups and for different purposes, resulting in some overlap to be expected across agencies. Additionally, agencies regularly implement new reporting tools, begin capturing new data, and initiate new studies. Even people familiar with existing data sources and programs may be unfamiliar with or unaware of new programs. Ongoing communication with different experts will help to ensure key data sources are not missed.

To continue research on the impacts covered in Chapter 4, federal data would likely be needed, in addition to data from state agencies. Requests for access to federal data through the NWR may require one month or longer to be approved (S. Freese, 2012 personal communication, unreferenced). A significant lead-time for acquiring access to data would be required, along with a backup plan if access is denied. Building relationships early on with key individuals who are responsible for some of the West Coast data would be extremely beneficial, if not required.

### **5.2.3. Implications for the AMP**

In developing the AMP, this analysis can be incorporated in multiple ways. Research can continue on the impacts described and can later be used in the AMP planning and allocation calculation process. The stakeholder groups identified in this document should also be considered individually to assess how the groups have been affected and for possible allocations to groups.

The data collection and reporting opportunities can also be prioritized for implementation, as they will facilitate allocating the AMP quota. Since allocations of quota with the adaptive management program are not permanent, meaning allocations of the 10% set-aside may be adjusted in years following the initial allocations, gathering and analyzing additional data may direct how future AMP allocations are made.

### **5.2.4. Recommendations for Future Program Implementations**

Including a wider range of stakeholders throughout the planning process would help to ensure long-term goals are met. One way to do this would be to appoint a wider range of stakeholders voting rights on ad hoc PFMC planning committees. While this approach may add contention to the development process, it may also increase efficiency in the long-term by dealing with issues and addressing concerns earlier on in the process. It is also possible that giving these stakeholders a vote would reduce the likelihood of lawsuits being filed at a later date.

### **5.2.5. Additional Suggestions and Next Steps**

The issues and risks included with the impact analyses can and should be applied to other assessments underway about the trawl rationalization program. Though the impact may

be outside of the scope of the other work, there is significant overlap across subjects – as was evidenced by the impact analyses.

There is a wealth of fisheries data, both historical and current, consolidated in one location for the West Coast in the PacFIN system. With the necessary approvals and once enough time has lapsed since the program began, there are vast opportunities for conducting statistical analyses.

The underlying goal of this research is that, as sufficient historical data becomes available, the preliminary analyses be used to guide future quantitative and qualitative analyses. These findings could then be included in the process for deciding how to distribute the 10% set aside for the AMP. For example, if fleet consolidation in other fisheries can be linked to the trawl rationalization program, economic hardships for those affected should be considered, along with options for how to mitigate the problem.

### **5.3. CLOSING REMARKS**

The impacts contained in this study focus on how West Coast fisheries, as a whole, and different fishery participant groups, including trawlers, have been affected by the trawl rationalization program. Future work can and should incorporate these observed changes when analyzing the trawl rationalization program's effect on fishery-dependent communities.

There is no single, perfect solution for managing fisheries. Catch share programs are a fishery management tool that assigns rights to individuals. Since coastal resources are shared, allocating individual ownership rights presents many challenges. However, any management approach selected will result in both positive and negative effects on the environment and on the stakeholders involved. Management approaches are developed based on determinations about the collective priorities of a region. After a new program has been implemented, it must then be evaluated regularly. The trawl rationalization



program resulted in greater achievement of multiple groups' priorities. However, as priorities vary by stakeholder group, meeting some objectives does not preclude the need for early and ongoing evaluations of the program.

