An Initial Review Draft of a Comparative Cost Study for the West Coast Groundfish Trawl Catch Share Program

March 13, 2023

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Prepared for the Pacific Fishery Management Council with Funding Provided by NMFS

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2.0 PROJECT DESCRIPTION

The Pacific Fishery Management Council (PFMC or Council) recommended and the National Marine Fisheries Service (NMFS) implemented a Limited Entry Permit (LEP) program for the West Coast Groundfish trawl fishery. The LEP program was implemented for the 2011 fishery. With minor modifications, the fisheries continue to be managed under that structure. While the LEP program has achieved some of the program's stated objectives, stakeholders have expressed concerns with specific aspects of the program. Primary concerns are the costs of some elements of the program and lower than anticipated increases in gross and net revenue. How those costs directly impact the benefits realized by the permit holders, vessel operators, first receivers and processors, and other stakeholders are addressed in this paper. Changes in revenue realized are also considered. To better understand these concerns, NMFS provided funding to the PFMC to delve more deeply into the underlying issues. This project provided stakeholders the opportunity to express their opinions on the program and have their concerns documented. Annual costs of the program are also presented by industry sector and compared to other LEP programs.

When the LEP program was being developed, the Council stated its rationale for selecting its preferred alternative from a suite of alternative management measures, including the status quo. The problem statement provided a foundation for considering changes to the status quo management structure. The status quo condition and projected beneficial and adverse impacts of the trawl rationalization alternatives were described in Chapter 2, Chapter 4 and the appendices

of the Regulatory Impact Review (RIR) implementing its preferred alternative (PFMC, 2010). Benefits of the Council's preferred alternative were determined to outweigh the disadvantages when compared to the status quo.

Two broad objectives in the problem statement steered the decision-making process. The first was related creating a structure that allowed for better management, including improved catch accounting and a structure that allowed the fleets to implement bycatch reduction measure. The second was to implement a management structure to provide for economically sustainable fisheries, benefiting all stakeholders. The stated goals and objectives of the program reflected this desired outcome.

"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." [1]

In general, stakeholders indicated that the Council's stated objective to consider "*environmental impacts, and achieves individual accountability of catch and bycatch"* has been successful. The goal of increasing net economic benefits, individual economic stability, and fostering full utilization of the trawl sector allocations" has been less successful and has varied by sector.

3.0 FISHERY BACKGROUND AND MANAGEMENT

Catch share programs have been implemented throughout the world as a management tool. The features of catch share programs may be tailored to help achieve the fishery manager's stated objectives. In U.S. fisheries, some program features are mandated under Section 303A(c) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSA). The stated requirements for limited access privilege programs are listed below and include several features that were implemented as part of the West Coast Trawl Catch Share Program.

> Any limited access privilege program to harvest fish submitted by a Council or approved by the Secretary under this section shall—
>
> (A) if established in a fishery that is overfished or subject to a rebuilding plan, assist in its rebuilding;
>
> (B) if established in a fishery that is determined by the Secretary or the Council to have over-capacity, contribute to reducing capacity;
>
> (C) promote—
>
> (i) fishing safety;
>
> (ii) fishery conservation and management; and
>
> (iii) social and economic benefits;

[t] See p 50 of the Amendment 20 RIR (https://www.pcouncil.org/documents/2010/06/groundfish-amendment-20-final--environmental-impact-statement.pdf)

(D) prohibit any person other than a United States citizen, a corporation, partnership, or other entity established under the laws of the United States or any State, or a permanent resident alien, that meets the eligibility and participation requirements established in the program from acquiring a privilege to harvest fish, including any person that acquires a limited access privilege solely for the purpose of perfecting or realizing on a security interest in such privilege;

(E) require that all fish harvested under a limited access privilege program be processed on vessels of the United States or on United States soil (including any territory of the United States);

(F) specify the goals of the program;

(G) include provisions for the regular monitoring and review by the Council and the Secretary of the operations of the program, including determining progress in meeting the goals of the program and this Act, and any necessary modification of the program to meet those goals, with a formal and detailed review 5 years after the implementation of the program and thereafter to coincide with scheduled Council review of the relevant fishery management plan (but no less frequently than once every 7 years);

(H) include an effective system for enforcement, monitoring, and management of the program, including the use of observers or electronic monitoring systems;

(I) include an appeals process for administrative review of the Secretary's decisions regarding initial allocation of limited access privileges;

(J) provide for the establishment by the Secretary, in consultation with appropriate Federal agencies, for an information collection and review process to provide any additional information needed to determine whether any illegal acts of anti-competition, anti-trust, price collusion, or price fixing have occurred among regional fishery associations or persons receiving limited access privileges under the program; and

(K) provide for the revocation by the Secretary of limited access privileges held by any person found to have violated the antitrust laws of the United States.

Section 303A(f) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSA) of 2006 defines the characteristics of limited access privilege programs established after 2006. That section notes that permits will be issued for a period of not more than 10 years that— (1) will be renewed before the end of that period, unless it has been revoked. Most catch share programs that have been developed in the U.S. have allowed the permits to be renewed after 10-years without the Council or NMFS needing to take additional actions to renew the program. Most catch share programs, including this program, allow the permits to automatically renew after 10-years.

There are several examples of catch share programs that have been implemented to manage other fisheries in the United States (U.S.). Current U.S. catch share programs are presented in Figure 3-1. In addition to those programs, a trawl catch share program for the Bering Sea and Aleutian Islands Pacific cod trawl fishery has been approved by the North Pacific Fishery Management Council and the proposed rule and regulations are being reviewed by stakeholders. After that review, the Secretary of Commerce will determine whether to approve or disapprove the proposed program.

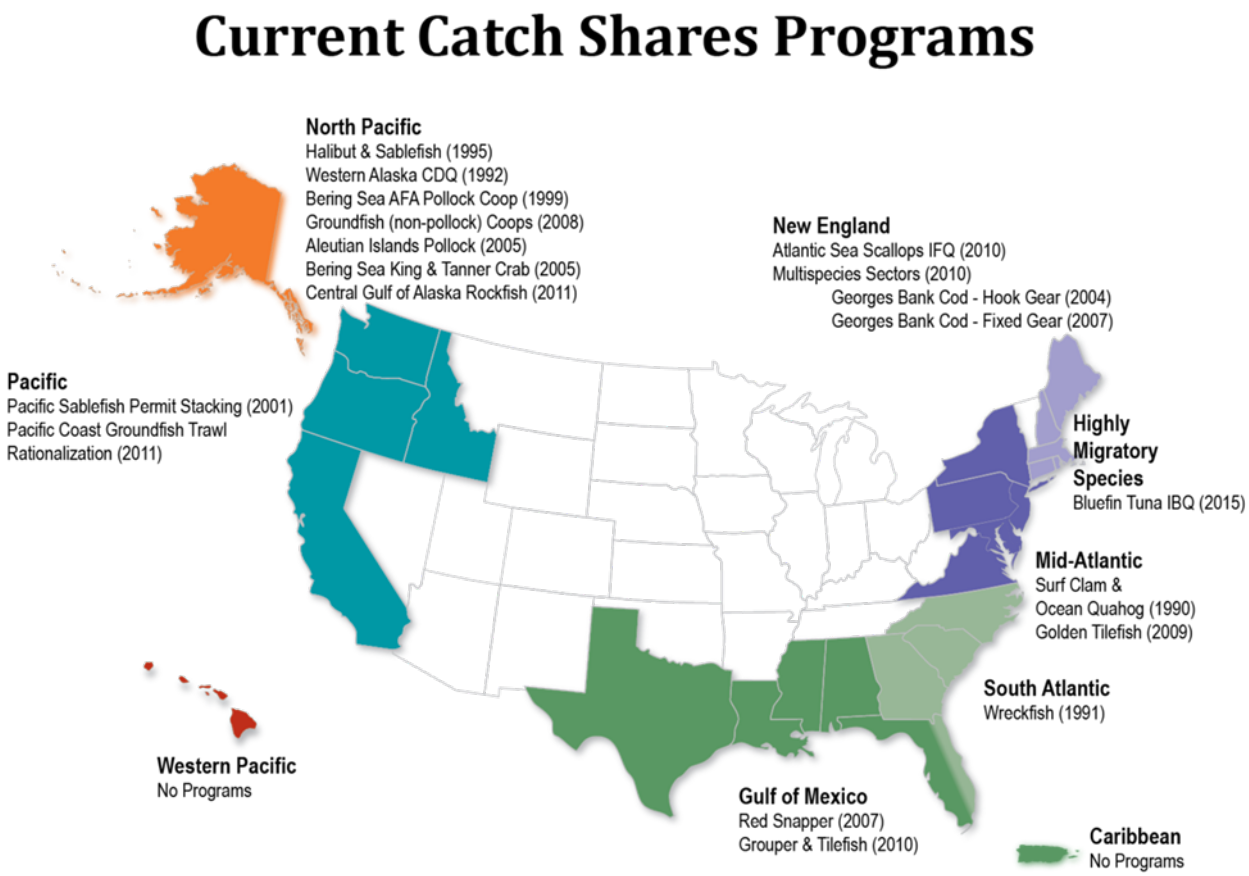

Figure 3-1 Catch share programs implemented in U.S. fisheries.

Source: https://www.fisheries.noaa.gov/national/laws-and-policies/catch-shares

The New England Multispecies Sector program implemented in 2010 is used to compare against the West Coast program, since they are both multi-species trawl fisheries. However, NMFS has determined that the program does not meet the definition of Limited Access Privilege Program (LAPP). The British Columbia (BC) groundfish program is also compared against the West Coast groundfish IFQ program. Trawl catch share program's in Alaska are also summarized.

A summary of the North American catch share programs is shown in Figure 3-2 (Grimm et al. 2012). That chart includes the BC groundfish program.

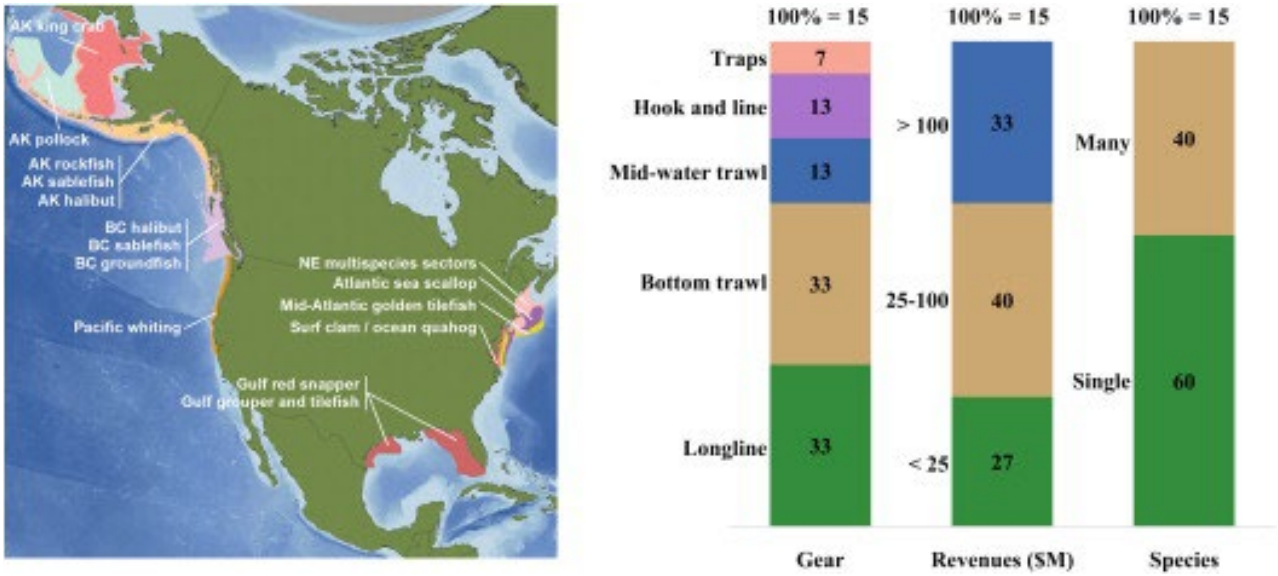

Figure 3-2 North American catch share programs

3.1 West Coast Groundfish Catch Share Program Structure

When considering the structure of the catch share program, the Council developed its rationale for the various program components to meet its stated goals and objectives. Primary goals addressed in the Council's problem statement were the need to account for, control, and reduce bycatch, and the second was the need to provide for an economically sustainable fishery for the benefit of industry participants and fishery dependent communities. These were both reflected in the goals 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 2010)

The status quo trawl fishery was viewed as economically unsustainable due to the number of participating vessels, excess capacity, a regulatory approach that constrained efficiency, and the management measures that were in place to protect fishery stocks that needed to be rebuilt. Because no management program is perfect, the Council had to determine whether trawl rationalization program improved management relative to the status quo. For example, the Council debated whether the economic benefits expected from increased harvests and greater economic efficiency would offset the increased program costs. It also discussed whether the proposed program would foster improvements to ex-vessel and first wholesale markets for groundfish species allocated under the program. Council members concluded that while it may take time for current markets to expand and new markets develop, the majority's conclusion was that the potential for improving the economics of the fishery through trawl rationalization was substantial enough relative to the risks and uncertainties (PFMC, 2010). During its consideration and debate on the program,

"Council members also noted that, due to cumulative limit management, the amount of one highly marketable fish species that had gone unharvested in a recent year was nearly enough to alone cover observer program costs, and reported discard rates and wastage were unacceptable.

Given the under-harvest of available Optimum Yields (OY), the Council believed it was important to the fishermen and the public to provide an opportunity to achieve the OYs and develop markets for additional fish products. Furthermore, the program would provide the fishery an opportunity to increase profits, not just through harvest expansion, but also through a variety of mechanisms leading to cost reductions. For the non-whiting fishery, an economically healthy fishery would also be expected to result in some improvement in safety. For the whiting fishery, an end to the derby would create substantial safety improvements. In addition to the potential for safety and strong economic benefits, Council members noted the substantial conservation benefits expected from 100 percent monitoring of catch. This would help reduce bycatch and discards and rebuild stocks that are suffering partially because of discards." (PFMC, 2010. page 53)[2].

Percent of allocated species harvested table and discussion of harvest rate changes will be inserted here in the final version of the document

A brief summary of some components of the program are discussed for each sector in the following sections. For additional information please refer to the Amendment 20 EA (PFMC, 2010) or the program's five-year review document (PFMC and NMFS, 2017). Also note that QP cannot be transferred between the IFQ and at-sea cooperatives.

3.1.1 IFQ

A sector wide IFQ fishery was implemented for the shoreside component of the fishery. When the program was implemented, it created trawl allocations for all species or species complex included under the program. Seven overfished species stocks were subject to rebuilding, so the OYs for these species were relatively low compared to target species OYs. The availability of quota for these stocks directly impacted the prosecution of the directed fisheries.

Management measures for non-whiting trawl fisheries that were in place prior to implementing the catch share program included two-month cumulative trip limit periods, gear restrictions to limit harvest of some overfished species, the use of trawl nets designed to reduce bycatch in certain areas, closed areas to protect overfished species, creation of essential fish habitat conservation areas to help protect bottom habitat. Some of the measures, like the two-month cumulative trip limits were eliminated when the catch share program was implemented. Other measures, like closed areas and certain gear restrictions were maintained.

The catch share program included several different components to help ensure the Council's goals and objectives may be achieved. Some of the management measures included:

Conservative allocation limits to aid the rebuilding of overfished stocks;

Comprehensive monitoring at-sea and shoreside requirements to ensure allocations were not exceeded, either individually or collectively;

Inseason quota tracking to allow quota transfers while having enforceable individual catch limits;

[2] https://www.pcouncil.org/documents/2010/06/groundfish-amendment-20-final-environmental-impact-statement.pdf

Annual allocations of quota shares;

Carryover provisions that allow quota holder that over or under harvests their quota by up to 10% to carry the overage or underage (if the ABC is not exceeded) to the following year;

Adaptive Management that set-aside 10% of quota to address future management issues;

Reporting of economic, landings and discards (log-books), and other information as required;

Gear switching to allow the use of trawl quota by other gear types;

Processor allocations of whiting quota only to help balance market power between harvesters and processors;

Quota shares were initially allocated to fishery participants based on catch/processing history during the 1994 to 2003 time period and in the shoreside and mothership sectors, based on equal sharing of buyback history. Harvesters were allocated all QS except shoreside whiting where 20% of the QS was allocated to processors to help balance market power and compensate processors for stranded capital.

After the initial allocation, eligible persons were allowed to buy and sell the QSs within limits established for the program. As stated earlier, the MSA restricts the duration of a fishing privilege to 10 years, and specifies conditions for automatic renewal. Allowing the limited entry permits to automatically renew unless they are revoked or modified reduces the analytical burden of reauthorizing the program every 10 years. One case where limited entry permits expired, unless they were renewed after 10 years, was in the Central Gulf of Alaska Rockfish Program. Renewing those permits was a 2-year analytical project that took substantial Council and industry time. Certain costs associated with the renewal project were subject to cost recovery. Primarily, slight changes to regulations associated with reimplementation of the program and development of the proposed and final rule. However, the majority of the costs were borne by the North Pacific Fishery Management Council for staff to develop the regulatory documents and hold public meetings. These costs were not included as part of cost recovery. Industry also incurred costs to attend the Council meetings, hold industry meetings, and provide written and oral testimony to the North Pacific Fishery Management Council. Because the West Coast catch share program was allowed to automatically renew these costs were not incurred.

QS represent a percent of the percent of the available harvest amount different groundfish stocks a QS holder is allocated. Each year, these shares are converted from a percent to a quantity by issuing quota pounds (QPs) based on the OYs/ACLs established for that fishing year. The amount of groundfish caught by a vessel fishing under the program, even if it is subsequently discarded, is deducted from the QP held. QP holders are not credited with an amount of discards that are expected to survive. The QPs are consumed in this way do not provide any direct economic value but allow the vessel operator to harvest the directed fishery. Both QSs (in units) and QPs (in pounds) are divisible and tradable. QS transfers were prohibited in the first two years of the program to help reduce transfers based on poor market information. QPs were fully transferable during the first two years, since it was only an annual transfer of quota.

Accumulation limits (QS control/QP vessel) were established to ensure than an entity does not acquire an excessive share of the fishery as required in the MSA. The program does not contain the grandfather clause, so permit holders receiving QSs in excess of the accumulation limits were

given two years after the prohibition on QS transfers expired to divest their excess QSs. Any QSs over the accumulation limit at the end of the period were reallocated to other permit holders below the limit.

An Adaptive Management Program (AMP) was implemented for non-whiting species QSs. That program reserved 10% of the non-whiting QS to be used to help achieve specific management measures in the future. The AMP QPs were required to be passed through to QS holders in proportion to their holdings for the first two years of the program. That practice has continued through the current year.

The program's five-year review indicated that discards of six of the seven historically overfished rockfish species dropped at least 90 percent after implementation of Amendment 20. Bottom trawl gear accounted for 90 percent or more of the discards before 2011. With the implementation of the catch share program, total fishing mortality decreased for darkblotched rockfish, POP, and cowcod rockfish, largely due to the reduced discards. Widow rockfish discards did not decline as much because they are more pelagic than the other overfished rockfish species and are commonly caught using midwater trawl gear and in the directed whiting fishery (PFMC and NMFS. 2017).

CVs are subject to 100% monitoring to ensure that catch and discards of catch are fully accounted and deducted from the available QPs. Similar information is also reported in the vessel's log-books. Vessels are required to have operational VMS to provide information on a vessel's location. The speed of the vessel can also be used to help determine how a vessel is operating (fishing, running, etc.).

Shoreside processors taking IFQ deliveries are also subject to 100% observer coverage. The at-sea and shoreside monitoring provisions were implemented to ensure complete accounting of QPs that are caught.

3.1.2 Mothership Cooperatives

The mothership cooperative structure requires catcher vessels to declare which cooperative they will join before the beginning of the fishing year. Catcher vessel operators are obligated to deliver their catch to the associated mothership processor for that fishing season. In any subsequent year, catcher vessel operators could change their affiliation without first participating in the non-cooperative fishery. A provision for a non-cooperative fishery is included in the program structure. Any vessel not wishing to affiliate with a cooperative could participate in the non-cooperative fishery and deliver to any willing mothership processor.

QPs are allocated by NMFS to the cooperatives and the allocation of QP within the cooperative is decided by the members of each cooperative. Because of the cooperative allocation structure, it is impossible to track the accumulation of QP shares on a vessel in the way that QP vessel limits work in the IFQ program. Because accumulation limits cannot be tracked, the usage limit was implemented as an alternative approach. Limits applied to the sector are that no individual or entity may own catcher vessel/mothership permits that represent more than 20% of the sector allocation. Also, A vessel may not catch more than 30% of the mothership sector's allocation. Finally, no individual or entity who owns a mothership permit can process more than 45% of the annual mothership sector allocation.

Motherships and the catcher vessels that deliver to them are both subject to 100% monitoring coverage under the catch share program. These requirements were in place prior to the catch share program for motherships, but represent an increase (was about 14% to 24%) in coverage requirements for the CVs (Somers, 2017). Motherships must have 100% observer coverage, while CVs can use either at-sea observers or EM to fulfill their monitoring requirements. Currently almost all CVs are opting to use EM.

Mothership representatives are required to comply with reporting of economic data on an annual basis. Catch and discard information must be reported in log-books for each landing. Motherships and the catcher vessels delivering to them must have an operational vessel monitoring system (VMS) to track speed and location.

3.1.3 Catcher-processor Cooperative

The catcher-processor sector operates as a single voluntary cooperative with all QP assigned to the cooperative. The cooperative members then determine the proportion of the cooperative allocation each member may harvest. This includes both the initial allocation to members and any in-season transfers of quota between members. It is also the responsibility of the cooperative to ensure that the cooperative members, as a whole, does not exceed the annual QP allocation. Because the cooperative is responsible for many of the in-season management measures, it has relatively limited NMFS management responsibilities and associated costs.

Catcher-processors are subject to 100% observer coverage to ensure that landings and discards are fully accounted. These coverage rates were in place prior to the catch share program being implemented.

Catcher-processors are subject to completing the detailed annual economic data report. Reporting catch and discard information in log-books for each haul. Maintaining operational VMS to provide speed and location information of the vessel.

3.2 NE Sector Program

Information in this section is derived from the NOAA website[3] and 50 CFR part 648. The Northeast Multispecies Fishery (groundfish fishery), is managed by the New England Fishery Management Council (NEFMC). The groundfish fishery is prosecuted by fixed and trawl gears. Before 2010, the groundfish fishery was primarily managed using effort controls, including Days at Sea (DAS) and trip limits. Amendment 13 to the groundfish FMP (implemented May 2004) redefined initial allocations of DAS and allowed vessel operators to lease or transfer DAS within the limitations of the program. Amendment 13 also introduced the “Sector Allocation” program, which gave fishermen the opportunity to voluntarily form “sectors”, or groups of fishing vessels. Sectors were allotted a percentage of the total ACL for groundfish stocks. The allocation of quota eliminated the need to manage effort using DAS. Sectors could request exemptions from many of the traditional input controls such as trip limits. The formation of sectors allowed

[3] https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/sector-management-northeast-multispecies-fishery

Amendment 16 to the Northeast Multispecies FMP to be developed and implemented on May 01, 2010.

The Northeast multispecies (groundfish) complex consists of 13 species:

- Atlantic cod (*Gadus morhua*)
- Haddock (*Melanogrammus aeglefinus*)
- Yellowtail flounder (*Limanda ferruginea*)
- Pollock (*Pollachius virens*)
- American plaice (*Hippoglossoides platessoides)*
- Witch flounder (*Glyptocephalus cynoglossus*)
- White hake (*Urophycis tenuis*)
- Windowpane flounder (*Scophthalmus aquosus*)
- Winter flounder (*Pseudopleuronectes americanus*)
- Acadian redfish (*Sebastes fasciatus*)
- Atlantic halibut (*Hippoglossus hippoglossus*)
- Atlantic wolffish (*Anarhichas lupus*)
- Ocean pout (*Macrozoarces americanus*)

Groundfish are distributed throughout the Greater Atlantic region, from Cape Hatteras, North Carolina, to the U.S./Canada border. Some species of groundfish are typically found on seafloor (flounders) and others near the seafloor (cod, haddock), while others (redfish and white hake) may only spend a portion of their time near the bottom of the ocean.

The majority of the groundfish that are landed in the Greater Atlantic Region are harvested in the Gulf of Maine (GOM) and on George's Bank (GB). Fishermen primarily use bottom trawl, sink gillnet, and hook gear to target groundfish. Historically, many of the vessels that actively fish for groundfish have hailed from ports from New Jersey to Maine. Atlantic cod, haddock, and yellowtail flounder have traditionally been the highest-value groundfish species.

Table 3-1 shows the percentage of each species allocation that was harvested from 2009 through 2021. While comparisons are made to the pre-Sector allocations, the information should be used with caution, because the types of harvesters allowed to catch the TAC/ACL changed when the program was implemented. The highest valued species harvested are typically GB cod, whose harvest percentage has declined in recent years, with harvest the last three years being about 40%. That is less than the 64.9% harvested in 2009. It is also lower than the 2013 through 2017 period that ranged from 78.6% to 97.5%. GOM cod rates increased from the 52.3% in 2009 to well over 80% most years. GB haddock percentages decreased and GOM haddock increase relative to 2009, but both are well below the harvest limit. Most yellowtail flounder fishery harvest rates have declined to less than 10% the past three years, except for the CC/GOM stock that was 43.6 % in 2021. That rate is has declined from 2015 (85.1%) through 2020 (27.8%), with an increase to the 43.6% rate in 2021. Note that because the fishing years are May through April, the final 2022 data were not available when this table was developed.

Table 3-1 Percentage of sector allocation harvested by species from 2009 through 2021 fishing years.

Species	2009*	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
GB cod	64.9	83.2	76.4	35.2	86.7	78.6	91.6	97.5	84.4	71.1	35.0	40.5	44.8
GOM cod	52.3	83.6	92.5	60.3	90.1	80.5	90.3	96.1	96.2	86.6	80.3	83.1	88.1
GB Haddock	33.1	20.5	12.6	4.4	11.4	32.0	23.5	8.6	7.8	11.6	10.1	5.4	4.2
GOM Haddock	7.8	46.4	62.8	37.8	91.5	75.0	76.8	65.9	75.4	32.8	43.1	34.2	34.4
GB Yellowtail Flounder	60.2	92.0	88.1	59.1	36.6	24.9	19.3	9.7	19.4	14.9	3.2	7.0	1.4
SNE Yellowtail Flounder	63.1	64.9	90.1	70.1	57.8	67.7	37.9	26.3	6.0	20.0	6.9	7.5	1.7
CC/GOM Yellowtail Flounder	25.4	76.8	87.1	93.5	80.8	53.9	85.1	76.1	60.2	43.3	37.4	27.8	43.6
Plaice	44.6	54.7	53.7	49.7	99.8	95.3	98.9	96.5	89.4	68.6	58.2	20.7	26.5
Witch Flounder	81.5	84.1	82.0	68.8	106.7	86.0	87.8	97.1	67.8	97.9	91.6	70.0	66.2
GB Winter Flounder	86.5	75.8	96.5	57.3	49.1	34.2	46.4	72.2	61.4	57.9	41.3	57.7	50.7
GOM Winter Flounder	63.9	60.7	50.5	37.4	24.4	18.1	31.7	18.0	18.3	26.7	16.9	20.3	25.7
SNE Winter Flounder					62.4	46.1	50.9	75.8	72.2	50.2	30.4	20.5	26.3
Redfish	15.7	31.7	36.0	53.4	39.6	44.5	48.2	43.0	45.9	50.1	45.4	60.5	45.6
White Hake	77.7	88.4	102.3	75.1	53.4	41.0	37.1	42.9	60.7	77.2	75.8	91.2	96.8
Pollock	106.9	33.7	54.5	51.0	38.1	30.2	21.1	16.7	16.9	9.4	8.3	16.6	16.7

Source: https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/h/groundfish_catch_accounting and https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports//mul.htm

All vessels with a federal limited access Northeast multispecies permit are eligible to join a groundfish sector. A sector is defined as a group of three distinct persons holding limited access vessel permits, who have voluntarily entered into a contract and agreed to certain fishing restrictions for a specified period of time, and which has been granted a quota in order to achieve objectives consistent with the applicable fishery management plan goals and objectives. Vessel owners are not required to join a sector. This is an annual selection vessel owner's make. Other members of a sector may approve or disapprove a vessel owner's application to join a sector.

Sectors in the Northeast multispecies fishery are intended to provide fishermen with more flexibility and more direct responsibility for managing the resource. On an annual basis, approved sectors receive quota for allocated groundfish stocks in the form of an annual catch entitlement. Each sector's annual catch entitlement is based on the cumulative contribution of its participating vessels fishing history (quota).

Under the catch share program vessels are exempted from trip limits with the exception of Atlantic halibut (1 fish per trip). Sector vessels are prohibited from possessing Atlantic wolfish, ocean pout, and windowpane flounder.

All groundfish catch, including landings and discards, by a sector vessel on a sector trip counts against a sector's annual catch entitlement for that stock. Sector vessels may not discard any legal-sized allocated stock, unless otherwise exempted.

The At-Sea Monitoring (ASM) program is specific to groundfish sector monitoring. At-sea monitors and observers have different, but similar roles. At-sea monitors are primarily tasked with recording all kept and discarded catch, with discard information as the priority. There duties are similar to those of a fishery observer, with the exception that at-sea monitors do not collect biological samples and do not record the same level of detail on protected species interactions.

Monitoring regulations require sectors to contract with an approved third-party at-sea monitoring company to provide at-sea monitoring services to the sector. At-sea monitoring data is used to verify area fished and catch (landings and discards), by species and gear type, and monitor sector quota. Data are reported to the sector managers and to the NOAA Fisheries. Electronic monitoring may be used in place of actual observers or at-sea monitors if the technology is deemed sufficient for a specific trip, based on gear type and area fished.

Prior to 2023, less than 100% electronic monitoring and at-sea observation was required. At-sea monitoring coverage levels were specified by NOAA Fisheries on an annual basis. NOAA Fisheries set the 2022 total target at-sea monitoring coverage level at 40 percent of all groundfish sector trips subject to the ASM program. NOAA Fisheries' annual analysis was based on the level of coverage required to estimate discards for each northeast multispecies stock with no greater than a 30-percent coefficient of variation. NOAA Fisheries calculated a minimum target coverage level of 33 percent of all groundfish sector trips. That estimate was based on Georges Bank yellowtail flounder[4]. In addition to the coefficient of variation analysis, the analyses of bias developed by the Groundfish Plan Development Team and the peer review by a sub-panel of the Council's Scientific and Statistical Committee in 2019 was also considered. The target coverage rate was increased from 33 percent to 40 percent to ensure achievement of the required 30-percent coefficient of variation.

The NEFMC developed and NOAA Fisheries implemented Amendment 23 to the Northeast Multispecies (Groundfish) plan for the 2023 fishing year, modify monitoring requirements[5]. Amendment 23 replaced the process for calculating an annual ASM coverage target with a fixed monitoring coverage target as a percentage of trips, dependent on Federal funding. Approved the use of EM as an alternative to human at-sea monitors. Excluded certain trip from all trip monitoring requirements in geographic areas with expected low groundfish catch. Required periodic evaluation of the monitoring program and exclusions from the monitoring requirement. Finally, remove the management uncertainty buffer from the portion of the ABC allocated to the sector catch share, if warranted, when the monitoring coverage target is 100%.

Amendment 23 expected to have substantial socioeconomic impacts in years the fishery participants are required to pay for coverage, because monitoring coverage would be increased from about 40% to 100% in most trawl fisheries and the sectors have been reimbursed for

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[4]https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports//Sectors/ASM/FY2021_Multispecies_Sector_ASM_Requirements_Summary.pdf

[5] https://d23h0vhsm26o6d.cloudfront.net/221206-GF-A23-Final-Rule-2022-26350.pdf

coverage costs. It would also mean that the sectors would have more operating costs than under past and current coverage levels, depending on future federal funding.

When Amendment 23 was being developed, industry has argued that 100% monitoring is too burdensome. NMFS has argued that 100% monitoring improves enforceability and reduces risk of non-compliance improve, which should improve the fairness and equitability of management measures. In the short term, impacts of 100% monitoring coverage on human communities could be reduced if federal reimbursements for monitoring costs and government subsidies continue to be available. Impacts over the long-term will vary depending on whether federal reimbursements of monitoring costs will continue into the future. Allowing sectors to use tools like EM to reduce costs relative to human at-sea monitors could reduce the cost burden. NMFS may also allow wavers of monitoring requirements in certain fisheries (NEFMC, 2020).

Eliminating the management uncertainty buffers for sector ACLs for allocated stocks results in higher operating costs since 100% monitoring coverage required for this option; however, revenues are expected to increase since more fish are available to harvest. Removing monitoring requirements for vessels fishing in a certain geographic area with low catch rates is expected to have positive impacts on fishing communities that fish exclusively in the exemption area as monitoring costs would be reduced.

Vessels are required to have an operational VMS unit installed if they operate in the groundfish sector program. Vessel monitoring system units must report a vessel's position at least once per hour, for 24 hours a day, 365 days per year, unless otherwise exempted. If a vessel holds other permits that require 30-minute vessel monitoring system reporting (e.g., a limited access Atlantic sea scallop permit), that vessel must report based on the most restrictive rate.

Sectors are allowed to carry over up to a maximum of 10 percent of their unused annual catch entitlement from one fishing year to the next for most allocated stocks. The amount of carryover allowed may be reduced as needed to comply with sector regulations and prevent overfishing.

An amendment to the sector program in 2014 created a mechanism allowing a sector to convert any of their eastern GB haddock allocation to a western GB haddock allocation at any time during the fishing year[6]; this mechanism does not permit conversion in the opposite direction. That provision added flexibility to harvest the GB haddock allocation while ensuring that the U.S. does not exceed its TAC for eastern GB haddock. Framework 55 (NEFMC 2016) adopted a similar mechanism for sectors to convert their eastern GB cod allocation to western GB cod allocation.

Any portion of a sector's annual catch entitlement may be temporarily transferred to another sector at any time during the fishing year. Sectors with an annual catch entitlement overage for a stock may transfer-in annual catch entitlement for the stock up to the amount of the overage. There is a two-week reconciliation period. Annual catch entitlement transfer requests must be submitted to, and approved by, NOAA Fisheries. Transfer requests may be submitted online or using paper applications.

[6] https://s3.amazonaws.com/nefmc.org/Framework_Adjustment_51.pdf

Under the sector system each member of a sector could be jointly charged with serious violations. Members all members can be liable for a violation even if other sector members were responsible for that violation.

Sectors are required to submit an operations plan and contract to NOAA Fisheries prior to the fishing year in which it intends to operate. Operations plans may span either a 1 or 2-year period and must include information about membership, planned fishing activity, and sector rules and enforcement.

The sector program also includes various accountability measures that are triggered when a sector's harvest of a quota allocation is exceeded. Accountability measures are designed to correct problems that caused the quota limit to be exceeded, so future overages can be prevented and include prohibiting a sector from fishing in the stock area for that stock (until it has acquired additional quota from another sector), deducting overages from that sector's quota of each stock for the following fishing year, applying common pool or limits to another sector associated with the permits of the disbanded sector.

Sector vessels are exempt from certain regulations when fishing in the sector multispecies program. Vessels are exempt from trip limits on Northeast multispecies stocks for which a sector receives quota with limited exceptions, Gulf of Maine Cod Protection Closures IV (October) and V (March), certain Northeast multispecies Days-at-Sea restrictions, minimum codend mesh size restrictions for trawl gear when using a haddock separator trawl or the Ruhle trawl within the Georges Bank Regulated Mesh Area (if sector vessels use a codend with 6-inch minimum mesh).

3.3 British Columbia Groundfish Program

Until the late 1970s, there was little management of marine resources in the waters off British Columbia (BC). The groundfish fishery was open to domestic and foreign fleets, and by the mid-70s, stocks had started to decline (e.g., in 1974 halibut landings were just one-third of the averages in the 1960s). In response, managers began implementing a variety of conventional management measures including limited entry licensing, annual catch limits, fishery closures, and gear and vessel restrictions.

Fishing licenses were largely based on the vessels' target species. For example, fishermen targeting halibut were required to have a halibut license while fishermen targeting sablefish were required to have a sablefish license. Fishermen who did not hold the appropriate license were not permitted to land those species. In actuality, fishermen were encountering multiple species and were therefore required to discard large amounts of marketable species.

From 1980 to the early 1990s, the capacity and ability of the fleet to catch fish increased dramatically. In 1980, the commercial halibut fleet harvested 5.7 million pounds of halibut in 65 days; in 1990, fishermen harvested 8.5 million pounds in six days (Sporer, 2001)[7]. In every year from 1979 to 1990 (except 1980), the halibut catch limit was exceeded and a race for fish resulted in shorter seasons, unsafe fishing conditions, large quantities of discards, poor quality of fish and inconsistent supply of fresh fish (and corresponding low dockside prices).

[7] https://www.fao.org/3/y2684e/y2684e23.htm#P0_0

The experience was similar in the sablefish and groundfish trawl fisheries. The groundfish trawl fishery was closed in 1995 due to severe overharvesting of the catch limit and the inability of managers to ensure compliance with catch limits (Sporer, 2001). The system failed to ensure sustainability leading to depletion of fish stocks, and the economic viability of the fleets and communities that depended upon them was decreasing.

In response to the failures of conventional management, and often upon request of the fishermen, catch share programs were implemented in the sablefish, halibut and groundfish fisheries in 1990, 1991 and 1997, respectively. The halibut and sablefish programs were initially implemented as trial programs, but they were formalized shortly thereafter, upon meeting identified conservation and economic goals (Sporer, 2001). In 2006, the remaining groundfish fleet were included in the program and all commercial fisherman targeting groundfish (including halibut and sablefish) were integrated into a single catch share program.

Conservation and protection of fish and fish habitat is the primary goal of Canada's fishery management. Additional goals include compliance with regulations, secure and stable access to fish stocks for fishermen, fairness to individuals and groups, promotion of historical participation, economic viability, best use of the fish for economics, social and cultural needs, and assuring public access.

In addition, groundfish trawl implemented hold-back programs: 80% of the total groundfish trawl shares were allocated to eligible participants and the remaining 20% is held by the government and the IVQ pounds from these quota shares are allocated annually based on recommendations by the Groundfish Development Authority (GDA), which consists of representatives from communities, crew and shoreworkers, processors, groundfish trawl license holders, First Nations, and a non-licensed individual. The GDA oversees Groundfish Development Quota (GDQ) and Code of Conduct Quota (CCQ), each equaling 10% of total shares. These shares are allocated annually based on certain criteria, including treatment of crew and co-applications by processors and harvesters (Sporer, 2001).

The BC groundfish trawl fishery is managed under an Individual Vessel Quota/Groundfish Development Authority (IVQ/GDA) program. Quota is divisible into one-pound increments, but a vessel must hold a T license to hold groundfish quota or harvest groundfish trawl TACs.

Initially, there were 142 licenses issued that allow a vessel to participate in the IVQ program that allocates about 60 different fish species. Only 40 of the licenses are actively being fished on vessels. The fleet ranges in size from 35 feet to 180 feet in length. The larger vessels are freezer trawlers. The six active freezer trawlers[8] may only process their own catch (prohibited from acting as a mothership for catcher vessels) and are limited to processing specific product types[9]. They can head, gut and tail fish but are not allowed to produce fillets. Vessels may fish with either mid-water or bottom trawl gear. Freezer trawlers primarily target hake, pollock and arrowtooth flounder. Rockfish[10] and other allocated species are taken as incidental catch in those directed fisheries. Catcher vessels (wet boats) also fish with bottom and mid-water gear and target rockfish, hake, pollock, flatfish and lingcod. Other allocated species (skate, sablefish,

[8] A seventh freezer trawler has not been active for the past four years.

[9] Round, H&G, and HGT. One vessel also has a reduction plant on board and produces oil and fishmeal from the offal.

[10] There is a 100% retention requirement for rockfish catch.

dogfish) and non-allocated species (ratfish, various soles and non-quota rockfish) are typically taken as incidental catch in the directed fisheries.

IVQ is issued for about individual species or species groups and is fully transferable, but species caps limit the amount of each species that may be harvested on a vessel. Species caps are structured as hard and soft caps. Hard caps limit the amount of a species IVQ that may be permanently held on a vessel. Species soft caps limit the amount of IVQ that may be temporarily put on a vessel within the fishing year. Soft caps may be increased during the year based on vessels being capped out, market conditions, consumer demand, species availability, time left in the year, to allow for carryover, etc. Vessels are also subject to a Total Holdings Cap limiting the total amount of IVQ (measured as groundfish equivalents) a vessel can hold. The vessel Total Holdings Cap is calculated by converting each IVQ species into a "common currency" with Pacific Ocean Perch set as the benchmark (1.0) and all other species are based off that equivalent[11] (Fisheries and Oceans Canada, 2022). Quota trades are common, primarily for soft cap species, with up to 8,000 trades per year. Trades often use quota as the currency, but money transfers also occur.

Compliance monitoring is paid by industry using a third-party service provider (Archipelago). All vessels and processors/buyers are subject to 100% at-sea monitoring and 100% dockside monitoring. Individual vessel accountability is for all catch (both retained and released). Information on licensed vessels is available online at the DFO website: http://www.pac.dfo-mpo.gc.ca/fm-gp/licencepermis/index-eng.htm. Dockside observers monitor the offload, sorting, and weighing of each species. Only retained catch delivered to the plants is monitored by dockside observers, since they have no access to discarded catch that was not retained. At-sea monitoring was 100% coverage (one observer on each boat) prior to Covid-19 measures being implemented on April 3, 2020. At-sea observers reviewed catch that was retained and catch that was not retained to help determine total catch. A data management system is paid for by industry using electronic logbooks that are created for dockside and at-sea (both for the observer and fisherman). The logbooks provide at-sea and shoreside data.

For the 2022/23 fishing season, where an independent at-sea observer is not deployed to a vessel hailed out on an Option A-quota observed trip, one 100% at-sea monitoring is achieved through the use of an EM system as part of the EM Program for Option A Trawl Vessels. Vessel masters are required to keep an accurate and complete record of all fishing activity carried out under authority of the license in a DFO-approved Groundfish Trawl Log Book ("fishing log") and At-Sea Log Book ("at-sea log"). Where an EM system is in use on a vessel, the accuracy of the at-sea log will be audited via a comparison against the EM data ("audit"). The shoreside data is only for retained catch by species. It does not include information on area of catch or non-retained catch. At-sea data includes total catch estimates by species and stock area. The catch data is added into the DFO Fisheries Operating System (FOS) along with other information such as hail-in and hail-out reports. Observers would record tow locations and when gear was deployed (doors went into the water) and retrieved (break release) using GPS information. VMS is not required on vessels.

[11] See Appendix 8, p. 67

Because of Covid-19, DFO stopped requiring that observers be deployed in all fisheries on April 3, 2020 and implemented EM requirements on April 10, 2020 based on a pilot EM program that had been developed by industry during the previous 2 years. EM requires three cameras on deck for all vessels (Freezer and wet boats) and an additional 5 cameras below deck for freezer trawlers to monitor all activity on the vessel, estimate total catch and catch disposition by species. Fish size limits can be verified to determine if they are legal by using measurement grids located above and below deck at all points where fish may be released, put into the hold, removed from the holding tanks, or sorted. The EM system has GPS capabilities. GPS is turned on when the vessel leaves the port until they return to port. GPS provides a complete track of the vessel. It also has hydraulic sensors that mark when fishing is occurring. EM is reviewed after every trip by the service provider at the defined rate. For wet boats, a minimum of 10% of tows are reviewed unless discrepancies with the logbook are found. Depending on the severity of the differences the vessel could be subject to increased review requirements (up to 100% of tows) as well as other penalties. Freezer trawlers have a minimum of 25% of their tows reviewed for compliance and verification against the logbook. Additional review (up to 100% of tows) and other penalties can be required if the logbooks do not match EM information. 100% of the trip sensor data (cruise track, number of tows, start and end points of tows, tow locations) is reviewed for the trips for both wet boats and freezer trawlers. Occurrence reports are sent to DFO for enforcement and is funded by industry.

3.4 Alaska Trawl Catch Share Fisheries

This section briefly describes the catch share fisheries in Alaska where trawl is a legal type to harvest quota. Catch share programs where pot (crab and sablefish) or longline gear (halibut and sablefish)[12] are used are not included in the discussion, since the cost structure and prosecution of those fisheries are different than trawl fisheries.

3.4.1 Central Gulf of Alaska Rockfish Program

The Central Gulf of Alaska rockfish fishery was traditionally prosecuted in July and was an important, but relatively small component, of the participating vessels annual fishing cycle. The trawl opening was generally timed to coincide with the availability of the third quarter halibut Prohibited Species Catch allocation, accommodate the sablefish longline survey that occurred later in the summer, and typically coincided with the openings of the Aleutian Islands Pacific ocean perch and Bering Sea flathead sole fisheries to distribute effort among the fisheries.

Congress directed the NPFMC to implement a catch share program for that fishery, so the NPFMC developed the Rockfish Pilot Program (RPP). The RPP was based on the guidelines described in the Consolidated Appropriations Act of 2004 to improve resource conservation and improve economic efficiency by establishing cooperatives that receive exclusive harvest privileges. Four goals of the program were to 1) reduce bycatch and discards; 2) encourage conservation-minded practices; 3) improve product quality and value; and 4) provide stability to the processing labor force.

[12] The industry organized freezer longline Pacific cod fishery that is a self-managed cooperative is also excluded.

The RPP allowed catcher-processors to form their own cooperatives. Catcher vessels were allowed to form cooperatives in association with shoreside processors located in Kodiak, Alaska. Catcher vessel cooperative contracts defined the requirements for deliveries to the associated cooperative processor. It is assumed that these contracts required delivery by member catcher vessels to the associated processor except under conditions agreed to by both parties. The cooperative agreements allowed shoreside processors and their associated catcher vessels to better time deliveries of rockfish and directed salmon harvests during the summer months.

The RPP allocated harvest privileges to holders of License Limitation Program (LLP) groundfish licenses with a history of legal Central Gulf of Alaska rockfish landings during the period defined in Section 802 of the Consolidated Appropriations Act. Table 1 of the proposed rule (71 FR 33043) defines the specific dates for each year that define the qualifying landings. Once RPP Quota Shares (QS) were assigned to a specific LLP license they could not be divided or transferred separately from that LLP license. The LLP holder was allowed to assign the license and associated QS for use in a rockfish cooperative, limited access fishery, or opt–out fishery. After the LLP license holder assigned the LLP license to a cooperative and the cooperative application was submitted to NMFS, NMFS would allocate each cooperative an amount of cooperative quota (CQ) that was generated by the QS assigned to the cooperative.