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## APPENDIX A: WEST COAST PORT, COUNTY, AND CITY RELATIONSHIPS

Port Group Area	County	Name	Port Group Area	County	Name		
<b>Washington</b>			<b>Oregon</b>				
N. Puget Sound	Whatcom	Blaine	Astoria	Multnomah	Pseudo Port Code for Columbia R.		
		Bellingham Bay				Astoria	
	San Juan	Friday Harbor			Clatsop	Gearhart - Seaside	
		Anacortes				Cannon Beach	
	Skagit	La Conner		Unknown	Landed in WA; Transp. to OR		
	Snohomish	Other North Puget Sound Ports	Tillamook	Tillamook	Nehalem Bay		
S. Puget Sound	Snohomish	Everett				Tillamook / Garibaldi	
		King				Netarts Bay	
		Pierce		Tacoma			Pacific City
		Thurston	Olympia	Newport	Lincoln	Salmon River	
		Mason	Shelton				Siletz Bay
	Unknown	Other South Puget Sound Ports				Depoe Bay	
						Newport	
North Washington Coast	Jefferson	Port Townsend			Waldport		
		Sequim			Yachats		
	Clallam		Port Angeles	Coos Bay	Lane	Florence	
			Neah Bay			Douglas	Winchester Bay
			La Push				Coos Bay
					Coos	Bandon	
South & Central WA Coast	Grays Harbor	Copalis Beach	Brookings	Curry	Port Orford		
		Grays Harbor				Gold Beach	
		Westport				Brookings	
		Pacific		Willapa Bay			
			Ilwaco/Chinook				
Unidentified WA	Klickitat	Other Columbia River Ports					
	Pacific	Other Washington Coastal Ports					
	Unknown	Unknown WA Ports					

Port Group Area	County	Name	Port Group Area	County	Name	
<b>California Recreational Groupings</b>			<b>California</b>			
North Coast: Humboldt and Del Norte Counties			Monterey	Santa Cruz	Santa Cruz	
North-Central: Mendocino County						Moss Landing
North-Central: San Mateo County to Sonoma County				Monterey	Monterey	
South-Central Coast: San Luis Obispo to Santa Cruz			Morro Bay	San Luis Obispo	Other S.C. and Mon. Co. Ports	
South Coast: Ventura to Santa Barbara Counties						
South Coast: Los Angeles to San Diego Counties					Avila	
<b>California</b>					Other S.L.O. Co. Ports	
Crescent City	Del Norte	Crescent City	Santa Barbara	Santa Barbara	Santa Barbara	
				Other Del Norte County Ports		Santa Barbara Area
Eureka	Humboldt	Eureka (Includes Fields Landing)				Port Hueneme
				Fields Landing	Ventura	Oxnard
			Trinidad	Ventura		
			Other Humboldt County Ports			Other S.B. and Ven. Co. Ports
Fort Bragg	Mendocino	Fort Bragg	Los Angeles	Los Angeles	Terminal Island	
				Albion		San Pedro Area
				Arena		San Pedro
				Other Mendocino County Ports		Willmington
Bodega Bay	Sonoma	Bodega Bay	Los Angeles		Longbeach	
		Tomaes Bay			Newport Beach	
	Marin			Point Reyes		Dana Point
				Other Son. & Mar. Co. Outer Coast Ports	Orange	Other LA and Orange Co. Ports
				Sausalito		
San Francisco	Alameda	Oakland	San Diego	San Diego	San Diego	
		Alameda				Oceanside
		Berkely				San Diego Area
	Contra Costa	Richmond			Other S.D. Co. Ports	
		San Francisco				
		San Francisco				
		San Francisco				
		San Mateo	Princeton			
		Other S.F. Bay & S.M. Co. Ports				
Unidentified CA			Unknown	Unknown CA Ports		

Figure A.1. Relationships between cities, counties, and port group areas (Source: Tables 3-65 and Table 3-66 PFMC and NMFS 2010b).



Figure A.2. PFMC map relating cities to port group areas (Source: Figure 3-29 PFMC and NMFS 2010b).



## APPENDIX B: CONSOLIDATED AND ADDITIONAL DATA SOURCES

Table B.1. Consolidated list of data sources from Chapter 4 and additional data sources. Listed alphabetically by Owner/Manager.