Catcher vessels, when participating in the Rockfish Program (RP), are subject to 100% at-sea observer coverage. Catcher-processors are subject to 200% at-sea observer coverage (two observers). All catcher processors are also participants in the Amendment 80 (A80) catch share program, so they are subject to 200% coverage in all their fisheries, not just the RP. Vessels in the RP may not use EM in place of the at-sea observers. While the NPFMC is considering EM for multi-species trawl fisheries, it is just in the development stages[13].

The RP replaced the RPP and was authorized for 10 years from January 1, 2012, until December 31, 2021 (76 FR 81247). The RP changed the qualification years and made relatively minor changes to the RPP (NPFMC 2011).

Given that the program would have expired in 2021, the NPFMC renewed the program with no expiration date. It also made changes to the RP. The changes were also relatively minor and are described in detail in the analytical document (NPFMC 2020).

3.4.2 American Fisheries Act Pollock Fishery

The American Fisheries Act was signed into law in October 1998. The purpose of the AFA was to tighten U.S. ownership standards that had been exploited under the Anti-reflagging Act, and to provide the Bering Sea and Aleutian Islands (BSAI) pollock fleet the opportunity to conduct their fishery in a more rational manner while protecting non-AFA participants in the other fisheries. The AFA established sector allocations in the BSAI pollock fishery, determined eligible vessels and processors, allowed the formation of cooperatives, set limits on the

[13] https://meetings.npfmc.org/CommentReview/DownloadFile?p=fe63bd61-9b73-4b74-8586-39fa83ca0adc.pdf&fileName=CGOA%20Rockfish%20EM%20Presentation%20for%20TEMC_FINAL_Jan2023.pdf

participation of AFA vessels in other fisheries, and imposed special catch weighing and monitoring requirements on AFA vessels.

The Bering Sea pollock fishery has been operating under cooperative a structure since 1999 for catcher-processors and 2000 for catcher vessels and motherships. In 2005, Amendment 82 the BSAI FMP, established a framework for the management of the Aleutian Islands (AI) subarea directed pollock fishery[14]. This action was mandated under provisions of the Consolidated Appropriations Act of 2004 that require the AI directed pollock fishery to be allocated to the Aleut Corporation for the purpose of economic development in Adak, Alaska. The Aleut Corporation has had limited success utilizing the pollock allocation due to a variety of reasons and it is typically reallocated to the BS cooperatives.

When the NPFMC was considering allowing the use of EM in the pollock fisheries, its staff estimated the costs of observer coverage versus EM. The findings are summarized here. The trawl catcher vessel operators that participate in the BS pollock shoreside fishery have been required to pay for 100% observer coverage since 2009. The daily at-sea observer rate for the full coverage fleet was estimated to range from $378/day to $417/day. Based on the estimate of 5,070 observer days that would have been deployed on EM trips in 2021, the lower cost per day estimate is about $1.92 million less in at-sea observer costs and the higher cost per day yields about $2.11 million less in at-sea observer costs.

For BS plants receiving deliveries of pollock, the daily rates for full coverage were again estimated to range from $380/day to $430/day. The estimated number of plant observer days in 2021 was 1,599. Based on the number of observer days at these plants, the estimated cost ranged from $608k to $688k.

Pollock catcher vessels and their processing partners in the partial coverage sector for the GOA pay 1.65% of their ex-vessel revenue for their monitoring costs. The average annual cost per sea day in the partial coverage fisheries have ranged between $895 and $1,393 since 2014. A low ($1,309/day) and high ($1,393/day) cost of at-sea observer coverage was estimated. Based on the estimate of 310 observer days that would have been deployed on EM trips in 2021 and sampling rates of 20 percent to 30 percent of trips, a low ($273k) and high ($435k) estimate of at-sea observer costs was estimated. For processing plants, using the 548 GOA plant EM observer days reported for 2021 and a range of daily costs of ($500/day to $1,050/day), the estimated annual costs range from $274k to $575k.

[14] https://www.federalregister.gov/d/05-3788/p-1

Table 3-2 Estimated costs of Status Quo Vessel Observers (for effort associated with 2021 trawl EM EFP)

Description	Area	Low Estimate	High Estimate
Partial coverage at-sea Observer Cost	GOA	$357,000	$570,000
Full coverage at-sea observer cost	BS	$1,916,000	$2,914,000
Full coverage shoreside monitoring cost	BS	$304,000	$344,000
Total	BS and GOA	$2,577,000	$3,828,000

Table 3-3 Estimated costs of Trawl EM (for 2021 EFP level of effort, scope, scale)

Description	Area	Low Estimate	High Estimate
Ongoing EM costs (does not include one-time equipment costs)	BS and GOA	$392,000	$392,000
Partial coverage shoreside monitoring cost	GOA	$274,000	$575,000
Full coverage shoreside monitoring cost	BS	$608,000	$688,000
Total	BS and GOA	$1,274,000	$1,655,000

3.4.3 Amendment 80

Amendment 80 to the BSAI FMP established a cooperative based catch share program for non-AFA trawl Catcher-processors. The NPFMC adopted BSAI Amendment 80 to meet the broad goals of: (1) improving retention and utilization of fishery resources by the non-AFA trawl catcher/processor fleet by extending the groundfish retention standard (GRS) to non-AFA trawl catcher/processor vessels of all lengths; (2) allocating fishery resources among BSAI trawl harvesters in consideration of historic and present harvest patterns and future harvest needs; (3) authorizing the allocation of groundfish species to harvesting cooperatives and establishing a limited access privilege program for the non-AFA trawl catcher/processors to reduce potential GRS compliance costs, encourage fishing practices with lower discard rates, and improve the opportunity for increasing the value of harvested species; and (4) limiting the ability of non-AFA trawl catcher/processors to expand their harvesting capacity into other fisheries.

A80 catcher-processors are allocated Atka mackerel, flathead sole, Pacific cod, Pacific ocean perch, rock sole, and yellowfin sole. PSC limits are also established that limit mortality of PSC species (e.g. halibut). Catch of other groundfish species are limited through maximum retainable

amounts and retention requirements. Because this program is only for non-AFA CPs, its structure is different than West Coast CP fisheries and is not considered further in this analysis even though it is the only Alaska trawl fishery with an extensive cost collection program.

4.0 STAKEHOLDER INPUT

Stakeholders were invited to provide their perspectives on the catch share programs. All Limited Entry Permit (LEP) holders and First Receiver License holders were notified of the project and were given the opportunity to provide any input related to the project they felt appropriate. This section does not attempt to verify of refute opinions of the persons providing comments, or the validity of suggested program changes. The author felt it is important to allow the stakeholder's views to be expressed as they were provided.

There was almost universal agreement, from permit holders that wished to comment on the program, that it has achieved many of its conservation and management objectives of addressing environmental impacts (including rebuilding of stocks) and achieving individual accountability of catch and bycatch. A preponderance of stakeholders, especially in the non-whiting fisheries, felt that the economic goals of the program have not been met, with many respondents indicating they felt structure of the program did not allow for the program to achieve its economic objectives of increasing net economic benefits, creating individual economic stability, and providing for full utilization of the trawl sector allocation.

4.1 Non-Whiting Harvesters

Stakeholders that commented from the non-whiting sector included both permit holders that are still active in the fishery and those that have exited the fishery because they were unable to operate profitably. All stakeholders that provided input expressed concern that the overhead associated with the program is too high. One stakeholder downgraded the size of vessel he operated and tried multiple strategies to make the fishery work including selling directly to buyers at the dock and value-added marketing of his catch. He reported that none of these strategies allowed him to cover his operating costs.

Harvesters, particularly those operating larger trawl vessels out of California ports, noted problems associated with local ports not having sufficient infrastructure to allow for efficient offloading of fish. Offloads sometimes would need to be done by hand because they could not access a hoist. These offloads took more hours and drove up the cost of operation. These logistical problems at the dock delayed offloads and increased costs associated with paying processing/dock staff and vessel crew. The loss of infrastructure problem was reported to be related to reduced catch limits necessary to facilitate the rebuilding of certain rockfish stocks. The lack of dock and hoist availability, in some cases, necessitated finding dock space in other communities that were an additional 2-hour cruise each way. Another permit holder dealing with a lack of portside infrastructure also noted that what is available is expensive. He stated that in his area there is a charge of $0.08 per pound to offload vessels using traps and $0.001 per pound for trawl vessels.

Another permit holder stated that in the 1990's people would fish mostly groundfish year-round. During that time period six trawl vessels delivered to the local processor. Now they were reported to be the only boat fishing out of their port and there are only two trawl vessels fishing

groundfish between Monterey and San Francisco. The permit holder's opinion was that catch shares allow a little more fishing flexibility but the cost of that flexibility is too high. Cost of observers, quota leases, buy-back fees, and the current high fuel prices, were stated to "make it impossible to make are reasonable profit". He noted that fuel prices were high 20-years ago and those prices were driving people out of business. Now they have comparable fuel prices, but because of all the additional costs, fuel - which costs about $2,000/trip, is only about one-third of the regulatory costs that directly resulted from the catch share program. To reduce observer costs they try to make day trips and need to catch about 13,000 lbs of fish to break even. They estimated they have $6,000 - $7,000 invested per trip in regulatory costs. Part of that cost is leasing quota. Even though he gets a small price break (about 10% off the market price) by leasing from a community organization that holds quota, the added cost is substantial. In addition to the other costs, fish taxes were reported to be 7% to 8% of the ex-vessel value and that also reduces the profitability of the firms.

One permit holder's perception of the program was that it was primarily focused on conservation goals. To achieve those goals an objective was to reduce the size of the fleet. To fix the program, the Council would need to reevaluate the program's goals and establish goals that would increase the percentage of allowable catch that is landed. He felt "they need to catch more fish and have a more consistent supply of fish being landed to support new infrastructure development". The program that was developed was intended to control a larger derby style fishery and applying those tools to the non-whiting fishery was not going to work from the beginning, in his opinion.

Another permit holder stated that he started out as a deck-hand and worked his way up to being a captain. He then acquired his own boat. His business plan was to use his quota and that of a community organization and deliver the fish to a processor and sell directly to consumers. However, leasing fish (especially black cod) is expensive and creating own markets has a high overhead. In addition, more of the firm's income gets eaten up by observer fees and high fuel costs, making it hard to be profitable. Because he still has not paid for the boat, he needs to figure out a way to make his business work to pay off his loan. He has not found a profitable solution yet, and he feels trapped in the fishery, stating that the entity he leases quota from "makes their margin but he does not make any money". The revenue he makes is just enough to cover the costs with no money left over to pay himself.

A harvester that fishes sablefish quota with traps provided the following summary. Prior to IFQs harvesters were able to make trips throughout the year and catch larger sablefish. The smaller vessels spread out the catch and did not fish in very deep waters that he feels provided a sanctuary for the larger fish that made up an important part of the breeding population. With the implementation of the IFQ program larger vessels moved in to the limited fishing areas they had traditionally fished as well as deeper water that was not accessible to the smaller vessels. He feels the stock assessments are good, but they should be improved to account for localized depletion of fishing areas that are caused by larger boats taking more removals in a short period of time from areas that were not traditionally targeted.

Another permit holder stated that the program is structured so that they cannot utilize the quota they are issued. Historically the fishery in his area was a small boat fishery comprised of vessels typically less than 35 feet. There were no large boats operating in the fishery. Now there are only one or two 35-foot boats operating because they cannot afford all the fees and costs incurred under the program and there is increased competition from larger vessels. With the increase effort in the area, the CPUE decreased. The smaller boats would typically set about 35 traps.

When the large boats entered, were reported to set about 30 traps, go get another 30 traps to set, and then set another 30 traps so they could rotate pulling about 90 traps. Because of the increased competition the fleet has been reduced from about 30 or 40 vessels to four to six vessels. The vessels used to take 24-hour trips to in supply a fresh market. They no longer have that market because of Covid-19 and increased regulations selling into that market.

A permit holder felt the resource is better managed when removals are spread out over a longer time in the summer, so it does not lead to localized depletion for the smaller vessels and it allows the fresh market to better absorb deliveries. His opinion was that the glut of fish at one time ruined the fish market. He indicated that in the past, small boats had a 2,000-pound limit. Smaller boats would often high-grade to make sure they brought larger, higher valued fish to market while staying within the 2,000-pound limit. Large boats have the capacity to catch 100,000 pounds per trip. In addition, boats have VMS and people can easily track where they are fishing, making it easier for other harvester not familiar with the area to determine productive fishing grounds. The permit holder indicated that tracking the larger boats they can see that they are fishing where the smaller boats traditionally fished. He also noted that larger boats have put escape ports in their traps to help increase the size of fish caught. Larger boats can also fish deeper waters with the traps (600 fathoms to 700 fathoms). This area was thought of as a reserve for the fish stocks. Small boats could not easily fish they area but when the larger vessels began fishing they could set their traps with heavier line to fish deeper and were able to selectively remove the larger fish.

Another permit holder stated that he “has not seen anything good coming out of these programs”. He relies on permits in other fisheries to keep their fishing operation viable. The program has not improved prices and or allowed the creation of new markets. These factors have limited their ability to operate a viable groundfish fishing business. Prior to the IFQ program, they would determine available markets and fish those fisheries. The flexibility to move fisheries was important to their business plan. The IFQ program qualifying years had a negative impact on a lot of fishermen that relied on different fisheries based on markets, buy limiting their initial allocation. To reduce costs and increase efficiency he built a new boat. However, the quota they hold is not enough to off-set the costs of the program even with the more efficient vessel.

A permit holder noted that about 3-years ago a study was conducted on how to revitalized the fishery in Fort Bragg. He has never heard the results of the study. However, he noted that they have lost almost all of their support industry. They have lost the electronics people, mechanics, ice production capacity is almost gone, fuel dock is gone (fuel comes down on a truck and is $2 a gallon higher than other places). They now have to get ice and fuel from Bodega Bay. Most vessel operators are either getting supplies from processor or other communities. He also noted that the port needs to be dredged for the larger vessels. Trawlers have some money saved for dock improvements, but are limited because the port is not open 24-hours a day.

Another limitation reported to be placed on harvesters is they cannot sell directly from the boat because of the permits that are required. This limits their ability to market fish.

One California harvester noted that they cannot obtain “John Doe” crew licenses that are available other places, so all workers need a crew license to help off-load. He noted that it is difficult to work through the application process for new crew to get a license. For people that already have had a license in the past, the process was reported to be relatively easy. Pre-IFQ the vessel owner would have crew that only helped with the offload. They operated with four fishing

crew members including the captain and two additional crew to help with the offload. Recently, they were only employing the captain and one crew member to reduce costs.

One harvester noted that one of the primary processors in California is for sale and the other is on a 40,000 lb delivery limit. The delivery limit reduces the economic efficiencies of larger trawlers that have the capacity to deliver much more than that amount on a trip.

One person noted that too much quota is being held by persons not actively harvesting fish (including trusts and other persons that only lease quota) that charge lease rates, when added to all the other costs, make it difficult for harvesters to earn a reasonable profit. Persons that only lease quota are also in a more difficult position to access loans, since they do not hold the long-term asset value to use as collateral.

Another issue causing lower profits is the non-whiting harvesters are able to utilized less of the available fish. One person felt that the three years before catch shares, the non-whiting catch (excluding rockfish (e.g. flatfish)) was better. Under the program the volume has gone down and landings have consolidated geographically. They are at the mercy of the processor and processors are at the mercy of markets with low-priced imports. Seafood is going to larger volume, lower cost, products. For example the costs have risen dramatically, but the price of dover/widow is same or less as 1993. Since the program was introduced the number fillet lines have declined. He thinks the program has inhibited the fresh product market and the world has changed in terms of fish marketing and consumption.

A respondent felt that the industry is in real trouble as a result of losing historical memory from long-term participants. “The older generation is getting out of the fishery” (greying fleet) and the younger generation is either discouraged from becoming owners or they do not have interest given current conditions that, they feel, do not provide the opportunity for reasonable returns on time and investment.

4.2 Whiting Harvesters

4.2.1 IFQ

Whiting vessel operators indicated that the program has, in general worked well. However, some stated that for other groundfish species the program was implemented too late. Regulators waited until the fishery had already collapsed. At that point there were limited processor options for deliveries and the marketing of fish was poor. Prior to the last two to three years, the whiting fishery had worked well. Fishermen noted that the recent problems with the fishery are reflected in the amount of whiting left in the water during 2022.

Representatives of one company noted that the program has worked very well rebuilding overfished stocks. Previously overfished stocks that they encounter now were called “abundant”. This includes choke species like widow rockfish, canary rockfish, and yellowtail. Over all, they felt the catch share program has done what it was intended to do.

One respondent noted that the costs in the fishery are too high because of the vessel buyback, cost recovery, at-sea and shoreside observers, ODFW fees, trawl commission fees, and taxes. The respondent was specifically concerned that the economic data collection program costs under the cost recovery fee were excessive. The operator was not only concerned about the cost, but also cited concerns about the quality of data generated, if the information provided does not

neatly fit into the boxes provide in the questionnaire and match closely with the information provided by other harvesters. Fuel prices/costs were provided as an example. Firms that buy fuel at the local docks pay a premium relative to firms that buy in bulk. Buying in bulk saves the firm $0.25 to $0.50 per gallon. Because the information they report is different from the fleet that buys at the dock, their information is flagged by NMFS and sent back for correction. Instead of using the actual price they ask what the "correct" price is and report that price, even though it does not reflect their business practice. They do not intend to change how they purchase fuel because that practice provides cost savings for their business and works better than the using either commodity markets to buy futures to help create more certainty in future costs or buying higher priced fuel at the dock.

Another stakeholder stated program costs significantly impact their business. Cost recovery fees, buyback program fees currently account for about 6.5% of ex-vessel revenue and was higher when the buyback fee percentage was higher. Fish taxes also increase costs. The increased fuel costs were reported to account for about 40% of trip costs. Observers currently cost the whiting fleet about $600/day and EM for the whiting fleet cost about $12,000 per year. Stakeholders were also concerned that regulators want to assess another fee for EM review for full retention of salmon discards. The additional costs and reviews were felt to be unnecessary because unusual events on deck in the whiting fisheries would be easy to detect. He indicated that discard events are rare and they typically result from poor weather conditions or other safety situations. The stakeholder also noted that the discard information is provided in the logbooks that is readily available. He was concerned that too much of an emphasis is placed on enforcement of the program and feels that industry has shown they can be trusted to report information accurately.

It was recommended that the VMS reporting should be changed to be more like it is done in Alaska. On the West Coast they are required to call every time they switch gears. This is difficult for harvesters at-sea to coordinate with their home office and NMFS. In Alaska, the agency monitors VMS to see where vessels are located and their speed. Some harvesters felt a similar program structure could be implemented in the West Coast fisheries to reduce reporting burdens on the fleet.

Gear switching remains a controversial issue. People in general felt that it needed to be fixed with some people stating it hurts the fishery and others using it as an important business tool. One vessel operator noted that during the past year black cod lease fees started at about $0.25 per pound. The price increased to $0.35 per pound in the spring. When the vessel operator provided comments, he indicated that the price was about $0.60 per pound[15]. He reported that most trawlers were getting $0.90 to $0.95 per pound for black cod. Because of the structure of the DTS fishery, he felt that black cod lease rates of $0.20 to $0.30 per pound were sustainable in the fishery. Rates above that level make it difficult to operate profitably. Gear switching is being address through an ongoing amendment package.

Industry is willing to pay for the additional costs associated with operating their cooperative's, but they are less happy with all of the costs included in the cost recovery program that results in them paying the full 3% fee most years. There was concern that a lot of the monitoring costs are

[15] The Jefferson State Trading Company website shows two QP transactions for 2023 with one transaction selling sablefish for $0.50 per pound and the other selling sablefish for about $0.70 per pound. https://jeffersonstatetradingco.com/closedauctions2.php?

hidden in the cost recovery fee and members of industry continue to request more transparency from the agency relative to those costs. While it is acknowledged that the cost recovery issue is important to industry, that issues will require greater discussion between the agencies that recover costs and the fishing industry.

Members of industry remain hopeful that EM can provide cost savings. They feel that the video review to determine if there are discrepancies between the logbook and the video captured should not take much time or require additional fees. Video can be reviewed at several times the real speed to verify retention. They also indicated that EM of the whiting fishery should not be a tool for harassment/fining industry for accidental/minor violations.

4.2.2 At-sea

One independent harvester in the mothership sector was dissatisfied with the program because of lack of processing capacity and available markets some years. That person felt that catcher vessel operators that are independent of the mothership were at a disadvantage. Catcher vessels that are owned by the mothership and fleets that own the mothership were thought to have better markets and benefit more from the catcher vessels and motherships working together.

An independent operator felt that the mothership whiting fishery has completely "failed to meet any kind of legitimate goals for a rationalized fishery other than it has controlled bycatch". When compared to the AFA pollock fishery and the Alaska crab cooperative he felt that it was not as successful in meeting the stated program goals of providing economic benefits to the independent at-sea catcher vessel fleet. He stated the mothership sector has never harvested all of its whiting quota and some quota holders do not even catch half of their whiting allocation. A cited primary reason was the lack of adequate processor markets available to independent catcher vessels. He noted that there are unused mothership licenses, owned the same processors operating in the mothership fishery. Holding those licenses, but not using them, limits the markets for catcher vessels and the motherships that are operating do not have the capacity to take all the whiting catcher vessels want to deliver during certain times of year. Many of the catcher vessels also fish pollock and Pacific cod in Alaska or operate in other west coast fisheries part of the year, limiting the times of year they are available to harvest whiting.

Lack of catcher vessel market power was also stated as a problem. When there is more quota available than is being delivered and catcher vessels compete for market opportunities to delivery their quota, the catcher vessel operators see themselves as having little market power. Mothership operators were felt to be able to attract new catcher vessels to make deliveries or more fully utilize the quota issued to its current fleet. Market conditions and capacity limits can result is catcher vessels being placed in a delivery rotation. If a mothership operator adds a catcher vessel to the delivery rotation is reduces the number of deliveries a CV can make, as harvest is limited by MS hold capacity before they must offload product.

One person suggested combining the mothership and shoreside sectors into a single IFQ fishery to provide harvesters with more markets and allow the mothership quota holders to deliver more of their quota. Other respondents noted that it would be hard to combine the two whiting fisheries because of the bycatch quota in the two fisheries. It was also noted that the mothership fleet can be efficient and have benefited from lower program costs.

Another person indicated that the whiting fishery is operating better under the cooperative structure than it was under the derby fishery. Costs of participating in the whiting fishery were thought to be reasonable under the cooperative fishery. NMFS has limited costs associated with running the fishery and as a result of the cost recovery fees are relatively low. The cooperative members incur additional costs to hire a cooperative manager and information technology specialists help run the cooperatives and monitor their performance. Those costs were anticipated when the program was being developed and the fleet, in general, felt they are reasonable.

A participant noted that they pay annual dues to one or more organizations. Cooperative membership can be in the at-sea cooperative and/or an IFQ cooperative. Membership in those cooperatives aid in in season hot-spot management and salmon bycatch avoidance among other vessel coordination issues. Some harvesters are also members of United Catcher Boats or Midwater Trawlers Association. Firms involved in both harvesting and processing may also be a member of the West Coast Seafood Processors Association. Depending on which groups and how many groups they are members, annual dues can exceed $100,000.

Another harvester holds quota, but leases it and no longer fishes. The person holds both groundfish and whiting quota and was more involved during the whiting cooperative formation and in the cooperative management in prior years. This person also noted the lack of processing in the mothership sector. Lack of markets (for catcher vessels delivering and the mothership first wholesale markets) were stated as reasons for the sector not using all its quota. During the years the person was more involved in the cooperative, he felt both the shoreside and mothership cooperatives allowed the fleet to be very successful managing bycatch.

4.3 Shoreside Processors

One respondent indicated that he was concerned from the beginning that the program would not work well for his sector/business for several reasons. The trip limit program required harvesters to catch and deliver groundfish every two months or lose their apportionment of fish. That structure forced deliveries to be spread out over more of the year which was more conducive to supplying a fresh market. He indicated that harvesters would often fish for groundfish for a couple weeks and then fish other species like shrimp. After the IFQ program was implemented, harvesters tended to shift the timing of groundfish effort and its associated catch to the fall. Harvesters would fish shrimp from April 1 through October. About the same time the IFQ program was implemented the shrimp stock was increasing and offering a good price, leading to more effort on shrimp and less on groundfish. Moving groundfish effort to later in the year made sense for harvesters because they did not need to keep switching fisheries and he indicated that groundfish are often easier to catch in the fall. However, from the processor's perspective it did not work as well since they would need to freeze more of the product, because it was delivered in a more compressed time window creating a glut of fish on the fresh market. Frozen product has a lower value and it increases costs due to loans required to cover costs until the product can be sold and the cost of freezing and holding the fish. He noted that rockfish and Dover sole compete well in the fresh market on quality and price compared to substitute products like tilapia. Fresh tilapia shipping costs increase the market price, where the fresh shipping costs of locally harvest fish are less. Costs of shipping frozen tilapia are much less and increased freezing and holding costs of frozen local products make it more difficult to compete on price. The change in the market structure with fewer local or more independent buyers also makes it more difficult to develop markets for smaller/less predictable deliveries of fresh fish. In general, the stakeholder

felt the program has hurt the fresh market and in the stakeholder's opinion, the fresh market could have beaten the substitute fish fresh market, but the design inhibited its development.

One processor thought the shoreside IFQ program may have worked better if it was designed as a cooperative structure that incentivizes harvesters and processors working together. The IFQ structure was thought to have never completely bridged the gap between harvesters and processors, like cooperative structures have in some other fisheries.

People indicated that the processing of groundfish is very different than the processing of whiting. The general opinion was that whiting was faring better in the world market than non-whiting species. It was noted that the USDA has bought whiting, shrimp, and rockfish in the past. Stakeholders are also encouraging the USDA to buy flatfish as an inexpensive, high-quality source of protein. The fresh market rockfish was hurt by Covid-19 restrictions and has not bounced back to previous levels. USDA buys fish once a year, but some members of industry would prefer that it was purchased quarterly. Quarterly purchases and more consistent purchases would help the processors, especially with overseas markets being less certain because of tariffs and other geopolitical uncertainties. People generally thought that the fresh groundfish market is a more difficult market to be in than the frozen/surimi market. Fresh markets need volume from a variety of fisheries to sustain a business. Access to multiple fisheries allows them to survive when a specific fishery has poor production or markets are soft.

Processors address the processing of groundfish in a variety of ways. Processors with multiple locations may truck the fish from a whiting plant to be cut in another location. Another processor noted that they do not take groundfish deliveries, but buy groundfish from whiting processors. The buyer does not get discounted pricing but it helps both operations. The whiting processor can pay harvesters for the fish and generate some revenue from their delivery and the processor buying the groundfish has access to raw product.

Oregon processors, and likely processors in other states, noted issues with wastewater permits. Wastewater problems may cause processors to move inland to process instead of processing at the docks, to reduce the issues associated with wastewater treatment and the permitting process.

Harvesters are strongly encouraging processors to invest in the fishery. Some of the processors are investing others are not, likely depending on their forecast of long-term participation in the fishery. Harvesters want processors increase fillet production, by investing in equipment like fillet machines and tunnel freezers. Processors, need a system that provides incentives to invest in flatfish processing automation. Two flatfish fillet machines were reported to cost about $5 million and to make the investment payoff they need greater certainty about steady, high-quality deliveries. One processor representative noted that it takes about 2-years to fully train an employee to be a good filleter and keeping good employees that long is often difficult.

Another person noted that while costs are always a concern, industry really needs a fishery that will grow in volume and value. Value can be increased if the fish delivered are of higher quality. This is an issue for whiting, because it begins to breakdown quickly. Fish handling and chilling are important to keep whiting quality, in a stable fishery stakeholders may be more willing invest in equipment if it can provide a return on investment.

Gear switching was noted as a contentious issue by several of the stakeholders that responded. A representative of a smaller processing firm supported the gear switching provision, but was concerned that some competitors did not want smaller processors to use quota to attract fixed

gear deliveries. Other processors were opposed to gear switching because of the impact sablefish has on constraining the harvest of groundfish species. Everyone acknowledged that fixed gear sablefish is more valuable than trawl caught sablefish. However, stakeholders in the trawl sector were concerned about the impact sablefish availability has on the fleets ability to "get more fish out of the water". The competition for sablefish quota has increased the cost of sablefish quota (as noted earlier). Because of the high price and limited availability over the last three years, fewer transfers were said to have been made. Some people felt that that quota holders that got into gear switching under the control date should be grandfathered, but others should not be allowed to gear switch. Others would like to see a cap placed on how much can be used, indicating that the reported 29% to 30% is too much. That person would like to see gear switching scaled back. He expressed concern that "armchair quota shareholders" are part of the problem. Keeping all of the sablefish in the trawl sector would help to make the DTS fishery more profitable. That person would be okay with a 10% to 12% annual sablefish gear switching limit. That person did not like the original control date, but since it is in place it is not likely to change. He also said that industry and policy makers need to resolve the issue so that they can focus on other pressing matters that more broadly impact the fishing industry, like wind energy that could have a substantial impact on both fishermen and fish/marine mammal populations in the future.

Some processors in the IFQ program still feel they should have been given an initial allocation of groundfish. A processor stated that they have bought quota to use in the fixed gear fishery and use that quota to build stronger relationships with their harvesters. That processor is pessimistic that the program will change because once the fishery is allocated, people do not want to change the rules. Because this processor is not a traditional participant in the groundfish or whiting fishery, the only increased costs they have realized is the cost of buying quota that they use to leverage fixed gear deliveries.

Some processor representatives indicated that they do not like that economic data collection program. For the vessels it was stated to be relatively low cost in time and money, only taking four to five hours to complete the survey. The processor data collection is very intensive and takes staff several days to complete.

One processor noted that they have considered opening a plant in San Francisco or south, but it does not pencil out as a profitable business decision.

4.4 Conclusions, Concerns, and Industry Recommendations

The information in this section is a bulleted list of the concerns and recommendations provided by industry.

- Costs are too high to run a viable operation under the current conditions and need to be reduced where possible.
- Observers cost about $550 per day (mid-night to mid-night) in the non-whiting fishery and about $600/day in the whiting fishery. Need to consider ways to reduce at-sea and shorebased observer costs, while meeting the objective of monitoring catch.
- Retaining all fish puts catch share program participants at a disadvantage because all catch counts against their QP and must be retained by regulation. Small sablefish do

not command as high of a price as larger fish and puts them at a disadvantage over smaller open access vessels that can high-grade and just retain the larger fish and vessels using traps that are more selective of larger fish.

- Additional markets for fresh fish have not developed under the catch share program and may have declined. This was attributed to delivery patterns as well as overall declines in the demand for higher valued finfish products domestically and world-wide.
- Firms holding QP to the end of the year results in some harvesters needing to pay a high price for quota to cover bycatch. This benefits the firms that were able to acquire enough quota to have excess available at the end of the year, but harms firms that must obtain quota to cover overages. There is probably little that can be done to prevent that behavior outside of changing holding or use caps.
- Captains would rather fish pink shrimp and whiting because they do not have to deal with as many bycatch/regulatory issues.
- Providing proper access to the fish was not a major goal of the plan, but should have been.
- Leasing of fish creates an expense that cannot be fully recovered especially for choke species.
- Too many people only lease quota and do not fish. Consider regulatory changes to reduce the amount of quota leasing by persons that no longer harvest fish.
- Program rules have removed any interest in dragging in some areas and without changes the non-whiting trawl fishery in some areas could be eliminated. Current rules were stated to likely eliminate the trawl portion of the fishery, especially in California, within 10-years. Stakeholders said the Council needs to look around the world to find a system that works for that type of fishery.
- The lack of profits in the California trawl fishery means that owners cannot afford to pay the crew to help with maintenance 3 days a month, so some repairs/maintenance has been forgone.
- California based trawls report that after all expenses are paid, they do not have enough revenue left to pay themselves and have been forced to leave the fishery or feel trapped with no apparent way to leave the fishery and get out from under their current debt.
- Vessel operators are concerned that small boat fishery access to larger fish has been reduced because of localized depletion and are primarily able to catch more smaller fish that have a much lower value.
- Consider rules to prohibit the use of crucifiers on vessels.
- Suggests that the Council consider more flexible quota limit approaches such as the soft cap system used in BC IVQ program.
- Need to consider new ways to get volume and value out of the fishery.

- Remove or loosen vessel caps so vessels can continue to fish with greater flexibility. The cost of fuel to selectively catch fish by changing locations if incidental catch rates of the limiting species is too high.
- Request to pull stripetail rockfish from the shelf rockfish group due to bycatch issues/acquisition issues. This request was noted to go beyond the IFQ program, but was requested to be included for consideration.
- Consider developing a program to allow the use of EM at plants to replace shoreplant observers.
- Supports the continued development of EM for whiting and development of EM for non-whiting fisheries, as an alternative to at-sea observers.
- Streamline activities with recoverable costs, such as social science research, to only what is absolutely necessary to fulfill program mandates.

A very specific comment and request for a regulatory change to improve fish quality by accounting for ice to determine QP used was provided by Dr. John Lin VP of Ocean Pacific Seafood. Because of the detailed and specific nature of the request it is included below as presented to the analyst. It is also noted that halibut IFQ program does include a 2% adjustment factor for slime and ice[16].

Background info on Quality:

It is our philosophy that the maximum end-point quality, utility, and value of wild-caught seafood is determined at the point of harvest. Once quality of the raw product is lost, no method of processing, post-processing, or careful cold-chain handling is going to return that quality or value to the consumer.

Quality loss in wild seafood products come from many sources: heat abuse, mishandling and direct damage (crushing, bruising, wounding), and contamination by bacteria or foreign materials (oil, plastic, wood, glass, etc). All quality loss leads to reduced marketability, reduced market value, increased waste of product, shrinking profit margins, decreased return to fishermen and coastal communities, and inconsistency in product that directly results in decreased consumer confidence. On top of negative effects on primary fishery products (fillet, whole product, mince, kamaboko), degradation on the "front-end" also decreases opportunity and viability in by-product/co-product valorization, which again directly impacts the ex-vessel value of each fish and the return to the coastal community.

As we work with our fishing partners on improving at-sea handling and chilling and with our receiving facilities on improving production technology and practices, we would like to address one of the points of quality loss necessitated by policy.

Current Procedure

[16] https://www.federalregister.gov/d/2019-04714/p-75

Due to the requirement of an accurate weight at the point of landing, the current procedure is de-icing in water, re-sorting (primary sorting occurs on the vessel), re-icing (usually bottom and middle ice) on the dock, weighing with a catch monitor present, and then top-icing in the tote. Once it is time for production to begin, the product must again be de-iced in water.

As mentioned, primary sorting takes place on the vessel deck to remove bycatch and detritus after harvest. This is also a critical point for quality loss or retention as there can be many hours between harvest and stowing in flake ice, depending on the contents of the trawl and the efficiency of the crew.

Issues with Current procedure

The primary issue with the current landing procedure is the potential for quality loss through heat abuse. De-icing the product raises the temperature (increasing enzymatic and bacterial activity), and although efforts are made to pass fish through the de-icing process as efficiently as possible, there is always the possibility of retention, particularly for flat fish. The icing method of bottom-middle-top ice then results in uneven cooling throughout the tote, resulting in variable quality of product, which decreases the shelf-life, value, and marketability of the final product.

Other issues include increased risk of contamination from seabirds and human sources, increased risk of mishandling during sorting, and the waste of energy in the cold chain to continually re-cool de-iced product. The current offloading practice and the on-the-dock resorting are a major attractant for local seabirds and other pests, regardless of deterrents. The droppings of seabirds have been found to contain high levels of both fecal coliforms and enterococcus bacteria, and they are known vectors of Listeria.

Result and Icelandic Example

To combat quality loss at receiving, Iceland accepts a weight for each species provided by the vessel, along with an estimated ice percentage, and then the buyer provides an exact weight taken at the time of processing. These weights and percentages can be verified at any time by a 3rd party observer, and heavy financial consequences or opportunity consequences are levied against anyone found to be misreporting.

US policy makers should look to the example of advanced fishing nations, such as Iceland, Norway, and the Faroe Islands. Their commercial species are analogous to many of the US west coast and northwest fisheries species, and decades ago, they faced and overcame many of the challenges with which the US wild fisheries and regulatory bodies are currently grappling. Iceland boasts the highest return value per seafood employee of any nation, a total utilization of bycatch, and expanding valorization of high value co-products. Although the US is not primarily a fishing-based economy, recent supply chain issues, and forecasted food insecurities make protecting and enhancing domestic means of producing nutritious food products more critical than ever. Challenges presented by changing oceans within changing climates must be met with more responsible and sustainable use of harvested resources.

We cannot make progress or sustain growth on the fantasy of simply increasing harvestable fish populations (and therefore quotas and harvests) alone, and many critical at-sea behavior changes and handling adjustments will result in lower harvest volumes.

To make these lower volumes palatable to fishermen (and processors) who traditionally relied largely on volume for profits, reaching quality goals and market return for that increased quality must be achievable. It will not be achievable if quality cannot be preserved at the dock.

Request

We ask that NOAA and other regulatory bodies work with Industry to find an approach to monitoring catch weights that is congruent with the stated goals of enhancing the economic value of these fisheries, ensuring the sustainability of both the marine resource and the seafood production, and maximizing the economic yield of US fisheries to the benefit of local fishing economies and the US economy as a whole.

5.0 COST DATA

Several cost data collection programs have been implemented in U.S. Federal fisheries. Thunberg et. al. (2015) provided an overview of those collections. Most of those data collection programs do not directly relate to this project. However, in addition to the West Coast program, information related to the NE Sector program and some Alaska trawl fisheries are considered. To the extent data are available from the Canadian IVQ program, it is provided.

How data are collected and the types of data collected varies by catch share program. West Coast cost data are generally more current and/or more complete than for other catch share programs. The availability of the West Coast cost and revenue data is useful for analysts, policy makers, and the public to understand the fishery. Stakeholders within the industry also benefit from having the data available, but are concerned with the overall cost of the data collection and data analysis, since some or all of the costs can be passed on to fishery participants through the mandatory costs recovery fee.

5.1 West Coast

The primary source of cost data for the West Coast Trawl Groundfish program is specified in 50 CFR 660.114. The economic data collection (EDC) program requires the collection of economic data from participants in the trawl rationalization program. Those regulations require industry to submit EDC forms to NMFS that provide ongoing, annual economic data. The required data includes annual data related to QS permit owner activity and characteristics of participation in the fishery, costs and earnings from quota trades, and quota leasing. It also includes annual data related to costs, earnings, value, labor, operations, physical characteristics, ownership and leasing information for vessels, first receiver sites, or shorebased processors. EDC collects much of the data related to participating in the fishery, but it may not cover all the cost data. Information collected from the annual EDC is summarized and made available to the public through the FISHEyE data tool.

In addition to FISHEyE, data from other sources are used to provide background information on buyback fees, observer costs, fuel prices, etc. The information from those sources is more specific to costs that have been specified as a concern by stakeholders, than the mean cost and revenue data derived from FISHEyE.

5.1.1 FISHEyE Data

FISHEyE divides the catch share program vessels and processors into groupings. Vessel are grouped and summarized as all vessels in that fleet, whiting vessels that fished for Pacific whiting, including those that fished for both whiting and non-whiting, and groundfish vessels that did not fish whiting. Vessels are separated into whiting and non-whiting vessels because whiting vessels tend to be larger and catch a higher volume of fish. In addition, total allowable catch for Pacific whiting has more annual variation than total annual catch for species targeted in the non-whiting groundfish sector, which can make interpreting the metrics provided in the data more difficult. Catcher vessels are also grouped by size. Catcher vessels are grouped into three categories representing the range of catcher vessel lengths: Large Vessels (>80 ft), Medium Vessels (>60 ft, ≤80 ft), and Small Vessels (≤60 ft). Finally, catcher vessels are grouped by homeport and state. All of these various groupings are used to describe costs and revenues for the catcher vessel fleets. Motherships and catcher-processors are not broken out by the various groupings because of confidentiality issues and they tend to operate out of the same region.

Shorebased processors are grouped into three size classes based on the number of production employees: Large (>200 workers), Medium (100–200 workers), and Small (<100 workers). On the EDC form, processors report the total number of production employees for the week that contains the 12th of each month. This information is used to classify processors. **Table** 5-1 reports the number of CVs that were reported in FISHEyE as being active in various fisheries during the 2009 through 2020 time period (the most recent year data were available when the report was generated). Limitations on the catcher vessels included in the data also means that only vessels that participated in the catch share fisheries are reported in the EDC. Therefore the "all catch share fisheries" and "all fisheries" counts are the same every year.

Table 5-1 Number of catcher vessels reported in the FISHEyE data by fishery reporting group, 2009 through 2020

Fisheries	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
All catch share fisheries	138	130	113	110	105	101	96	97	99	100	98	87
All fisheries	138	130	113	110	105	101	96	97	99	100	98	87
All non-catch share fisheries	82	81	71	68	67	62	59	60	63	59	62	50
At-sea Pacific whiting	19	21	18	16	18	19	14	17	15	17	19	15
Crab	56	54	51	47	51	43	36	46	52	48	46	38
DTS trawl with trawl endorsement	108	97	63	58	58	51	51	50	55	49	45	37
Groundfish fixed gear w/ trawl end.	8	8	25	25	14	16	17	19	17	16	16	10
Groundfish with trawl gear	118	105	72	67	69	64	62	59	63	66	65	62
Non-whiting midwater trawl				5	5	9	12	9	14	20	23	25
Non-whiting, non-DTS trawl w/ trawl end.	89	58	42	45	44	49	36	47	50	44	46	43
Other fisheries	27	25	20	20	19	17	17	16	11	12	18	10

Pacific whiting	41	41	31	29	29	30	26	28	29	30	32	33
Shoreside Pacific whiting	34	35	26	25	24	25	22	23	25	26	27	28
Shrimp	32	35	30	33	31	31	35	27	26	31	31	23
Trawl only catch share fisheries	131	123	91	89	91	86	80	80	84	85	84	78

Source: FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435

Calculation of performance metrics in FISHEyE data are based on four primary data sources. Fish Ticket data are collected by each state and then compiled by the Pacific Fisheries Information Network PacFIN). PacFIN data used in FISHEyE includes vessel IDs, buyer IDs, gear, delivery date, species, landings weight, and ex-vessel revenue for each shorebased delivery. For the purposes of the performance metrics, this information is primarily used to obtain shoreside ex-vessel revenue, landings weight, and number of trips.

Permit data are from the NOAA Fisheries West Coast Region Permits and Monitoring Branch. Data includes the limited entry permits on each vessel during a specific time period. Similar data are provided for First Receiver Site Licenses (FRSLs). The information is primarily used to assign trips and their associated ex-vessel revenue and landings to permit-specific fisheries.

Federal observer data collected on catcher–processors and motherships provide similar data to fish tickets, including catcher vessel IDs, fish buyer IDs, landings weight by species, and catch/delivery date. They do not include ex-vessel revenue for mothership deliveries. Catcher–processors do not pay an ex-vessel value, since they both harvest and process the fish. As a result, revenue and net revenue estimates for catcher vessels are based on ex-vessel value; revenue and net revenue estimates for motherships and catcher-processors are based on first wholesale values.

EDC data are the source of the majority of the data presented in the performance metrics. More details about each data element can be found on the EDC Forms web page[17] and in the descriptions of the performance metrics.

Revenue and cost data are inflation-adjusted to 2020 dollars using the Gross Domestic Product: Implicit Price Deflator (GDPDEF) quarterly series is obtained from the Federal Reserve Bank of St. Louis (the St. Louis Fed), and averaged to create an annual deflator. This price deflator was also used to adjust the NE Sector data to 2020 dollars. Costs and revenues for the Canadian Integrated Program cost and value data were adjusted for inflation to 2020 dollars using the Canadian CPI before being converted to U.S. dollars.

Not all entities receive revenue from each source or incur costs in each category listed on the EDC form. For the purpose of performance metrics, zeroes are excluded in each statistic. In this report confidential data are listed as "conf." in the data tables and excluded from the average calculation when it allows the confidential data to be back-calculated. Vessels homeport/state, and processors location is based on the location of their facility. Size is based on the vessel length, or for processors, by the number of employees.

[17] https://www.fisheries.noaa.gov/west-coast/science-data/economic-data-collection-forms

It is also important to note that FISHEyE data does not include all expenses. For vessels, these expenses include office space, pickup trucks, storage of equipment, professional fees, and marketing. For processors, common costs that are not collected are trucks and professional fees. For these reasons, the EDC Program's aggregated measures of costs (variable costs, fixed costs, and total costs) underestimate the true costs of operating a business[18].

Detailed tables derived from FISHEyE data are presented in Section 8.1. The information is reported as a mean for the vessel or processor class. The reader is referred to that section for detailed cost information by category. Summary information is included in the main body of the document and focuses on costs that are triggered by specific elements of the catch share program when possible.

The figure below is divided into two parts with the one on the left showing the how the annual catcher vessel revenue, in real 2020 dollars, is divided between net revenue, fixed costs, and variable costs. The right part of the figure shows the percentage of ex-vessel revenue each of those groupings represents. Net revenue increased after the catch share program was implemented and remained greater than the pre catch share years until 2020. However, the peak year for net revenue was 2017 and has declined since.

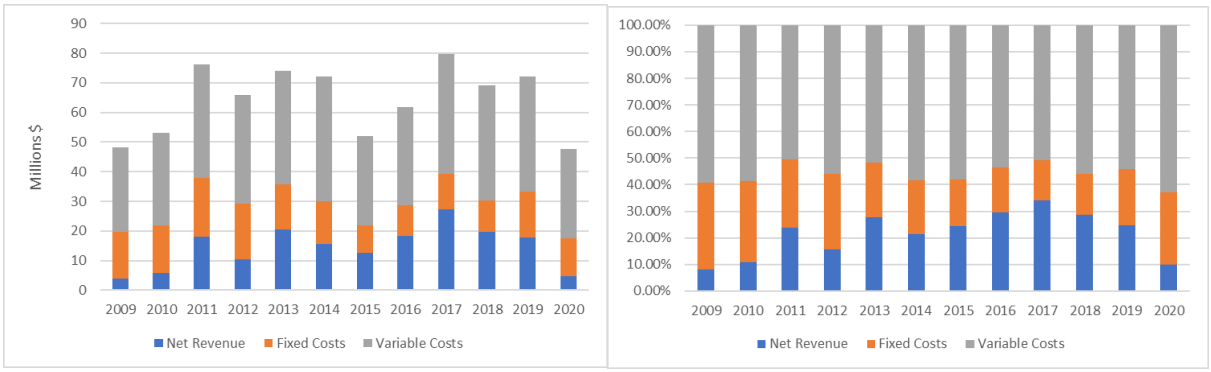

Figure 5-1 Catcher vessel revenue, net revenue, fixed costs, and variable costs, 2009 through 2020

Individual sectors and geographic locations have realized different outcomes from the program. For example, vessels that reported being homeported in San Francisco or Moro Bay/Monterey have not realized positive mean net revenues since 2017 (Figure 5-2). In the three years that followed, negative net revenues were realized. These data are consistent with the reported stakeholder's concerns that they have been unable to operate profitably in recent years.