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Alaska Sablefish Reports	Alaska Regional Office	1995 - Present	<ul style="list-style-type: none"> <li>Summary reports for the Alaska sablefish fishery, including weekly and monthly roll-up information.</li> <li>Detailed reports are also available, but may not include all relevant years - e.g. the "Transfer Report - Changes Under Alaska's Sablefish IFQ program 1995 through 2009" includes details ranging from quota share prices to a breakdown of vessel participation by vessel class and quota share ownership by community type</li> </ul>	Required for information not included in the summary reports	<a href="http://www.fakr.noaa.gov/ram/iffrep/orts.htm">http://www.fakr.noaa.gov/ram/iffrep/orts.htm</a>
CDFG Summary Commercial Catch Reports	CDFG	2000-2010	<ul style="list-style-type: none"> <li>Includes catch details commercially caught species in CA (not just groundfish species).</li> <li>Summary data on state-managed fisheries.</li> <li>* May not be up to current year.</li> </ul>	N/A	<a href="http://www.dfg.ca.gov/marine/research.asp#management">http://www.dfg.ca.gov/marine/research.asp#management</a>
Groundfish Fleet Restructuring and Information and Analysis Project (Scholz 2003)	EcoTrust and the Pacific Marine Conservation Council	2003	Though outdated, the report contains detailed information about the groundfish fleet and policy implications with the vessel buyback program	N/A	<ul style="list-style-type: none"> <li><a href="http://www.inforain.org/gfr/gfr_report.pdf">http://www.inforain.org/gfr/gfr_report.pdf</a></li> <li><a href="http://www.inforain.org/gfr/">http://www.inforain.org/gfr/</a></li> </ul>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Canada Sablefish Fishery Reports	Fisheries and Oceans Canada	1997 - 2010, Present	<ul style="list-style-type: none"> <li>Summary reports for the British Columbia fishery (requires user to set up a login account)</li> <li>Historical assessments on the aquaculture program</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Sablefish Fishery: <a href="http://www.pac.dfo-mpo.gc.ca/fm-gp/commercial/ground-fond/sablefish/index-eng.htm">http://www.pac.dfo-mpo.gc.ca/fm-gp/commercial/ground-fond/sablefish/index-eng.htm</a></li> <li>Aquaculture: <a href="http://www.dfo-mpo.gc.ca/aquaculture/finfish-poissons/sablefish-morue-eng.htm">http://www.dfo-mpo.gc.ca/aquaculture/finfish-poissons/sablefish-morue-eng.htm</a></li> </ul>
MSC Certification Report – North Pacific and Canadian Sablefish	MSC	North Pacific: 2006, 2011 Canada: 2010	Research conducted by the MSC to certify the North Pacific and Canadian sablefish fisheries	N/A	<ul style="list-style-type: none"> <li>North Pacific: <a href="http://www.msc.org/track-a-fishery/certified/pacific/us-north-pacific-sablefish/reassessment-downloads">http://www.msc.org/track-a-fishery/certified/pacific/us-north-pacific-sablefish/reassessment-downloads</a></li> <li>Canada: <a href="http://www.msc.org/track-a-fishery/certified/pacific/Canada-sablefish/assessment-downloads">http://www.msc.org/track-a-fishery/certified/pacific/Canada-sablefish/assessment-downloads</a></li> </ul>
MSC Certification Report - Oregon Dungeness Crab	MSC	2010	<ul style="list-style-type: none"> <li>Research conducted by the MSC to certify the crab fishery as sustainable.</li> <li>Key research papers on the fishery are included in the analysis.</li> <li>Additionally, the certification stipulated that multiple conditions be met to maintain the certification. More analysis and data tracking should be available as a result of these conditions.</li> </ul>	N/A. May be required for new data collected as a result of certification.	<a href="http://www.msc.org/track-a-fishery/certified/pacific/Oregon-Dungeness-crab/assessment-downloads-1/ODC_V4_Final-Report_27Oct2010.pdf">http://www.msc.org/track-a-fishery/certified/pacific/Oregon-Dungeness-crab/assessment-downloads-1/ODC_V4_Final-Report_27Oct2010.pdf</a>
Commercial Fishery Statistics Query Tool	NMFS	Varies by Report	<ul style="list-style-type: none"> <li>National, regional, and state commercial fishery historical data</li> <li>Some searches allow breakout by species, gear, port</li> </ul>	N/A	<a href="http://www.st.nmfs.noaa.gov/st1/commercial/">http://www.st.nmfs.noaa.gov/st1/commercial/</a>