[18] NOAA Technical Memorandum NMFS-NWFSC-169

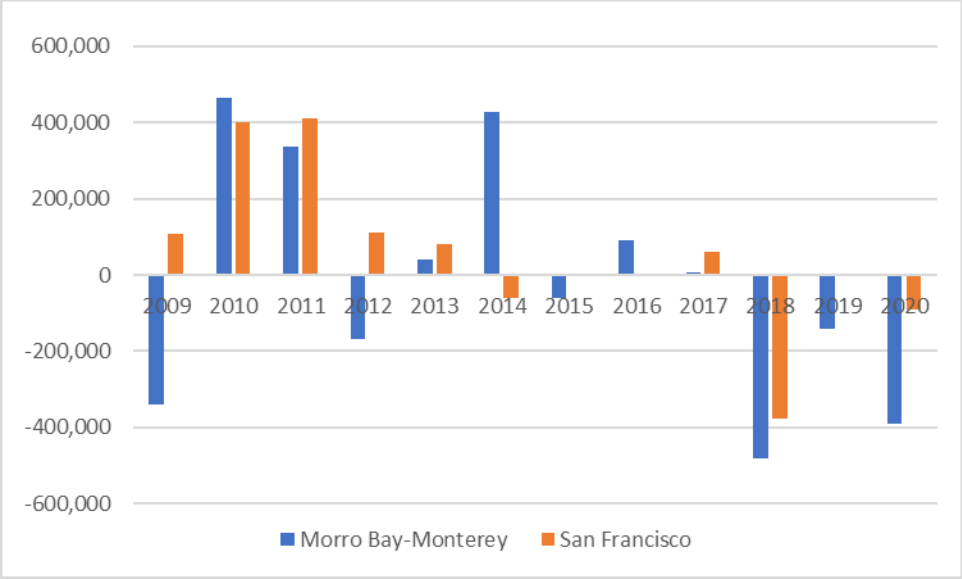

Figure 5-2 Catcher vessel net revenues in San Francisco and Moro Bay/Monterey, 2009 through 2020

5.1.2 Observer and EM daily cost

Section 303A(C)(1)(H) of the MSA requires that LAPPs "include an effective system for enforcement, monitoring, and management of the program, including the use of observers or electronic monitoring systems". Prior to implementing the catch share program total mortality for all species was measured and controlled by monitoring total landings and sampling 20% of the trawl trips to estimate bycatch rates (discard rates) that were applied to landings to develop an estimate of total catch and mortality. That estimation methodology resulted in less certainty around the total catch and mortality estimates.

Amendment 20 implemented 100% monitoring at-sea and dockside to ensure accountability for all landings and discards of all allocated species. Catcher-processors and motherships are required to carry two observers at all times, with certain exceptions based on the length of the vessel, and catcher vessels are required to carry one observer until all fish are offloaded. First receivers are required to have shoreside catch monitors for 100% of IFQ offloads. These requirements were included in the program to address certain Council's stated goals and objectives of the program. The first was to have comprehensive monitoring at-sea and shoreside to ensure allocations are not exceeded, either individually or collectively. This also supports the rebuilding of overfished stocks and helps ensure that ABC's of allocated species are not exceeded. The second is to support accurate, close to real-time, catch accounting to allow inseason quota tracking to allow quota transfers while having enforceable individual catch limits. Third, it provides a mechanism to verify logbook information. That information is important for a variety of reasons including the verification of reported at-sea discards.

Detailed information regarding mean vessel observer and EM costs is provided in the FISHEyE data tables in Section 8.1. That information represents a mean monitoring cost for the vessels and processors in each category. FISHEyE data was also queried to report cost per day for vessels. That information is reported in Figure 5-3. The cost per day for motherships and catcher-processors is greater than for CVs, because of the requirement that they carry two observers, in

most cases. Catcher-vessel daily monitoring costs track fairly closely from 2011 through 2014. Prior to 2011, non-whiting CVs were not required to carry at-sea observers. The figure shows their monitoring costs were zero in 2009 and 2010. Beginning in 2015, whiting catcher vessels daily cost was about half of the non-whiting vessels. Much of that difference is attributed to the whiting CVs being allowed to use EM, while the non-whiting vessels were required to carry at-sea observers.

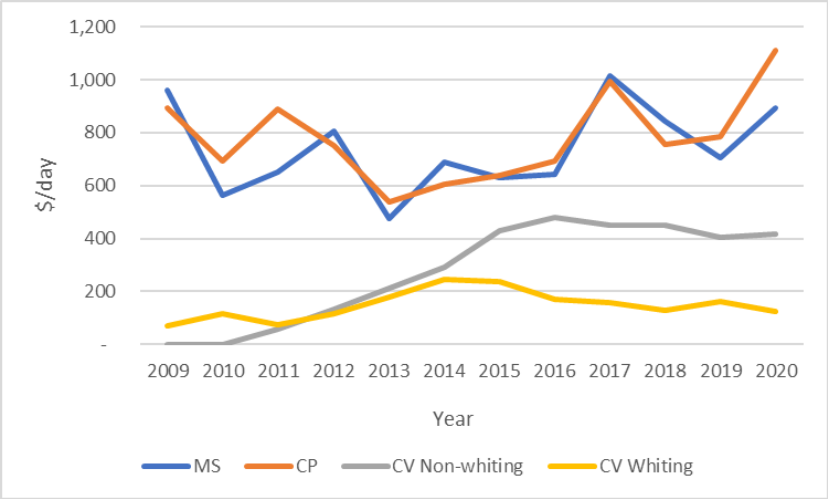

Figure 5-3 Reported monitoring cost per day

FISHEyE data does not provide estimates of daily shoreside monitoring costs. Instead, mean annual shoreside monitoring cost by the size class of the first receiver is presented in Figure 5-4. Mean annual cost differences are likely more impacted by days taking IFQ deliveries rather than differences in daily shoreside monitor rates. Sharp declines in the 2020 medium size processors monitoring costs relative to the large processors may also indicate that the Covid-19 issues had greater negative impacts on those processors daily operations.

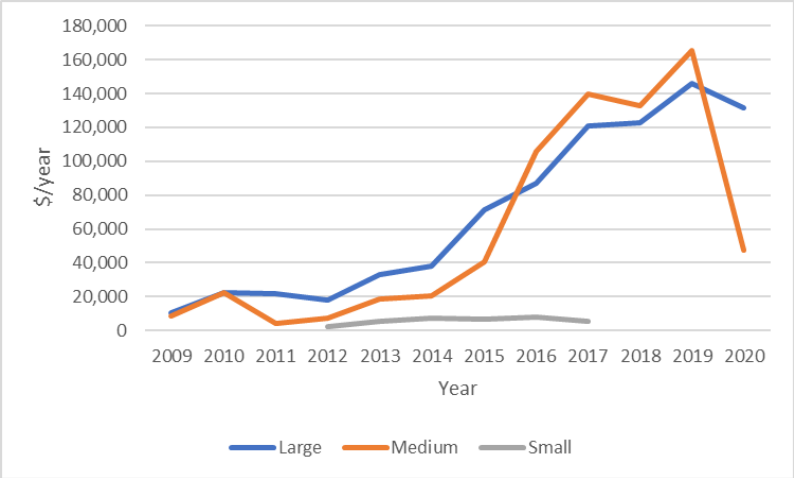

Figure 5-4 Mean annual monitoring cost of first receivers, 2009 through 2020 (2020 $)

Information is also presented in this paper from sources other than FISHEyE. This information is intended to provide the reader additional information on the differential costs of monitoring by sector. In a March 2021 report to the Council, NMFS provided estimates of EM and costs as well

as an estimate observer sea day costs. "Observer sea days" was NMFS's estimate of the cost of observer coverage if the EM EFP (exempted fishing permit) whiting fleet returned to using observers fulltime with an equivalent amount of effort, assuming 2,596 seadays and a seaday rate of $525/day. The observer sea day rate was estimated based on the average cost reported to the Economic Data Collection Program 2015-2019 and feedback from observer providers[19]. Information collected for this report indicates that one observer provider for the non-whiting fishery is currently charging industry $550/day. The reported going rate for at-sea and shoreside observers in the whiting fishery is $600/day, but almost all participants are currently using EM for at-sea coverage[20]. These costs do not include costs incurred by NOAA Fishery. Using information in the 2021 Council document referenced above and assuming the same NOAA Fisheries annual costs to support 2,596 seadays and $550/day observer cost, the total daily rate would be $691/trip. Some of that cost may be borne by NMFS if the total recoverable cost exceeds the 3% limit.

EM was reported to cost about $12,000 per year per vessel by members of industry. Using the information from the EM report and assuming the EM EMP cost of $1.119 million to fund 2,596 seadays, the cost per seaday is about $431/day. EM usage is increasing in many catch share programs around the world and, in most cases, there is little difference in catch estimates using at-sea observers and EM[21].

The Pacific fleet's at-sea observer rate is higher than the at-sea rate paid in the Alaska pollock - full coverage fishery. It was recently estimated that the rate in that fishery was $417/day. Stakeholders in that fishery contract directly with a NMFS approved observer provider for coverage. The GOA catcher vessel pollock fleet operates in the partial coverage sector (non-catch share program) and pays a percentage of their ex-vessel value (currently 1.65%) to NMFS for their observer coverage. The partial coverage fleet includes catcher vessels that operate in non-catch share programs as well as the halibut and sablefish IFQ fishery. The most recent published estimate of the daily at-sea cost for the partial coverage sector is $1,393/day[22]. NMFS' current contract with the lone partial coverage service provider expires during August 2023, which could result in rate changes in the near future.

The North Pacific pollock fishery EM costs, **excluding one-time equipment purchases[23]**, were estimated to cost about $78/day. Most of the days would occur in the full coverage sector. Based on information reported in **Table 3-3** the cost of $392,000 would support 5,070 observer days that would have been deployed on EM trips in 2021. Members of the full-coverage sector were very supportive of a regulatory option implementing EM in the pollock fishery because of the cost savings realized when the fishery was operated under the exempted fishing permit to work out program details. EM providers did caution industry that they were giving industry price discounts to stay within the grant's budget, but substantial savings in that fishery are expected

[19] https://www.pcouncil.org/documents/2021/03/g-5-a-supplemental-nmfs-report-8-em-cost-estimates.pdf/

[20] Personal communication with industry

[21] https://www.nature.org/content/dam/tnc/nature/en/documents/Catalyzing_Growth_of_Electronic_Monitoring_in_Fisheries_9-10-2018.pdf

[22] https://meetings.npfmc.org/CommentReview/DownloadFile?p=e31b9c56-d3a4-4d1e-b621-b0b4bd892b5a.pdf&fileName=C3%20Trawl%20EM%20Analysis.pdf

[23] One time equipment purchases were excluded, in part, grant money was available to help fund some of the purchases and some vessels already purchased the equipment for use in other fisheries (e.g., whiting)

under the regulated program. Program daily costs are expected to be greater in the partial coverage sectors than the full coverage sector and the differential savings from at-sea observers less. But industry operating in the partial coverage sector still supported the use of EM because of other perceived benefits of not carrying an observer.

The NE Sector fishery at-sea observer cost is estimated to be $700/day. That cost is currently not paid by industry so their cost is $0/day and the coverage rate was about 40% in 2022, as discussed in Section 5.1.4.

All vessels in the BC groundfish fishery now use EM for at-sea monitoring. Recent information on total monitoring costs are not available to the analyst. See Section 5.3 for additional information. Information that is available indicated that the aggregate monitoring costs for groundfish fisheries was around 5% of the fishery value every year (McElderry, 2008b), but implementation of EM has likely reduced costs. The daily cost of EM was reported to be approximately $154 Canadian dollars (U.S. $146) versus $558 Canadian dollars (U.S. $527) for onboard observers (McElderry, 2008b).

It is almost universally recognized that a monitoring system that achieves the stated goals of the program is necessary. Some stakeholders are concerned that the level of monitoring is too burdensome and similar results could be achieved without 100% coverage. These individuals often reference programs like the NE Sector program and the Alaska Halibut and Sablefish IFQ program that have not required 100% coverage. However, as noted to the extent possible, the NE Sector program will be moving to 100% coverage. Ultimately this is a policy decision that is driven by input from agency staff that are mandated to ensure healthy and viable fish stocks.

5.1.3 Diesel Fuel Cost and Prices

Fuel cost are a major component of annual variable costs for the West Coast groundfish fleet as shown in the FISHEyE data. PSMFC staff have been collecting and reporting information on diesel fuel prices since 1999. That data is available by port and month. Monthly data by state was used to estimate an average annual price by taking the mean of the monthly price over the calendar year and using the CPI to convert the price to 2020 dollars. That information is reported in Figure 5-5, and shows that while real prices are high compared to the recent past, they are similar to the average realized from 2009 through 2014, except in California, where the 2022 price is considerably higher than any year during the time period considered.

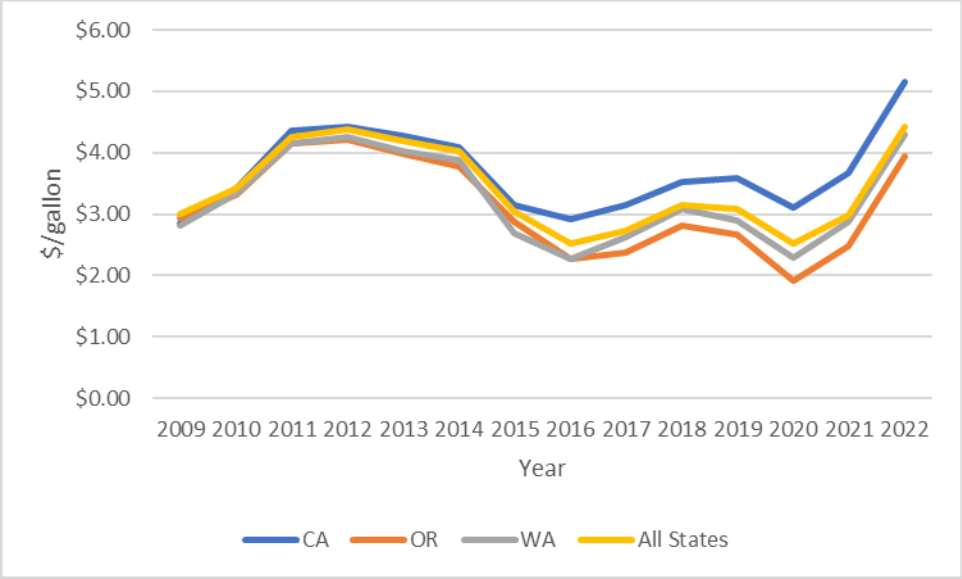

Figure 5-5 Average annual diesel fuel prices by state in 2020 dollars, 2009 through February 2023

Source: https://www.psmfc.org/efin/data/state_averages.xls

FISHEyE data shows a similar trend with overall fuel costs being lower 2015 through 2017 and beginning to increase in 2018 before declining in 2020. The decline that year is attributed to lower diesel prices as well as less usage, in part due to the Covid-19 issues. Figure 5-6 provides the mean fuel cost per vessel for catcher vessels, motherships, and catcher-processors. Greater detail is provided in Section 8.1. Due to increases in prices and usage after 2020, the steep decline in 2020 should not be considered a trend that would continue into the near future. Data are not currently available for the 2021 or 2022 fishing years. However, based on fuel price information for all states in Figure 5-5, the 2022 price was 76% more than the 2020 price.

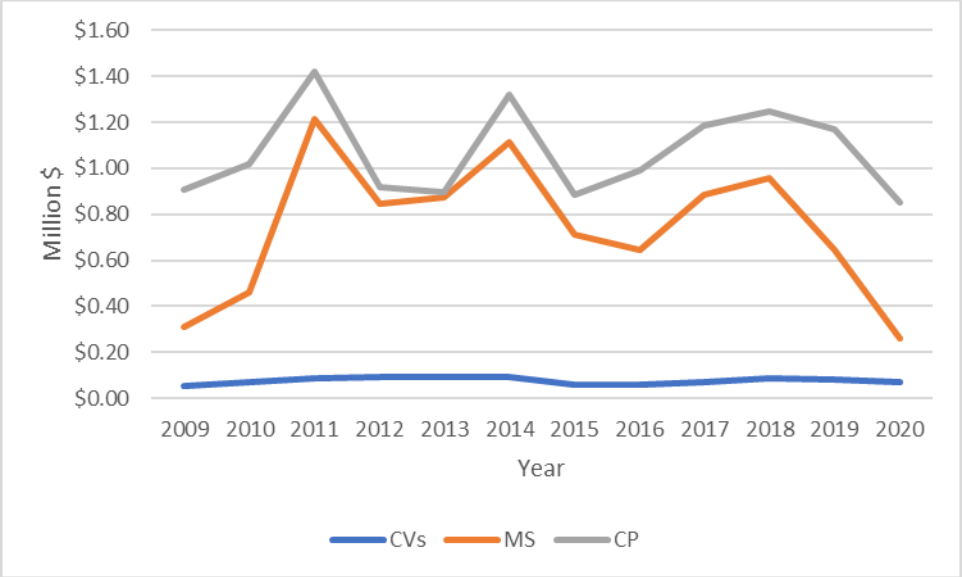

Figure 5-6 Mean fuel cost per vessel in millions 2020 $, 2009 through 2020

Source: FISHEyE data

Fuel costs are impacted by changes in fishing behavior. Vessel operators in the IFQ fisheries and cooperatives often change fishing locations, even when directed harvests are good, to avoid incidental catch of species. Especially species whose catch is highly scrutinized (e.g., salmon) and species that have very small allocations that could prevent a vessel operator from harvesting all of the directed fishery allocations. Because fuel costs change for a variety of reasons each year, it is difficult to attribute fuel usage changes to this type of behavior versus other factors that change annually. For example, changes in fuel costs can be attributed to changes in fuel prices, but it is more difficult to determine whether increased costs are associated with changes in CPUE or incidental catch avoidance measures employed by the vessel operator.

5.1.4 Buyback Fees

Information in this section was derived from the NOAA Fisheries website[24]. Congress authorized a $46 million buyback program to remove excess capacity from West Coast fisheries. Using a reverse auction bidding model, the program permanently removed 91 vessels and 239 fishing permits from the groundfish trawl fishery and associated corollary fisheries of Dungeness crab and pink shrimp off the coasts of California, Oregon, and Washington.

Fees for repayment of the loan paid based on groundfish harvests using federal trawl permits. Fish sellers are required to pay the fee and all parties making the first ex-vessel purchase of groundfish ("fish buyers") are required to collect and submit the fee, account for and forward the fee revenue for the purpose of repaying the loan. Table 5-2 indicates the fee percentage charged against ex-vessel revenue in the various fisheries. A dashed line indicates the fishery group has met their loan obligation and are no longer subject to the buyback fee ex-vessel landings in their fishery. As of 2018, "groundfish species" is the only fishery group still subject to the fee.

Table 5-2 Buyback fee percentages by year and fishery, 2005 through 2022

Fishery group	2005–07	2008–12	2013–14	2015–16	2017	2018	2019	2020	2021	2022
Groundfish species	5.00%	5.00%	5.00%	5.00%	5.00%	4.50%	4.00%	3.50%	3.50%	3.50%
California crab	1.24%	1.24%	—	—	—	—	—	—	—	—
Oregon crab	0.55%	0.55%	0.55%	—	—	—	—	—	—	—
Washington crab	0.17%	0.17%	0.17%	0.17%	0.17%	—	—	—	—	—
California shrimp	5.00%	5.00%	5.00%	5.00%	—	—	—	—	—	—
Oregon	3.75%	4.70%	—	—	—	—	—	—	—	—

[24] https://www.fisheries.noaa.gov/national/funding-and-financial-services/pacific-coast-groundfish-buyback-program

shrimp										

Source: NMFS West Coast Region

Based on these fee rates, industry reported paying about $2.5 million during 2009 and 2010. Annual payments were generally $3 to $4 million per year from 2011 through 2017, with 2015 being the outlier. Fee payments decreased from 2017 through 2020. The current groundfish loan balance as of January 1, 2023 was about $9.8 million[25]. While not a direct result of the catch share program, the buyback program did help facilitate development and implementation of the catch share program, and is a substantial ongoing cost to the groundfish portion of the fishery.

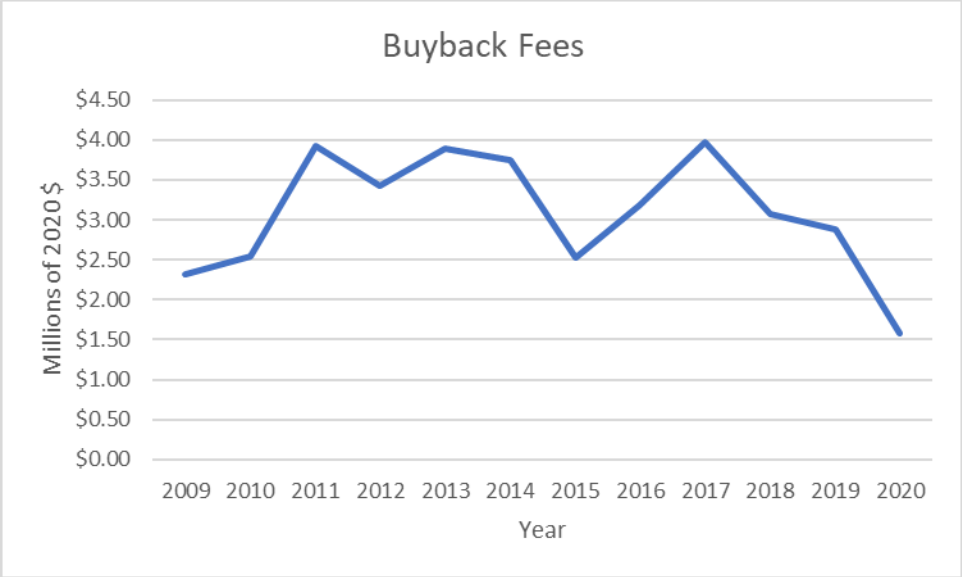

Figure 5-7 Industry buyback fees for 2009 through 2020.

Source: FISHEyE data.

5.2 Northeast Sector Program

The Social Sciences Branch (SSB) of the Northeast Fisheries Science Center (NEFSC) collected fixed and labor cost information, on a voluntary basis, from commercial fishing vessel owners in the Northeast for the years 2011, 2012, and 2015. At-sea monitors/observers in the Northeast region collect information on vessel operating costs (i.e., trip costs), such as fuel, bait, and ice. The SSB cost survey is the only source of cost information collected by NOAA Fisheries in the Northeast region for vessel-level repairs, upgrades, fees and insurance, and business level/overhead costs (e.g., trucking, advertising, administration). A survey is underway to update the available information, but the results were unavailable when this initial document was drafted.

All active, federally permitted commercial fishing vessels owned by individuals operating in the Northeast region were sent the SSB cost survey. An active fishing vessel was defined as holding

[25] https://www.fisheries.noaa.gov/s3//2023-01/Groundfish-Loan-Balances-01-04-23.pdf

at least one federal fishing permit and reporting landings of at least one pound of finfish or shellfish through the Northeast seafood dealer reporting system or through the vessel trip report (VTR) during the cost years 2011 and 2012. The definition was slightly modified in 2015 to only include vessels that had dealer-reported landings. This excluded VTR trips associated with federally-permitted party/charter vessels. Data derived from those survey years are reported in this analysis to compare similar costs against the groundfish program on the West Coast.

Variable costs are collected using a different method. Trip level costs are collected on observed trips. Econometric modeling is used to predict trip costs for trips where costs were not observed (Werner et al, 2020). Econometric modeling adjusts for biases within the trip cost data, as data collectors are stratified by biological data needs rather than economic.

Trip level costs are provided using information from the 5-year review. That report summarized changes in net revenue, where net revenue was ex-vessel revenue less trip level costs. Various caveats should be noted when considering the vessel and trip cost data. First, they are derived using different methodology's. Second, the most recent years of the cost surveys was 2015. Third, the response rate for the trawl sectors was relatively low in all three years of the SSB cost survey, with response rates falling from about 30 percent in 2011 to about 7 percent in 2015. The pot/trap sectors also exhibited similar trends, as did most other sector's response rates (Table 8-23).

Detailed fixed cost categories were surveyed in the 2011, 2012, and 2015. Questions and the structure of the surveys was not constant over the three years. As a result data had to be rearranged to form consistent groupings. Those cost category groupings are provided in the Appendix (Section 8.2) and summarized Figure 5-8. The information in that table shows that while the total fixed costs have declined, the vessel permit and value has also declined from 2011 to 2015. Recall the vessel and permit value was collected as a metric to represent the economic health of the fishery.

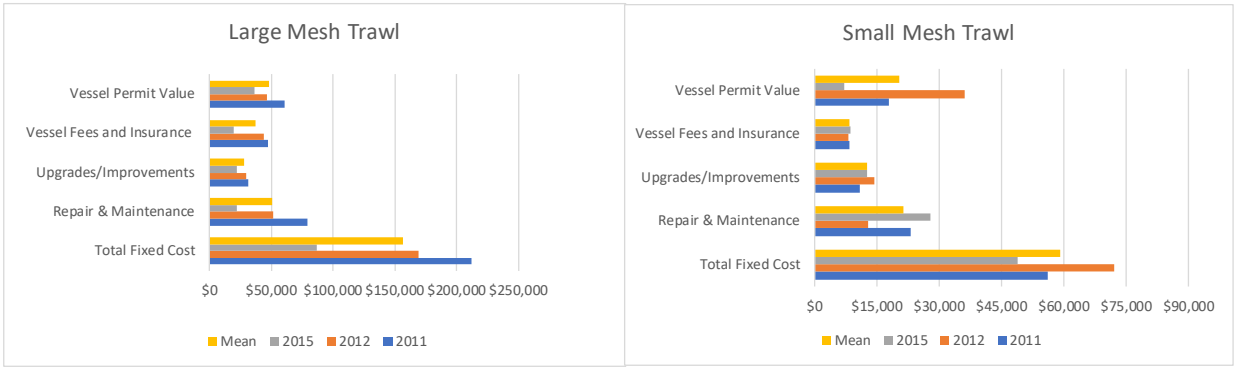

Figure 5-8 NE Sector mean fixed costs per sector, 2011, 2012, and 2015 (2020 $).

The recent five-year review of the NE Sector program provides a summary of cost data and "profitability" of trips and vessels. The review notes that estimating profitability in commercial fishing requires a full account of revenues, variable costs (costs associated with at-sea operation) and fixed costs (costs that are constant despite vessel operation). It also notes that cost data for crew and recent year for fixed costs are limited because the most recent fixed cost survey data that are available were conducted in 2015 and the voluntary survey had a low response rate. Because of the fixed cost data limitations, trip costs including the cost of supplies, groceries,

bait, fuel, ice, water and oil, were used to estimate net revenues (revenue minus variable costs). Trip level costs are more current and complete than vessel level costs. Trip cost data do not include leasing of quota, crew payments, sector fees, or at-sea monitoring costs.

Net revenues were used in the five-year review[26] to track the financial performance of the groundfish fleet over the implementation of catch share management at the groundfish trip, vessel, and entity level. To be more directly comparable to the information provided for other fisheries in this analysis, the focus is on vessel level trip costs.

Net revenues per groundfish vessel were generally higher after the implementation of catch share management program. Average net revenues per vessel ranged from $199, 000 to $224,000 with a mean of $210,000) over 2007-2009. The range increase to $283,000 to $364,000 (a mean of $325,000) from 2010 through 2015. The changes represent a 55% increase in average net revenues from the pre to post-catch share time period. However, it is noted that including leasing of quota, changes in crew payments, sector fees that would not have been incurred prior to the catch share program, and additional at-sea monitoring costs – if they are paid by industry in the future could change magnitude or direction of the estimate.

Variable trip costs per hour (fuel, ice, bait, supplies, groceries, water and oil) were $40.9/hour pre catch share ($982 / 24-hour day)and increased to $43.4/hour ($1,042 / 24-hour day) post-catch share period. Average trip costs per hour are primarily impacted by average fuel prices, as fuel expenditures generally accounted for about 78% of total trip costs.

Note that for the same reasons the 5-year review did not attempt to calculate total net revenue in the fishery, this analysis does not either. Too many assumptions would be required, making the conclusions unreliable.

Monitoring costs for the NE Trawl vessels have been - and are - currently paid by federal funding, with the fleet being reimbursed for costs by the Atlantic States Marine Fisheries Commission. As described in Section 3.2, the goal of the monitoring program had been to determine the level of at-sea monitoring coverage required to estimate discards for each Northeast multispecies stock with no greater than a 30-percent coefficient of variation, but Amendment 23 will change the structure starting in 2023.

5.3 Canadian Pacific Individual Vessel Quota Program

DFO has in the past administered the “Costs and Earnings Survey” to collect information, but low response rates made efforts in years leading up to 2008 unsuccessful. In 2008, with DFO’s Pacific Region Economic Analysis Unit guidance, and industry participation, Stuart Nelson was retained to develop a methodology to assess the financial situation of several commercial fleets for the 2007 calendar year (Nelson, 2009). Additional fleet profiles were added to the series in 2011. Discussions with Bruce Turris indicated that DFO has undertaken an updated data collection with good response rates. Information from that survey were not available when this document was drafted. As a result, much of the information in this analysis relies on data collected by Nelson (2011) for the fleet profiles he developed for the 2009 fishing year. Direct

[26] https://s3.amazonaws.com/nefmc.org/Sector-Program-Review_Final-May2021.pdf

comparisons across years are not made for the Canada profiles, based on the advice of the author. This also means that baseline data, prior to development IVQ program, are not provided.

The author noted that while all profiles are part of the series, there are important methodological differences between the studies in terms of the data used, the quantity of data used in generating estimates, and the presentation of results. Nelson stated that "while ***results within a single study are comparable, users should use caution when making comparisons between studies,*** including between years." In addition the author cautions that values within the studies were not based on a census or always even a statistically validated sample. "Consequently, it is best to view the reports as providing a range of estimates validated by the informed judgement of the authors. Users should not use these numbers without thoughtful consideration." With those caveats, cost information data and the authors used a variety of sources, contacts and professional judgement to develop costs estimates. Fixed costs may or may not allocate between fisheries when vessels participated in more than one fishery. The degree of cost aggregation by cost categories are consistent across reports, but were based on the fisheries examined and the level of information available.

Other sources of data provided on government websites but that information only focused on landings and revenue[27]. Also, this past year DFO reportedly conducted another mandatory cost and earnings survey. Response rates were reported to be good, but published results were not available for this paper.

The groundfish trawl license (T license) renewal fee for 2022/2023 is based on the combination of a base license fee of $521.22 and the Permanent IVQ holdings of the license on February 20th . The IVQ fee portion of the license renewal cost for 2022/2023 is shown in Table 5-3. In accordance with the Service Fees Act, the annual license renewal fees are adjusted by the annual rate of inflation as determined by the Consumer Price Index (CPI) published by Statistics Canada.

[27] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/statistics/industry-and-sector-profiles/sector-reports/british_columbias_fisheries_and_aquaculture_sector_2016_edition.pdf. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/336686.pdf

Table 5-3 Trawl vessel license renewal fee for 2022/2023

IVQ species	Fee per ton of IVQ	Fee per pound of IVQ
All rockfish species	$ 15.64	$ 0.01
All sole species	$ 16.68	$ 0.01
Lingcod	$ 16.68	$ 0.01
Pollock	$ 7.82	$ 0.00
Hake	$ 4.17	$ 0.00

Source: https://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/fees-frais-22-23-eng.html#groundfish

Figure 5-9 shows the percentage of cost and earnings in the BC IVQ fishery as a percentage of total ex-vessel revenue. Not all costs are included in the calculation, so the reported earnings over-estimates the total profit for the vessels.

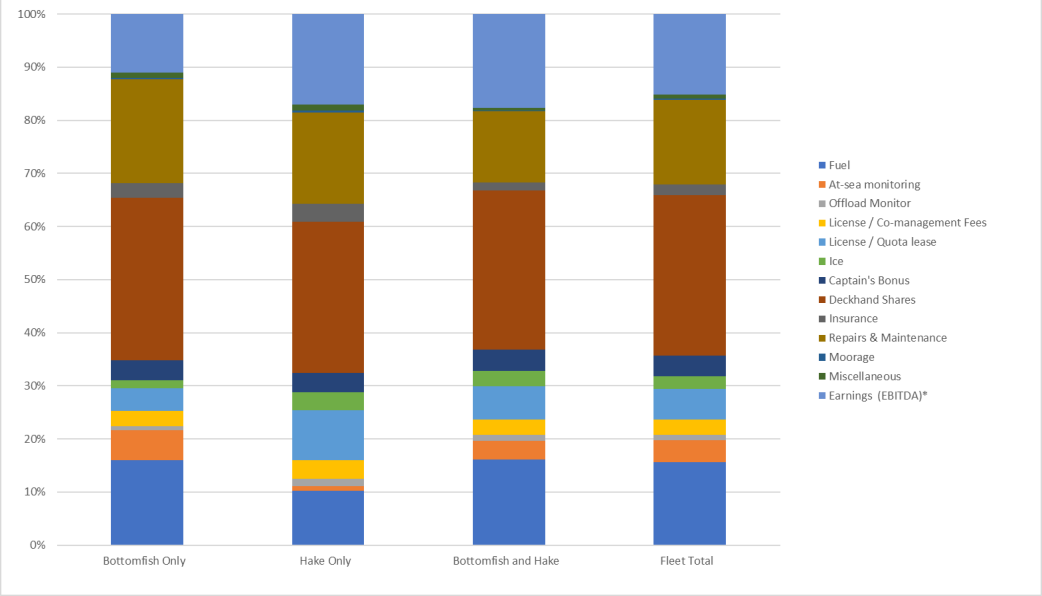

Figure 5-9 Percent of ex-vessel costs and net revenue associated relative to total revenue, 2009

Source: Nelson 2011

Figure 5-10 provides similar information, but the data are shown in real 2020 dollars as opposed to percentage. The figure is provided to show the difference in cost and earnings by value and not percentage.

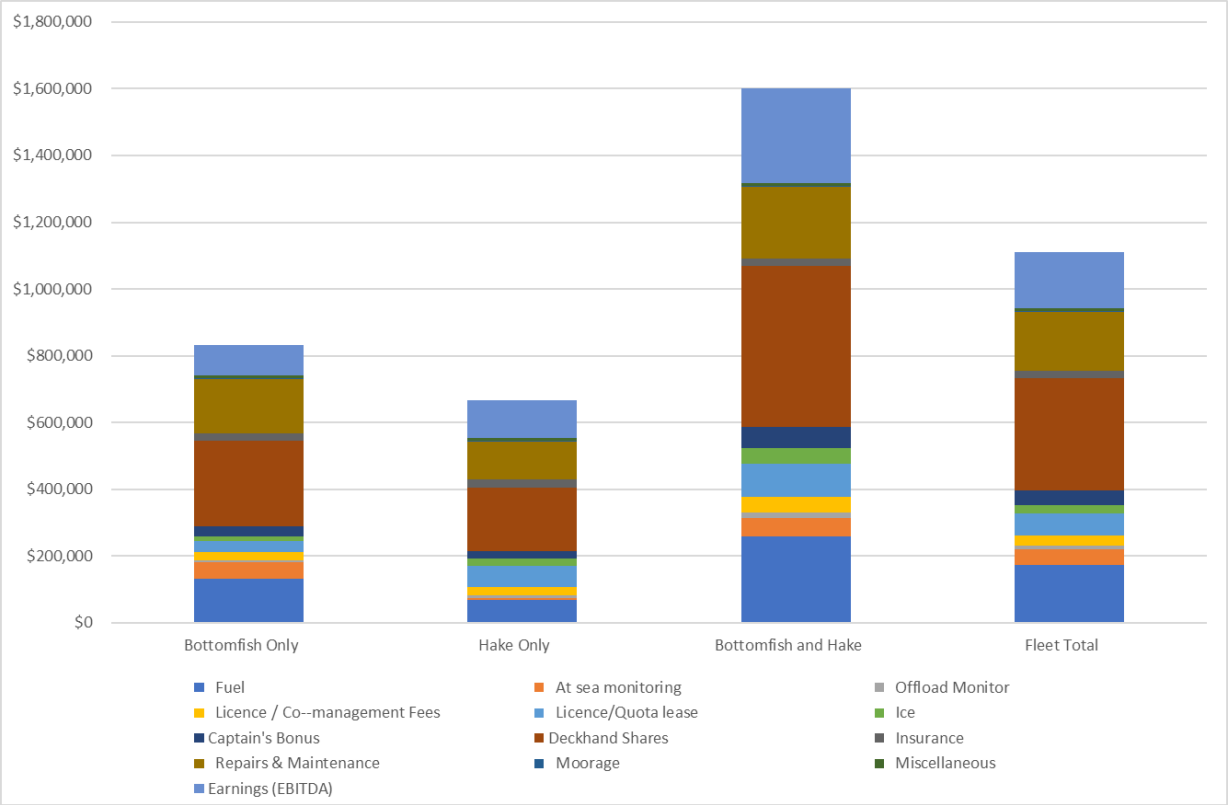

Figure 5-10 BC cost by fishery and expense group and earnings, 2009

Source: Nelson 2011

Error! Not a valid bookmark self-reference. shows the most recent cost data available for the BC trawl fishery. As noted, more recent information may be available soon, and the result of a recent survey. **Because the data are dated, the information is provided for reference with the hope that it can be updated with information from the recent survey for the final draft.**

Table 5-4 British Columbia Groundfish Trawl Fleet Costs from 2011 (converted to 2020 U.S. $)

Groundfish Trawl Fleet	Bottomfish Only	Hake Only	Bottomfish and Hake	Fleet Total
Vessels (count)	31	8	25	64
Landings (lb.) – All Species	1,094,591	3,872,780	4,984,328	2,961,293
Vessel Price (per Lb)	$0.50	$0.11	$0.21	$0.24
Gross Revenue (Gross Stock)	$832,939	$666,815	$1,599,907	$1,111,771
Less: Fishery Specific Expenses				
Fuel	$133,097	$68,557	$257,729	$173,714
At sea monitoring	$47,271	$5,142	$56,738	$45,703
Offload Monitor	$6,253	$9,834	$16,740	$10,797
License / Co--management Fees	$24,098	$23,433	$46,229	$32,660
License/Quota lease	$34,996	$62,430	$100,318	$63,942

Ice	$12,409	$22,852	$46,309	$26,957
Bait	$0	$0	$0	$0
Gear Maintenance/replace	$0	$0	$0	$0
Total Fishery Specific Expenses	$258,125	$192,248	$524,063	$353,772
Net Revenue (Net Stock)	$574,814	$474,567	$1,075,845	$757,998
Less:				
Captain's Bonus	$32,064	$23,728	$64,104	$43,537
Deckhand Shares	$255,040	$189,827	$481,001	$335,154
Fishery Contribution (Boat Share)	$287,711	$261,012	$530,739	$379,307
Vessel Fixed Expenses				
Insurance	$22,852	$22,852	$22,852	$22,852
Repairs & Maintenance	$162,178	$114,262	$214,812	$176,749
Moorage	$3,047	$3,047	$3,047	$3,047
Miscellaneous	$7,617	$7,617	$7,617	$7,617
Total Vessel Expenses	$195,695	$147,779	$248,329	$210,266
Earnings (EBITDA)	$92,016	$113,233	$282,410	$169,041

Source: Nelson, 2011

5.4 Alaska Trawl Catch Share Programs

Certain catch share fisheries under the authority of the NPFMC are currently (or have been) subject to reporting economic data (costs). Revenue information is collected through other reports and not described here. Each fishery has different Economic Data Report (EDR) requirements. The only catcher vessel trawl fisheries that have EDRs are the GOA trawl fishery and the AFA fishery. Also note that the NPFMC is considering restructuring all the EDRs to collect limited, but similar information, for all fisheries (NPFMC 2023).

The GOA trawl fishery EDR collects information on fuel and fluids purchased, fishing gear costs, excluder device cost, and captain and crew cost and license information. No other fishing cost information is collected from the fleet.

AFA EDRs focuses on Chinook salmon bycatch and measures employed to avoid catching Chinook incidentally to pollock harvests. A fuel survey is also collected that collects information on the average rate of fuel consumption, annual fuel purchase (in dollars and gallons). Fuel information excludes lubrication and fluids costs other than fuel. Because of the limited cost information collected under these reports, it is not used to compare costs in this study. However, the costs of collecting those data are presented.

Table 5-5 outlines the historic administrative costs associated with EDR data collection and the cost recovery paid by participants of rationalized programs to fund these administrative costs. The GOA Trawl program will no longer be active in 2023 and the costs associated with the crab EDR program have significantly declined with the removal of third-party audits.

Table 5-5 Cost Recovery and PSMFC Administrative Costs of the Alaska EDR Programs

Program/Year	*Crab*[1]	*A80*	*AFA*[2]	*Cost Recovery Total*	*GOA Trawl*[3]	*Total EDR cost*
2005	$150,000			$150,000		$150,000
2006	$150,000			$150,000		$150,000
2007	$259,938			$259,938		$259,938
2008	$338,276			$338,276		$338,276
2009	$314,303			$314,303		$314,303
2010	$352,508			$352,508		$352,508
2011	$323,588			$323,588		$323,588
2012	$373,316			$373,316		$373,316
2013	$318,278			$318,278		$318,278
2014	$342,703			$342,703		$342,703
2015	$269,583			$269,583	$53,771	$323,354
2016	$345,509	$88,254	$62,114	$495,877	$73,221	$569,098
2017	$180,168	$91,482	$66,929	$338,579	$91,879	$430,458
2018	$202,012	$92,462	$40,631	$335,105	$61,765	$396,870
2019	$180,224	$87,644	$56,989	$324,857	$57,486	$382,343
2020	$91,620	$72,976	$48,194	$212,791	$107,459	$320,250
2021	$72,927	$85,123	$52,735	$210,786	$73,240	$284,026

Source: EDR Amendment Final Action (February 2022)[28]

1 The year listed in this table reflects the first year of the crab fishing season.

2 Only includes costs associated with the inshore sector

3 Only includes PSMFC administrative costs

PSMFC is the Data Collection Agent for the EDRs. The costs of the EDR efforts are primarily borne by AFSC. Catch-share programs have cost recovery requirements that may be used to

[28] https://meetings.npfmc.org/CommentReview/DownloadFile?p=9409e0da-1e1a-4e07-9654-1b49cafebac6.pdf&fileName=D5%20Universal%20Data%20Collection%20Discussion%20Paper.pdf

support EDR programs. EDRs are funded through NMFS' Data Collection Grant which is then passed on to PSMFC. AFSC manages the grant and oversees PSMFCs scope of work for each of the EDR projects. PSMFC submits expenditure reports to NMFS (NPFMC 2023). Copies of the data collection instruments are available on the PSMFC website[29].

In addition to agency costs, industry also realizes costs preparing and submitting EDRs. To estimate the cost to the industry cost per hour and number of hours to complete the forms are needed. Based on Paperwork Reduction Act reports, an estimate of $37 per hour for small vessel operators to complete the form was used as the low end of the range. The estimate of $37 per hour has not been systematically validated through surveys. The upper estimate for the hourly expense identified for EDRs was $165 per hour for the crab EDR and $75 per hour for the AFA EDR based on comments received on past EDR renewals. The Amendment 80 EDR is estimated to take 22 hours and the crab EDR is estimated to take 20 hours. While the GOA Trawl EDR form was estimated to take 15 hours (NPFMC 2023).

5.5 Summary Comparison of Costs

A direct comparison of a time series of costs and total net revenues in the fisheries cannot be provided because of a lack of considered should be viewed with caution, because of the fixed cost data for the Northeast Groundfish Sector program and both variable and fixed costs for the BC IVQ program. As noted, the Northeast Groundfish Sector program is implementing an updated fixed cost survey. Information from that study may inform the current conditions, but will not provide a time series of data. Recall the most recent fixed cost survey data are from 2015 and the response rates were low. The BC IVQ program is also reportedly undertaking a survey to update cost information. Data from that survey may also update the current conditions in that fishery. Surveys for that fishery were last conducted for the 2009 fishing year. The West Coast data are much more current and complete. Information in this draft of the study was provided for the 2009 through 2020 fishing years. It is anticipated that the 2021 will be available and can be included in the final draft.

There have been many changes in the fisheries since 2009 and 2015. While the data from the Northeast Groundfish Program and the BC IVQ program were updated to real 2020 dollars and the BC IVQ program data was converted to U.S. dollars using an average 2020 exchange rate, those changes do not capture the fundamental, underlying changes in the economy and fish markets specifically, that could impact changes in costs and net revenue.

[29] https://www.psmfc.org/edr/

Table 5-6 Revenue minus variable costs by fishery (millions of 2020 U.S. $)

Fishery	Species Groups	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WC CV	Gf. fixed gear w/ trawl end.	$0.028	$0.087	$0.192	$0.113	$0.108	$0.143	$0.141	$0.190	$0.205	$0.136	$0.128	$0.056
WC CV	Gf with trawl gear	$0.122	$0.109	$0.179	$0.171	$0.188	$0.173	$0.209	$0.242	$0.286	$0.201	$0.195	$0.096
WC CV	Whiting	$0.123	$0.239	$0.655	$0.513	$0.738	$0.561	$0.248	$0.387	$0.611	$0.497	$0.579	$0.337
WC CV	Trawl catch share fisheries	$0.148	$0.173	$0.364	$0.296	$0.378	$0.324	$0.242	$0.314	$0.425	$0.331	$0.371	$0.219
WC MS	Whiting	$1.368	$2.085	$2.216	$1.672	$1.995	$2.753	$1.784	$2.207	$3.836	$2.869	$1.883	na
WC CP	Whiting	$4.356	$6.589	$3.956	$3.391	$4.900	$7.104	$4.201	$5.748	$6.589	$6.638	$7.783	$7.133
WC Shoreside Processor (gf prod)		$1.658	$1.201	$1.840	$1.528	$1.406	$1.424	$0.639	$0.663	$1.255	$2.712	$1.919	$2.616
NE Sector Groundfish		$0.210	$0.296			$0.283		$0.364					
BC IVQ Bottomfish Only		$0.288											
BC IVQ Hake Only		$0.261											
BC IVQ Bottomfish and Hake		$0.531											
BC IVQ Fleet Total		$0.379											

Sources: FISHEyE, NE Sector 5-year review, Nelson 2021.