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Species Information Network	NMFIS	2001 - Present	Visual representation of stock status for each regional fishery management council	N/A for public site	<a href="https://www.st.nmfs.noaa.gov/sisPortal/sisPortalMain.jsp">https://www.st.nmfs.noaa.gov/sisPortal/sisPortalMain.jsp</a>
Alaska Fleet Profiles (Witherell et al. 2012)	North Pacific Fishery Management Council	2012	<ul style="list-style-type: none"> <li>Report on the Alaska commercial fishing fleet structure.</li> <li>Includes counts of the vessels participating in federally managed fisheries and the overlap of vessels participating in multiple federally managed fisheries.</li> <li>* Does not include counts of vessels participating in state-managed fisheries.</li> </ul>	N/A	<a href="http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf">http://www.fakr.noaa.gov/npfmc/PDFdocuments/resources/FleetProfiles412.pdf</a>
Groundfish Permit Information	NWR	1993 - Present	Historical records on permit owners for West Coast groundfish fisheries.	N/A	<a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/index_public_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/index_public_permits_ss.cfm</a>
Inseason Groundfish Regulatory Changes and Announcements	NWR	Historical, Current	Includes changes to regulations made during the year, including trip limit updates and changes to protect overfished species.	N/A	<a href="http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Public-Notices/Index.cfm">http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Public-Notices/Index.cfm</a>
Quota Share and Vessel Account Data	NWR	Present (publicly available)	<ul style="list-style-type: none"> <li>Information on vessel account and quota share account balance became visible to the general public online starting in 2012.</li> <li>* Historical account balances are not visible on the site and would require approval at the federal level to access.</li> </ul>	NWR	<a href="https://www.webapps.nwfsc.noaa.gov/ifq/">https://www.webapps.nwfsc.noaa.gov/ifq/</a>

<b>Data or Report</b>	<b>Owner / Manager</b>	<b>Dates</b>	<b>Description</b>	<b>Approvals Required</b>	<b>Links</b>
Sablefish Permit Details	NWR	1998 - Present	<ul style="list-style-type: none"> <li>Historical records on sablefish endorsements and tiers for the vessels.</li> <li>In the case of stacked permits, vessels will appear up to three times in the table.</li> </ul>	N/A	History of LE Permits (XLS): <a href="https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwp_public_ss/home/index_pub_permits_ss.cfm</a>
ODFW Fishing Logbook Data	ODFW	2007 - Present	Detailed information about fishing effort for Oregon.	ODFW. Less likely to receive approval.	N/A, database
ODFW Supplemental Reports on the Trawl Rationalization Program	ODFW	2011, 2012	Reports and analysis specific to Oregon on 2011 and 2012 fisheries and ports as they relate to the trawl rationalization program (ODFW 2012).	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf">http://www.pcouncil.org/wp-content/uploads/D8b_SUP_ODFW_JUN2012BB.pdf</a></li> <li><a href="http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/G7b_SUP_ODFW_SEPT2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E5b_SUP_ODFW_JUN2011BB.pdf</a></li> </ul>
Description of the U.S. West Coast Commercial Fishing Fleet and	Pacific States	2000	Though outdated, the report provides detailed background on West Coast commercial fisheries, as well as the processing sector	N/A	<a href="http://www.psmfc.org/efin/docs/fleetreport.pdf">http://www.psmfc.org/efin/docs/fleetreport.pdf</a>
EFIN	Pacific States	Historical, current	<ul style="list-style-type: none"> <li>Economic data relevant to West Coast and Alaska fisheries, including marine fuel prices and input costs.</li> <li>Results and reports from surveys conducted for West Coast and Alaska fisheries.</li> </ul>	N/A	<a href="http://www.psmfc.org/efin/index.html">http://www.psmfc.org/efin/index.html</a>
Fish Ticket Data	Pacific States (PacFIN)	1981 - Present	Detailed price and catch information for the West Coast sablefish fishery.	ODFW, CDFG, WDFW	N/A, database