Discussions with stakeholders, Section 4.0, indicated that two of their primary cost concerns were monitoring costs and cost recovery fees. IFQ stakeholders expressed the greatest concern with cost recovery fees in the West Coast Groundfish Program. As shown in Table 5-7, the structure of the program and the federal regulation have a substantial impact on the costs. All West Coast catch share fisheries (including the BC program) require industry to pay for 100% shoreside and at-sea monitoring coverage. The NE Sector program has recently changed the monitoring coverage target to 100% of sector trips, but that is dependent on federal funding to cover the monitoring costs. Federal funding has reimbursed industry for the costs in all previous year.

Table 5-7 Comparison of monitoring and cost recovery fee structures

Cost	WC IFQ	WC MS & CP	NE Sectors	BC IVQ
Monitoring	100% at-sea & shoreside (1 observer/monitor) with EM option for at-sea whiting vessels. Costs are paid for by industry other than limited EM funding.	100% at-sea (2 monitors/observers). Costs are 100% industry funded.	Prior to 2023, coverage levels were set to achieve a coefficient of variation in catch estimates of 30. Amendment 23 to the Multi-species Groundfish FMP increased coverage to 100%, dependent on available federal funding. Federal funding sources through the current year pay for monitoring coverage.	The BC IVQ program operates under different regulatory requirements. The fleet is required to maintain 100% at-sea and shoreside coverage. All at-sea vessels are currently using EM to monitor catch. Costs are all borne by the fishing industry.
Cost Recovery	NMFS has more of the day-to-day management of the IFQ fishery. Including individual allocations, transfers between, IFQ holders, managing quota overages/underages, data collection for more vessels and processors, etc. The structure of the program results in the sector paying the maximum fee of 3% of the ex-vessel value each year.	The MS and catcher-processor sectors operate under a cooperative structure that allows for more self-management of allocations within cooperatives. The structure differences from the IFQ program and the fewer vessels resulted in a cost recovery fee of 0.1% of the allocated species ex-vessel value for the catcher-processor cooperative program and	The Northeast Sector program is not subject to cost recovery, because NMFS has determined that the Sector program did not meet definition of a LAPP.	The BC IVQ recovers some costs through the annual license fee. That fee is based on a flat rate plus a charge for each pound of quota assigned to the license.

		1.7% for the mothership cooperative Program.		

Some of the costs of the program are recovered in the West Coast fisheries and the BC IVQ program, using different methods. However, NMFS concluded that the Northeast Multispecies Sector Program is not a limited access privilege program. Consequently, the LAPP provision of the MSA—which requires a cost recovery program be implemented for the costs of management, data collection and analysis, and enforcement activities—does not apply to the Northeast Multispecies Sector Program. NMFS made a similar finding for the Alaska Freezer Longline Sector's voluntary cooperative program. In that case, NMFS determined the sector was not given an exclusive harvest privilege in terms of a permit (MSA Section 303A(b)(1).

6.0 CONCLUSION AND POTENTIAL FUTURE STEPS

This section will be updated after receiving feedback from the Council and other stakeholders at the April 2023 meeting.

An overall conclusion of the study is that all West Coast groundfish catch share fisheries have been successful at reducing bycatch and establishing monitoring requirements that allow catch and discards to be accurately accounted as required in Section 303A of the MSA. Achieving these goals has been an important component of rebuilding stock that were overfished prior to implementation of the catch share program. This was a primary objective of the Council when implementing the catch share program.

The economic efficiency goals of the program have had mixed results. The whiting fisher, in general, has allow harvesters to operate profitably, based on FISHEyE data. Some owners of catch vessel's that are not vertically integrated with the mothership have indicated that the program has not allowed them to fully harvest their allocation, because not enough markets are available to deliver their catch. In their opinion, the program has failed to achieve its OY objective. Harvesting a fraction of their allocation has reduced potential profits. Catcher vessels operating in the shoreside whiting fishery are also concerned about markets, but most indicated there are several shoreside buyers. Catcher-processors did not provide any feedback related to program concerns. Shoreside processors are concerned about the quality if whiting being delivered and how that impacts their final products. They are also concerned about the limited availability of fresh markets. All participants noted that the structure of the fishery has made it difficult to develop and maintain fresh markets in both whiting and groundfish.

Participants in the IFQ groundfish fishery have noted the lack of infrastructure to support their fishery as well as the lack of markets. Larger trawl vessel operators in California, in particular, have indicated that the program has not improved their economic conditions. Many of the vessel operators in this category have exited the fishery or feel trapped in the fishery with no way to exit the fishery and pay off their fishery related debts. Other groundfish vessel operators have also expressed concern with the additional costs associated with the IFQ program and that revenue increases have not covered the higher costs. Costs directly related to the IFQ program often cited by stakeholders are the monitoring costs, cost recovery fees, and quota leasing/purchase costs. Groundfish participants also note the cost of the buyback program, is problematic, even though the fee percentage has declined in recent years.

Specific recommendations provided by stakeholders are listed in Section 4.4. Some of the recommendations are outside the scope of this paper and could have broader biological implications (e.g., removing stripetail rockfish from the shelf rockfish group). Other recommendations are specific and include:

- revisiting monitoring requirements, including the use of EM for shoreside monitoring,
- considering methods to account for the weight of ice when off-loading fish to improve whiting product quality,
- limiting the economic data collections to those that are required,
- consider program revisions that would allow allocations to be more fully harvested,
- modify program provisions to support the development of higher valued, fresh markets,
- eliminate the use of crucifiers,
- allow species conversion as done in the soft caps for the BC fishery, and
- remove or loosen vessel caps so vessels can continue to fish with greater flexibility.

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8.0 APPENDIX OF DATA

8.1 Detailed FISHEyE Data Tables

All cost data presented in the tables are derived from the economic reports. These data are also reported in the NMFS FISHEyE data tool available online. Vessel counts are also from that data and are based on vessels subject to the annual cost reports. Revenue data are derived from PacFIN data aggregations.

At the time the data were summarized, cost information was only available through the 2020 fishing year. Caution should be used when considering 2020 data because of the impacts that COVID-19 had on the fishery and the economy in general. Data for the 2021 fishery may be available when the final report is developed. If it is available, the tables will be updated to reflect the most recent information. Updating the data may result in minor changes to previous year's information.

8.1.1 Catcher vessels mean cost and revenues by vessel length in the Catch Share Fisheries

Table 8-1 Catcher vessel counts in catch share program by length category, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Whiting vessels													
Large vessel (> 80 ft)	30	31	25	24	25	26	24	25	25	26	29	29	27
Medium vessel (> 60 ft, <= 80 ft)	11	10	6	5	4	4	2	3	4	4	3	4	5
Small vessel (<= 60 ft)	0	0	0	0	0	0	0	0	0	0	0	0	0
Whiting vessels Total	41	41	31	29	29	30	26	28	29	30	32	33	32
Non-whiting vessels													
Large vessel (> 80 ft)	6	6	7	7	5	4	5	5	5	6	6	7	6
Medium vessel (> 60 ft, <= 80 ft)	44	44	44	43	42	40	41	40	40	37	37	29	40
Small vessel (<= 60 ft)	47	39	31	31	29	27	24	24	25	27	23	18	29
Non-whiting vessels Total	97	89	82	81	76	71	70	69	70	70	66	54	75
All vessels													
Large vessel (> 80 ft)	36	37	32	31	30	30	29	30	30	32	35	36	32
Medium vessel (> 60 ft, <= 80 ft)	55	54	50	48	46	44	43	43	44	41	40	33	45
Small vessel (<= 60 ft)	47	39	31	31	29	27	24	24	25	27	23	18	29
All vessels Total	138	130	113	110	105	101	96	97	99	100	98	87	106

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435

Table 8-2 Catcher vessel mean net revenue (millions of 2020 $) from the catch share program, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.003	0.052	0.321	0.177	0.455	0.251	0.130	0.259	0.483	0.355	0.268	0.171	0.028	0.286
Medium vessel (> 60 ft, <= 80 ft)	0.063	0.059	0.278	0.008	0.360	0.177	conf.	0.152	0.433	0.285	0.274	0.247	0.062	0.256
Small vessel (<= 60 ft)														
Whiting vessels Total	0.019	0.054	0.313	0.148	0.441	0.241	conf.	0.248	0.476	0.345	0.268	0.180	0.037	0.298
Non-whiting vessels														
Large vessel (> 80 ft)	0.017	0.076	0.204	0.085	0.251	0.251	0.406	0.375	0.367	0.355	0.322	-0.646	0.046	0.168
Medium vessel (> 60 ft, <= 80 ft)	0.040	0.035	0.096	0.091	0.111	0.123	conf.	0.151	0.208	0.133	0.132	0.092	0.038	0.126
Small vessel (<= 60 ft)	0.027	0.039	0.090	0.052	0.064	0.088	0.086	0.140	0.131	0.087	0.106	0.039	0.033	0.088
Non-whiting vessels Total	0.033	0.039	0.103	0.076	0.102	0.117	conf.	0.164	0.192	0.135	0.141	-0.021	0.036	0.114
All vessels														
Large vessel (> 80 ft)	0.005	0.056	0.296	0.156	0.421	0.251	0.178	0.279	0.463	0.355	0.277	0.012	0.031	0.265
Medium vessel (> 60 ft, <= 80 ft)	0.045	0.039	0.118	0.083	0.132	0.128	0.126	0.151	0.228	0.148	0.143	0.111	0.042	0.137
Small vessel (<= 60 ft)	0.027	0.039	0.090	0.052	0.064	0.088	0.086	0.140	0.131	0.087	0.106	0.039	0.033	0.088
All vessels Total	0.029	0.044	0.161	0.095	0.196	0.154	0.132	0.188	0.275	0.198	0.182	0.055	0.036	0.164

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435.
Note: Conf. indicates that the data is considered confidential and cannot be reported because fewer than three entities provided the information.

Table 8-3 Catcher vessel mean ex-vessel revenue (millions of 2020 $) from the catch share program, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.471	0.726	1.436	1.352	1.610	1.483	0.804	1.096	1.525	1.410	1.462	0.972	0.600	1.315
Medium vessel (> 60 ft, <= 80 ft)	0.568	0.511	1.136	0.953	1.301	1.266	conf.	0.663	1.218	0.946	1.141	0.792	0.541	1.114
Small vessel (<= 60 ft)														
Whiting vessels Total	0.497	0.673	1.378	1.283	1.567	1.454	conf.	1.049	1.483	1.348	1.432	0.951	0.585	1.343
Non-whiting vessels														
Large vessel (> 80 ft)	0.348	0.439	0.528	0.326	0.654	0.637	0.820	0.946	0.990	0.739	0.671	0.472	0.393	0.655
Medium vessel (> 60 ft, <= 80 ft)	0.377	0.354	0.460	0.443	0.442	0.459	conf.	0.460	0.543	0.437	0.411	0.310	0.366	0.443
Small vessel (<= 60 ft)	0.196	0.189	0.315	0.240	0.237	0.286	0.313	0.393	0.398	0.295	0.308	0.224	0.193	0.300
Non-whiting vessels Total	0.287	0.288	0.411	0.355	0.378	0.403	conf.	0.472	0.523	0.408	0.399	0.302	0.288	0.408
All vessels														
Large vessel (> 80 ft)	0.450	0.679	1.237	1.120	1.450	1.370	0.807	1.071	1.436	1.284	1.326	0.875	0.566	1.195
Medium vessel (> 60 ft, <= 80 ft)	0.416	0.383	0.541	0.496	0.517	0.533	0.489	0.474	0.605	0.487	0.466	0.368	0.400	0.502
Small vessel (<= 60 ft)	0.196	0.189	0.315	0.240	0.237	0.286	0.313	0.393	0.398	0.295	0.308	0.224	0.193	0.300
All vessels Total	0.350	0.409	0.676	0.600	0.706	0.716	0.541	0.639	0.804	0.690	0.736	0.548	0.379	0.667

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-4 Catcher vessel mean fixed costs (millions of 2020 $) in catch share program by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.209	0.275	0.416	0.421	0.355	0.360	0.182	0.202	0.215	0.236	0.380	0.216	0.243	0.298
Medium vessel (> 60 ft, <= 80 ft)	0.200	0.147	0.292	0.356	0.334	0.338	conf.	0.124	0.165	0.153	0.292	0.138	0.175	0.265
Small vessel (<= 60 ft)														
Whiting vessels Total	0.207	0.244	0.392	0.410	0.352	0.358	conf.	0.193	0.208	0.225	0.372	0.207	0.226	0.306
Non-whiting vessels														
Large vessel (> 80 ft)	0.079	0.107	0.096	0.085	0.112	0.132	0.101	0.192	0.225	0.086	0.074	0.555	0.093	0.172
Medium vessel (> 60 ft, <= 80 ft)	0.099	0.093	0.109	0.101	0.077	0.061	conf.	0.073	0.071	0.054	0.053	0.046	0.096	0.073
Small vessel (<= 60 ft)	0.051	0.039	0.069	0.062	0.042	0.033	0.047	0.050	0.078	0.048	0.044	0.045	0.046	0.052
Non-whiting vessels Total	0.074	0.070	0.093	0.084	0.066	0.054	conf.	0.074	0.085	0.055	0.052	0.112	0.072	0.075
All vessels														
Large vessel (> 80 ft)	0.188	0.248	0.346	0.345	0.315	0.330	0.168	0.200	0.217	0.208	0.328	0.282	0.218	0.275
Medium vessel (> 60 ft, <= 80 ft)	0.119	0.103	0.131	0.127	0.099	0.086	0.074	0.077	0.080	0.064	0.071	0.057	0.111	0.089
Small vessel (<= 60 ft)	0.051	0.039	0.069	0.062	0.042	0.033	0.047	0.050	0.078	0.048	0.044	0.045	0.046	0.052
All vessels Total	0.114	0.125	0.175	0.170	0.145	0.144	0.095	0.108	0.121	0.106	0.156	0.148	0.119	0.138

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-5 Catcher vessel mean variable costs (millions of 2020 $) in catch share program by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.258	0.398	0.696	0.751	0.797	0.869	0.493	0.634	0.827	0.819	0.814	0.586	0.329	0.729
Medium vessel (> 60 ft, <= 80 ft)	0.305	0.305	0.565	0.589	0.607	0.751	conf.	0.387	0.621	0.508	0.574	0.406	0.305	0.592
Small vessel (<= 60 ft)														
Whiting vessels Total	0.271	0.375	0.671	0.723	0.770	0.853	conf.	0.608	0.798	0.778	0.792	0.564	0.323	0.738
Non-whiting vessels														
Large vessel (> 80 ft)	0.253	0.255	0.227	0.156	0.291	0.253	0.314	0.379	0.398	0.298	0.272	0.563	0.254	0.315
Medium vessel (> 60 ft, <= 80 ft)	0.238	0.227	0.255	0.251	0.255	0.275	conf.	0.236	0.264	0.250	0.225	0.172	0.233	0.244
Small vessel (<= 60 ft)	0.117	0.111	0.155	0.126	0.130	0.166	0.180	0.203	0.188	0.160	0.158	0.141	0.114	0.160
Non-whiting vessels Total	0.180	0.178	0.215	0.195	0.210	0.232	conf.	0.235	0.246	0.219	0.206	0.212	0.179	0.219
All vessels														
Large vessel (> 80 ft)	0.258	0.374	0.593	0.617	0.712	0.787	0.462	0.592	0.755	0.721	0.721	0.581	0.317	0.654
Medium vessel (> 60 ft, <= 80 ft)	0.252	0.241	0.292	0.286	0.285	0.318	0.289	0.246	0.296	0.275	0.251	0.200	0.246	0.277
Small vessel (<= 60 ft)	0.117	0.111	0.155	0.126	0.130	0.166	0.180	0.203	0.188	0.160	0.158	0.141	0.114	0.160
All vessels Total	0.207	0.240	0.340	0.334	0.365	0.417	0.314	0.342	0.408	0.387	0.397	0.346	0.223	0.365

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-6 Catcher vessel mean observer and EM costs (millions of 2020 $) in catch share program by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.002	0.003	0.005	0.009	0.014	0.022	0.016	0.016	0.016	0.013	0.013	0.010	0.003	0.013
Medium vessel (> 60 ft, <= 80 ft)	0.002	0.004	0.005	0.009	0.016	0.025	conf.	0.021	0.033	0.007	0.013	0.010	0.003	0.015
Small vessel (<= 60 ft)														
Whiting vessels Total	0.002	0.003	0.005	0.009	0.014	0.022	conf.	0.017	0.018	0.012	0.013	0.010	0.003	0.014
Non-whiting vessels														
Large vessel (> 80 ft)	0.000	0.000	0.002	0.004	0.017	0.014	0.033	0.035	0.033	0.030	0.031	0.032	0.000	0.022
Medium vessel (> 60 ft, <= 80 ft)	0.000	0.000	0.003	0.006	0.012	0.016	conf.	0.020	0.023	0.023	0.021	0.019	0.000	0.015
Small vessel (<= 60 ft)	0.000	0.000	0.003	0.004	0.007	0.011	0.015	0.021	0.017	0.014	0.016	0.020	0.000	0.012
Non-whiting vessels Total	0.000	0.000	0.003	0.005	0.011	0.014	conf.	0.022	0.022	0.020	0.020	0.021	0.000	0.015
All vessels														
Large vessel (> 80 ft)	0.002	0.003	0.005	0.008	0.015	0.021	0.019	0.020	0.018	0.016	0.016	0.014	0.002	0.015
Medium vessel (> 60 ft, <= 80 ft)	0.000	0.001	0.003	0.006	0.013	0.017	0.022	0.020	0.024	0.021	0.020	0.018	0.001	0.016
Small vessel (<= 60 ft)	0.000	0.000	0.003	0.004	0.007	0.011	0.015	0.021	0.017	0.014	0.016	0.020	0.000	0.012
All vessels Total	0.001	0.001	0.003	0.006	0.012	0.016	0.019	0.020	0.021	0.018	0.018	0.017	0.001	0.015

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-7 Catcher vessel mean cost recovery fees (millions of 2020 $) for catch share program vessels by vessel length 2014 through 2020

	2014	2015	2016	2017	2018	2019	2020	Average 2014-20
Whiting vessels								
Large vessel (> 80 ft)	0.041	0.020	0.032	0.031	0.028	0.031	0.021	0.030
Medium vessel (> 60 ft, <= 80 ft)	0.037	conf.	0.020	0.036	0.028	0.033	0.023	0.028
Small vessel (<= 60 ft)								
Whiting vessels Total	0.040	conf.	0.031	0.032	0.028	0.032	0.021	0.031
Non-whiting vessels								
Large vessel (> 80 ft)	0.019	0.025	0.028	0.030	0.022	0.019	0.014	0.021
Medium vessel (> 60 ft, <= 80 ft)	0.014	conf.	0.014	0.016	0.013	0.012	0.009	0.012
Small vessel (<= 60 ft)	0.009	0.009	0.012	0.012	0.009	0.009	0.007	0.009
Non-whiting vessels Total	0.012	conf.	0.014	0.016	0.012	0.012	0.009	0.012
All vessels								
Large vessel (> 80 ft)	0.038	0.021	0.031	0.031	0.027	0.029	0.020	0.028
Medium vessel (> 60 ft, <= 80 ft)	0.016	0.015	0.014	0.018	0.015	0.013	0.011	0.014
Small vessel (<= 60 ft)	0.009	0.009	0.012	0.012	0.009	0.009	0.007	0.009
All vessels Total	0.020	0.015	0.019	0.020	0.017	0.018	0.014	0.017

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-8 Catcher vessel mean buyback fees (millions of 2020 $) for catch share program vessels by vessel length 2014 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting														
Large vessel (> 80 ft)	0.021	0.033	0.076	0.072	0.088	0.080	0.037	0.058	0.076	0.062	0.058	0.031	0.027	0.063
Medium vessel (> 60 ft, <= 80 ft)	0.028	0.026	0.057	0.052	0.066	0.064	Conf.	0.033	0.061	0.043	0.046	0.028	0.027	0.054
Small vessel (<= 60 ft)														
Vessel length class	0.023	0.031	0.073	0.069	0.085	0.077	Conf.	0.055	0.074	0.060	0.057	0.031	0.027	0.065
Non-whiting														
Large vessel (> 80 ft)	0.017	0.022	0.026	0.016	0.033	0.032	0.041	0.047	0.050	0.033	0.027	0.017	0.020	0.031
Medium vessel (> 60 ft, <= 80 ft)	0.019	0.018	0.023	0.022	0.022	0.023	Conf.	0.023	0.027	0.020	0.016	0.011	0.018	0.021
Small vessel (<= 60 ft)	0.010	0.009	0.016	0.012	0.012	0.014	0.016	0.020	0.020	0.013	0.012	0.008	0.010	0.014
Vessel length class	0.014	0.014	0.020	0.018	0.019	0.020	Conf.	0.024	0.026	0.018	0.016	0.011	0.014	0.019
All vessels														
Large vessel (> 80 ft)	0.020	0.031	0.066	0.060	0.079	0.073	0.038	0.056	0.071	0.057	0.053	0.028	0.026	0.058
Medium vessel (> 60 ft, <= 80 ft)	0.021	0.019	0.027	0.025	0.026	0.027	0.024	0.024	0.030	0.022	0.019	0.013	0.020	0.024
Small vessel (<= 60 ft)	0.010	0.009	0.016	0.012	0.012	0.014	0.016	0.020	0.020	0.013	0.012	0.008	0.010	0.014
Vessel length class	0.017	0.020	0.035	0.031	0.037	0.037	0.026	0.033	0.040	0.031	0.029	0.018	0.018	0.032

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Table 8-9 Catcher vessel mean fuel usage (millions of 2020 $) for catch share program vessels by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.083	0.147	0.199	0.244	0.203	0.227	0.145	0.158	0.179	0.244	0.192	0.117	0.115	0.190
Medium vessel (> 60 ft, <= 80 ft)	0.085	0.108	0.201	0.209	0.214	0.257	conf.	0.091	0.146	0.145	0.170	0.119	0.096	0.187
Small vessel (<= 60 ft)														
Whiting vessels Total	0.083	0.137	0.199	0.238	0.204	0.231	conf.	0.151	0.175	0.231	0.190	0.117	0.110	0.195
Non-whiting vessels														
Large vessel (> 80 ft)	0.106	0.081	0.080	0.060	0.131	0.072	0.066	0.059	0.079	0.063	0.065	0.194	0.093	0.089
Medium vessel (> 60 ft, <= 80 ft)	0.051	0.057	0.059	0.059	0.061	0.053	conf.	0.024	0.031	0.036	0.035	0.024	0.054	0.043
Small vessel (<= 60 ft)	0.025	0.026	0.029	0.032	0.032	0.028	0.019	0.019	0.020	0.022	0.022	0.024	0.025	0.025
Non-whiting vessels Total	0.041	0.045	0.049	0.049	0.054	0.045	conf.	0.025	0.031	0.033	0.033	0.046	0.043	0.041
All vessels														
Large vessel (> 80 ft)	0.083	0.132	0.167	0.198	0.183	0.202	0.127	0.137	0.157	0.205	0.166	0.126	0.107	0.167
Medium vessel (> 60 ft, <= 80 ft)	0.055	0.063	0.070	0.069	0.068	0.063	0.039	0.026	0.037	0.042	0.041	0.030	0.059	0.050
Small vessel (<= 60 ft)	0.025	0.026	0.029	0.032	0.032	0.028	0.019	0.019	0.020	0.022	0.022	0.024	0.025	0.025
All vessels Total	0.052	0.071	0.086	0.095	0.091	0.095	0.060	0.059	0.069	0.089	0.081	0.069	0.061	0.080