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
NMFS Trawl Logbook Data	Pacific States (PacFIN)	CDFG: 1981 - Present, WDFW and ODFW: 1987 - Present	<ul style="list-style-type: none"> <li>Logbook data includes detailed information about where trawlers fish, thus it is classified as highly confidential.</li> <li>Having trawl effort data will still not allow comparisons to changes in effort for other gear types.</li> <li>Records are not complete. The historical shortcomings are described on the PacFIN site.</li> </ul> <a href="http://pacfin.psmfc.org/pacfin_pub/usrdoc.php#data">http://pacfin.psmfc.org/pacfin_pub/usrdoc.php#data</a>	ODFW, CDFG, WDFW	N/A, database
Permit Information for State-Managed Fisheries	Pacific States (PacFIN)	Varies	Historical records on permit owners for West Coast state-managed fisheries, including details such as pot limits for Dungeness crab fisheries.	ODFW, CDFG, WDFW	N/A, database
Summary Reports Based on PFMC and State Data	Pacific States (PacFIN)	1981 - Present	<ul style="list-style-type: none"> <li>Available to the public via the PacFIN website, which contains a substantial amount of general information.</li> <li>Additionally, tables, column descriptions, and code mapping data are also available.</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://pacfin.psmfc.org/pacfin_pub/pfmc.php">http://pacfin.psmfc.org/pacfin_pub/pfmc.php</a></li> <li><a href="http://pacfin.psmfc.org/pacfin_pub/data.php">http://pacfin.psmfc.org/pacfin_pub/data.php</a></li> </ul>
Tracking of Alaska and West Coast trawlers (future)	Pacific States	N/A	The program is specifically targeted to review trawlers who participate in Alaska fisheries.	To Be Determined	N/A, database

Data or Report	Owner / Manager	Dates	Description	Approvals Required	Links
Vessel Length Information	Pacific States (PacFIN), Coast Guard, or NWR	1993 or earlier - Present	Vessel length information	Not required. If receiving it with other data, may need approval.	<ul style="list-style-type: none"> <li>Endorsed and actual length of vessels with groundfish permits;</li> <li>History of LE Permits (XLS) - <a href="https://nwr2.nmfs.noaa.gov/nwr_public_ss/home/index_pub_permits_ss.cfm">https://nwr2.nmfs.noaa.gov/nwr_public_ss/home/index_pub_permits_ss.cfm</a></li> </ul>
Fishery Management Plan	PFMC	Biannual	Includes ABC/OY and allocations for groundfish fisheries.	N/A	<a href="http://www.pcouncil.org/groundfish/fishery-management-plan/fimp-amendment-16-5/">http://www.pcouncil.org/groundfish/fishery-management-plan/fimp-amendment-16-5/</a>
Historical Landings and Revenue in Groundfish Fisheries Report and Tablets (PFMC 2011)	PFMC	2011	<ul style="list-style-type: none"> <li>Graphical and tabular data about West Coast groundfish landings and catch data</li> <li>Documentation of the criteria used to pull data for the reports from the PacFIN vessel daily summary (vdrfd) table</li> </ul>	N/A	<ul style="list-style-type: none"> <li><a href="http://www.pcouncil.org/wp-content/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf">http://www.pcouncil.org/wp-content/uploads/E4a_ATT5_HISTORICAL_NOV2011BB.pdf</a></li> <li><a href="http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/">http://www.pcouncil.org/groundfish/background/document-library/historical-landings-and-revenue-in-groundfish-fisheries/</a></li> </ul>
PFMC Managed Groundfish Stock Assessments and Rebuilding Plans	PFMC	N/A	<ul style="list-style-type: none"> <li>Full assessments of the status of stocks, produced every other year for many stocks.</li> <li>In addition to biological information, they also cover take activities</li> </ul> <p>*Pacific Halibut assessments can be found on the IPHC's website</p>	N/A	<a href="http://www.pcouncil.org/groundfish/stock-assessments/by-species/">http://www.pcouncil.org/groundfish/stock-assessments/by-species/</a>