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-10 Catcher vessel mean labor cost (million of 2020 $) by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.147	0.211	0.432	0.443	0.505	0.503	0.268	0.365	0.521	0.469	0.514	0.391	0.180	0.442
Medium vessel (> 60 ft, <= 80 ft)	0.202	0.187	0.432	0.447	0.536	0.619	conf.	0.330	0.517	0.447	0.560	0.346	0.195	0.494
Small vessel (<= 60 ft)														
Whiting vessels Total	0.162	0.205	0.432	0.444	0.509	0.519	conf.	0.361	0.520	0.466	0.519	0.385	0.183	0.468
Non-whiting vessels														
Large vessel (> 80 ft)	0.161	0.201	0.134	0.082	0.184	0.181	0.197	0.268	0.269	0.187	0.155	0.144	0.181	0.173
Medium vessel (> 60 ft, <= 80 ft)	0.151	0.137	0.150	0.144	0.145	0.153	conf.	0.140	0.151	0.145	0.125	0.098	0.144	0.140
Small vessel (<= 60 ft)	0.072	0.063	0.089	0.067	0.068	0.088	0.105	0.114	0.106	0.087	0.086	0.066	0.068	0.087
Non-whiting vessels Total	0.113	0.109	0.125	0.109	0.118	0.130	conf.	0.140	0.143	0.126	0.114	0.093	0.111	0.123
All vessels														
Large vessel (> 80 ft)	0.142	0.200	0.355	0.350	0.434	0.449	0.245	0.333	0.463	0.404	0.441	0.334	0.172	0.381
Medium vessel (> 60 ft, <= 80 ft)	0.155	0.140	0.172	0.164	0.163	0.177	0.171	0.145	0.169	0.160	0.141	0.115	0.148	0.159
Small vessel (<= 60 ft)	0.072	0.063	0.089	0.067	0.068	0.088	0.105	0.114	0.106	0.087	0.086	0.066	0.068	0.087
All vessels Total	0.124	0.134	0.201	0.189	0.215	0.234	0.177	0.196	0.242	0.219	0.235	0.196	0.129	0.210

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-11 Catcher vessel mean other variable costs (million of 2020 $) by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.020	0.024	0.030	0.035	0.041	0.046	0.039	0.043	0.054	0.052	0.050	0.047	0.022	0.044
Medium vessel (> 60 ft, <= 80 ft)	0.033	0.031	0.027	0.045	0.031	0.049	conf.	0.041	0.045	0.038	0.048	0.033	0.032	0.041
Small vessel (<= 60 ft)														
Whiting vessels Total	0.024	0.026	0.029	0.036	0.039	0.046	conf.	0.043	0.053	0.050	0.050	0.045	0.025	0.044
Non-whiting vessels														
Large vessel (> 80 ft)	0.035	0.027	0.029	0.023	0.027	0.020	0.024	0.038	0.035	0.026	0.030	0.110	0.031	0.038
Medium vessel (> 60 ft, <= 80 ft)	0.026	0.024	0.029	0.029	0.023	0.025	conf.	0.022	0.024	0.022	0.024	0.019	0.025	0.024
Small vessel (<= 60 ft)	0.014	0.017	0.027	0.017	0.017	0.022	0.026	0.028	0.023	0.022	0.022	0.025	0.016	0.023
Non-whiting vessels Total	0.021	0.021	0.028	0.023	0.021	0.023	conf.	0.025	0.025	0.022	0.024	0.033	0.021	0.025
All vessels														
Large vessel (> 80 ft)	0.023	0.025	0.030	0.032	0.039	0.042	0.037	0.042	0.051	0.047	0.046	0.059	0.024	0.043
Medium vessel (> 60 ft, <= 80 ft)	0.027	0.026	0.029	0.030	0.024	0.027	0.027	0.023	0.026	0.023	0.026	0.020	0.027	0.026
Small vessel (<= 60 ft)	0.014	0.017	0.027	0.017	0.017	0.022	0.026	0.028	0.023	0.022	0.022	0.025	0.016	0.023
All vessels Total	0.022	0.023	0.029	0.027	0.026	0.030	0.030	0.030	0.033	0.031	0.032	0.037	0.022	0.030

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
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Table 8-12 Catcher vessel mean other gear costs (million of 2020 $) by vessel length 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Large vessel (> 80 ft)	0.072	0.093	0.175	0.106	0.037	0.036	0.037	0.042	0.043	0.043	0.042	0.017	0.083	0.057
Medium vessel (> 60 ft, <= 80 ft)	0.069	0.062	0.146	0.177	0.000	0.000	conf.	0.000	0.000	0.000	0.000	0.000	0.066	0.050
Small vessel (<= 60 ft)														
Whiting vessels Total	0.071	0.086	0.170	0.119	0.032	0.031	conf.	0.038	0.037	0.038	0.038	0.015	0.079	0.058
Non-whiting vessels														
Large vessel (> 80 ft)	0.021	0.017	0.027	0.026	0.043	0.009	0.023	0.030	0.049	0.026	0.026	0.033	0.019	0.029
Medium vessel (> 60 ft, <= 80 ft)	0.030	0.029	0.033	0.037	0.016	0.010	conf.	0.014	0.013	0.008	0.009	0.007	0.030	0.017
Small vessel (<= 60 ft)	0.018	0.016	0.028	0.025	0.012	0.008	0.013	0.012	0.019	0.013	0.012	0.011	0.017	0.016
Non-whiting vessels Total	0.024	0.023	0.031	0.031	0.016	0.009	conf.	0.015	0.018	0.012	0.012	0.012	0.023	0.018
All vessels														
Large vessel (> 80 ft)	0.064	0.081	0.143	0.088	0.038	0.033	0.034	0.040	0.044	0.040	0.040	0.020	0.072	0.052
Medium vessel (> 60 ft, <= 80 ft)	0.038	0.036	0.046	0.051	0.029	0.011	0.012	0.014	0.015	0.010	0.016	0.008	0.037	0.022
Small vessel (<= 60 ft)	0.018	0.016	0.028	0.025	0.012	0.008	0.013	0.012	0.019	0.013	0.012	0.011	0.017	0.016
All vessels Total	0.038	0.043	0.069	0.054	0.027	0.017	0.019	0.022	0.025	0.021	0.024	0.014	0.040	0.030

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435
Note: Conf. indicates that the data is considered confidential and cannot be reported because fewer than three entities provided the information. Those data are treated as zero to protect the confidentiality of related cells. Totals and averages also exclude those values to minimize the number of cells that must be excluded.

8.1.2 Catcher vessel counts by homeport and state, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	1	1	0	0	0	0	0	0	0	0	0	0	1.0	0.0
Eureka	1	1	0	0	0	0	0	0	0	0	0	0	1.0	0.0
San Francisco	1	1	1	1	0	0	0	0	0	0	0	0	1.0	0.2
California	3	3	1	1	0	0	0	0	0	0	0	0	3.0	0.2
Astoria	3	3	3	3	1	2	0	1	1	1	1	1	3.0	1.4
Brookings	1	1	1	1	1	1	1	1	1	1	1	1	1.0	1.0
Coos Bay	4	2	2	1	0	0	0	0	0	0	0	0	3.0	0.3
Newport	16	16	15	14	15	15	14	14	14	15	14	16	16.0	14.6
Tillamook	2	2	0	0	0	0	0	0	1	0	1	1	2.0	0.3
Oregon	26	24	21	19	17	18	15	16	17	17	17	19	25.0	17.6
Puget Sound	11	13	8	7	10	10	9	10	10	11	13	12	12.0	10.0
South and central WA coast	1	1	1	2	2	2	2	2	2	2	2	2	1.0	1.9
Washington & Alaska	12	14	9	9	12	12	11	12	12	13	15	14	13.0	11.9
Whiting vessels total	41	41	31	29	29	30	26	28	29	30	32	33	41.0	29.7
Non-whiting vessels														
Crescent City	6	5	3	4	4	3	2	3	4	3	1	1	5.5	2.8
Eureka	9	8	7	7	7	7	6	6	4	7	8	5	8.5	6.4
Fort Bragg	7	7	7	6	7	7	6	6	7	4	3	4	7.0	5.7
Morro Bay-Monterey	9	6	7	7	6	5	3	3	4	3	3	3	7.5	4.4
San Francisco	6	8	5	5	5	3	2	1	3	3	2	3	7.0	3.2

California	37	34	29	29	29	25	19	19	22	20	17	16	35.5	22.5
Astoria	19	17	19	19	18	16	20	20	18	18	16	13	18.0	17.7
Brookings	7	7	6	6	4	6	6	6	6	6	5	6	7.0	5.7
Coos Bay	15	16	13	13	14	13	12	11	9	10	8	6	15.5	10.9
Newport	9	8	5	5	6	6	9	9	10	9	13	10	8.5	8.2
Tillamook	3	3	1	2	1	0	0	0	0	0	0	0	3.0	0.4
Oregon	53	51	44	45	43	41	47	46	43	43	42	35	52.0	42.9
Puget Sound	3	2	7	5	2	3	3	3	4	6	6	2	2.5	4.1
South and central WA coast	4	2	2	2	2	2	1	1	1	1	1	1	3.0	1.4
Washington & Alaska	7	4	9	7	4	5	4	4	5	7	7	3	5.5	5.5
Non-whiting vessels total	97	89	82	81	76	71	70	69	70	70	66	54	93.0	70.9
All vessels														
Crescent City	7	6	3	4	4	3	2	3	4	3	1	1	6.5	2.8
Eureka	10	9	7	7	7	7	6	6	4	7	8	5	9.5	6.4
Fort Bragg	7	7	7	6	7	7	6	6	7	4	3	4	7.0	5.7
Morro Bay-Monterey	9	6	7	7	6	5	3	3	4	3	3	3	7.5	4.4
San Francisco	7	9	6	6	5	3	2	1	3	3	2	3	8.0	3.4
California	40	37	30	30	29	25	19	19	22	20	17	16	38.5	22.7
Astoria	22	20	22	22	19	18	20	21	19	19	17	14	21.0	19.1
Brookings	8	8	7	7	5	7	7	7	7	7	6	7	8.0	6.7
Coos Bay	19	18	15	14	14	13	12	11	9	10	8	6	18.5	11.2
Newport	25	24	20	19	21	21	23	23	24	24	27	26	24.5	22.8
Tillamook	5	5	1	2	1	0	0	0	1	0	1	1	5.0	0.7
Oregon	79	75	65	64	60	59	62	62	60	60	59	54	77.0	60.5

Puget Sound	14	15	15	12	12	13	12	13	14	17	19	14	14.5	14.1
South and central WA coast	5	3	3	4	4	4	3	3	3	3	3	3	4.0	3.3
Washington & Alaska	19	18	18	16	16	17	15	16	17	20	22	17	18.5	17.4
All vessels total	138	130	113	110	105	101	96	97	99	100	98	87	134.0	100.6

Table 8-13 Catcher vessel mean net revenue (millions of 2020 $) by homeport city and state, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	conf.	conf.											conf.	
Eureka	conf.	conf.											conf.	
San Francisco	conf.	conf.	conf.	conf.									conf.	conf.
California	0.213	0.209	conf.	conf.									0.211	conf.
Astoria	0.028	0.432	0.653	(0.057)	conf.	conf.		conf.	conf.	conf.	conf.	conf.	0.230	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Coos Bay	(0.140)	conf.	conf.	conf.									-	conf.
Newport	0.007	0.019	0.266	0.175	0.359	0.200	0.099	0.149	0.480	0.369	0.151	0.174	0.013	0.243
Tillamook	conf.	conf.							conf.		conf.	conf.	conf.	conf.
Oregon	0.005	0.071	0.332	0.163	0.416	0.172	0.122	0.164	0.471	0.379	0.173	0.182	0.037	0.259
Puget Sound	conf.	-	conf.	conf.	-	Conf.	conf.	conf.	conf.	conf.	conf.	-	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.001	(0.008)	0.272	0.125	0.477	0.344	0.140	0.359	0.483	0.302	0.375	Conf.	(0.004)	0.324
Whiting vessels total	0.019	0.054	0.304	0.146	0.441	0.241	0.129	0.248	0.476	0.345	0.268	0.180	0.037	0.278
Non-whiting vessels														
Crescent City	-	-	0.029	0.049	(0.025)	0.036	conf.	0.025	0.134	-	conf.	conf.	-	conf.
Eureka	-	-	0.150	0.084	0.112	0.106	0.187	0.198	0.442	0.186	0.140	0.145	-	0.162
Fort Bragg	0.093	0.082	0.080	0.066	0.063	0.079	0.151	0.043	0.164	0.033	0.164	0.073	0.087	0.091
Morro Bay-Monterey	(0.038)	0.078	0.048	(0.024)	0.007	0.085	(0.020)	0.030	0.002	(0.160)	(0.047)	(0.130)	0.008	(0.008)
San Francisco	-	-	-	-	0.016	(0.020)	conf.	conf.	0.020	(0.126)	conf.	(0.030)	-	(0.024)
California	0.017	0.039	-	-	0.043	0.071	0.096	0.085	0.160	0.042	0.094	0.037	0.028	0.072

Astoria	0.053	0.032	conf.	conf.	-	-	0.195	-	-	-	-	-	0.043	0.171
Brookings	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	0.033	-	-	-	conf.	0.039	0.030	0.042	0.115	0.058	0.049	0.049	-	0.046
Newport	0.033	0.006	0.203	0.111	0.124	0.171	0.146	0.276	0.249	0.241	0.151	0.111	0.020	0.181
Tillamook	-	-	conf.	conf.	conf.								-	conf.
Oregon	0.048	0.037	0.119	0.099	0.140	0.146	0.145	0.192	0.214	0.174	0.166	(0.053)	0.043	0.138
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	(0.003)	0.074	0.119	0.094	0.125	0.109	0.157	0.217	0.146	0.159	0.098	0.041	0.025	0.126
Non-whiting total	0.033	0.039	0.077	0.063	0.102	0.117	0.132	0.164	0.192	0.135	0.141	(0.021)	0.036	0.111
All vessels														
Crescent City	0.031	0.017	0.029	0.049	(0.025)	0.036	conf.	conf.	0.134	-	conf.	conf.	0.025	conf.
Eureka	0.064	0.045	0.150	0.084	0.112	0.106	0.187	0.198	0.442	0.186	0.140	0.145	0.055	0.162
Fort Bragg	0.093	0.082	0.080	0.066	0.063	0.079	0.151	0.043	0.164	0.033	0.164	conf.	0.087	conf.
Morro Bay-Monterey	(0.038)	0.078	0.048	(0.024)	0.007	0.085	(0.020)	0.030	0.002	(0.160)	(0.047)	(0.130)	0.008	(0.008)
San Francisco	0.015	0.045	0.069	0.018	0.016	(0.020)	conf.	conf.	0.020	(0.126)	conf.	(0.030)	0.032	0.006
California	0.032	0.053	0.081	0.037	0.043	0.071	0.096	0.085	0.160	0.042	0.094	0.037	0.042	0.073
Astoria	0.050	0.092	0.199	0.119	0.219	0.168	0.195	0.212	0.273	0.199	0.217	0.157	0.070	0.196
Brookings	0.113	0.159	conf.	conf.	conf.	0.221	0.240	0.282	conf.	0.264	conf.	conf.	0.136	0.166
Coos Bay	(0.004)	0.011	0.050	0.069	0.026	0.039	0.030	0.042	0.115	0.058	0.049	0.049	0.004	0.051
Newport	0.017	0.014	0.250	0.159	0.292	0.191	0.117	0.199	0.384	0.321	0.151	0.150	0.015	0.221
Tillamook	0.070	(0.014)	conf.	conf.	conf.				conf.		conf.	conf.	0.028	conf.
Oregon	0.034	0.048	0.187	0.118	0.218	0.154	0.139	0.185	0.287	0.232	0.168	0.029	0.041	0.173
Puget Sound	0.026	0.151	0.229	0.085	0.390	0.285	0.145	0.313	0.426	0.295	0.325	0.187	0.091	0.272

South and central WA coast	(0.074)	-	0.029	0.190	0.386	0.241	0.141	0.370	0.185	0.007	0.051	(0.005)	(0.046)	0.170
Washington & Alaska	(0.000)	0.010	0.195	0.111	0.389	0.275	0.144	0.324	0.383	0.252	0.287	0.153	0.005	0.253
Total	0.029	0.044	0.161	0.095	0.196	0.154	0.132	0.188	0.275	0.198	0.182	0.055	0.036	0.164

Table 8-14 Catcher vessel mean fixed cost (millions of 2020 $) by homeport city and state, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	conf.	conf.											conf.	
Eureka	conf.	conf.											conf.	
San Francisco	conf.	conf.	conf.	conf.									conf.	conf.
California	0.012	0.013	conf.	conf.									0.012	conf.
Astoria	0.023	0.014	0.027	0.022	conf.	conf.		conf.	conf.	conf.	conf.	conf.	0.018	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Coos Bay	0.029	conf.	conf.	conf.									-	conf.
Newport	0.024	0.025	0.040	0.035	0.036	0.027	conf.	0.022	0.024	0.024	0.056	0.024	0.024	0.031
Tillamook	conf.	conf.							conf.		conf.	conf.	conf.	conf.
Oregon	0.024	0.023	0.037	0.033	0.036	0.031	0.021	0.021	0.024	0.024	0.052	0.023	0.023	0.030
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.017	0.030	0.045	0.056	0.034	0.043	0.013	0.017	0.017	0.020	0.021	0.018	0.024	0.027
Whiting vessels total	0.021	0.024	0.038	0.039	0.035	0.036	0.018	0.019	0.021	0.022	0.037	0.021	0.023	0.029
Non-whiting vessels														
Crescent City	-	-	0.006	0.008	0.009	0.005	conf.	0.005	0.006	0.001	conf.	conf.	-	conf.
Eureka	-	-	0.007	0.008	0.006	0.008	0.010	0.007	0.013	0.006	0.005	0.006	-	0.007
Fort Bragg	0.010	0.006	0.007	0.008	0.005	0.006	0.005	0.004	0.005	0.004	0.004	0.006	0.008	0.006
Morro Bay-Monterey	0.004	0.004	0.007	0.006	0.008	0.002	0.003	0.003	0.002	0.012	0.005	0.007	0.004	0.006

San Francisco	-	-	-	-	0.003	0.004	conf.	conf.	0.004	0.010	conf.	0.003	-	0.005
California	0.007	0.006	-	-	0.006	0.005	0.006	0.005	0.006	0.006	0.005	0.005	0.006	0.005
Astoria	0.008	0.008	0.013	0.010	-	-	0.009	-	-	-	-	-	0.008	0.012
Brookings	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	0.006	-	-	-	0.004	0.002	0.003	0.004	0.005	0.003	0.002	0.002	0.005	0.003
Newport	0.009	0.008	0.008	0.008	0.004	0.005	0.005	0.005	0.011	0.006	0.006	0.004	0.009	0.006
Tillamook	-	-	conf.	conf.	conf.								-	conf.
Oregon	0.008	0.008	0.011	0.009	0.007	0.005	0.007	0.009	0.010	0.005	0.005	0.014	0.008	0.008
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.010	0.006	0.010	0.011	0.011	0.007	0.004	0.005	0.007	0.003	0.004	0.009	0.009	0.007
Non-whiting total	0.007	0.007	0.007	0.006	0.007	0.005	0.006	0.007	0.008	0.005	0.005	0.011	0.007	0.007
All vessels														
Crescent City	0.009	0.006	0.006	0.008	0.009	0.005	conf.	0.005	0.006	0.001	conf.	conf.	0.008	conf.
Eureka	0.008	0.009	0.007	0.008	0.006	0.008	0.010	0.007	0.013	0.006	0.005	0.006	0.008	0.007
Fort Bragg	0.010	0.006	0.007	0.008	0.005	0.006	0.005	0.004	0.005	0.004	0.004	0.006	0.008	0.006
Morro Bay-Monterey	0.004	0.004	0.007	0.006	0.008	0.002	0.003	0.003	0.002	0.012	0.005	0.007	0.004	0.006
San Francisco	0.006	0.005	0.010	0.013	0.003	0.004	conf.	conf.	0.004	0.010	conf.	0.003	0.005	0.009
California	0.007	0.006	0.007	0.009	0.006	0.005	0.006	0.005	0.006	0.006	0.005	0.005	0.007	0.006
Astoria	0.010	0.009	0.015	0.012	0.011	0.013	0.009	0.011	0.010	0.007	0.009	0.008	0.009	0.011
Brookings	0.009	0.011	conf.	conf.	conf.	0.012	0.009	0.014	conf.	0.009	conf.	conf.	0.010	conf.
Coos Bay	0.010	0.010	0.013	0.009	0.004	0.002	0.003	0.004	0.005	0.003	0.002	0.002	0.010	0.005
Newport	0.019	0.019	0.032	0.028	0.027	0.021	0.015	0.015	0.018	0.017	0.032	0.016	0.019	0.022
Tillamook	0.010	0.010	conf.	conf.	conf.				conf.		conf.	conf.	0.010	conf.

Oregon	0.013	0.013	0.019	0.016	0.015	0.013	0.010	0.012	0.014	0.011	0.019	0.017	0.013	0.015
Puget Sound	0.011	0.012	0.026	0.036	0.030	0.036	0.009	0.013	0.013	0.013	0.015	0.016	0.012	0.020
South and central WA coast	0.022	-	0.036	0.037	0.023	0.023	0.019	0.020	0.019	0.022	0.021	0.017	0.027	0.024
Washington & Alaska	0.014	0.025	0.028	0.036	0.028	0.033	0.011	0.014	0.014	0.014	0.015	0.016	0.019	0.021
Total	0.011	0.012	0.017	0.017	0.014	0.014	0.010	0.011	0.012	0.011	0.016	0.015	0.012	0.014

Table 8-15 Catcher vessel mean variable cost (millions of 2020 $) by homeport city and state, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	conf.	conf.											conf.	
Eureka	conf.	conf.											conf.	
San Francisco	conf.	conf.	conf.	conf.									conf.	conf.
California	0.215	0.258	conf.	conf.									0.237	conf.
Astoria	0.363	0.456	0.785	0.884	conf.	conf.		conf.	conf.	conf.	conf.	conf.	0.409	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Coos Bay	0.281	conf.	conf.	conf.									-	conf.
Newport	0.298	0.435	0.668	0.683	0.802	0.966	0.596	0.686	0.925	0.856	0.983	0.705	0.366	0.787
Tillamook	conf.	conf.							conf.		conf.	conf.	conf.	conf.
Oregon	0.302	0.402	0.689	0.709	0.807	0.936	0.597	0.659	0.876	0.852	0.944	0.662	0.350	0.773
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.218	0.354	0.649	0.768	0.719	0.728	0.369	0.541	0.689	0.680	0.619	0.432	0.291	0.628
Whiting vessels total	0.271	0.375	0.655	0.703	0.770	0.853	0.501	0.608	0.798	0.778	0.792	0.564	0.323	0.704
Non-whiting vessels														
Crescent City	-	-	0.096	0.143	0.090	0.140	conf.	0.175	0.184	-	conf.	conf.	-	conf.

Eureka	-	-	0.193	0.145	0.170	0.186	0.217	0.181	0.268	0.185	0.171	0.176	-	0.186
Fort Bragg	0.263	0.235	0.278	0.216	0.242	0.273	0.311	0.201	0.205	0.213	0.265	0.249	0.249	0.246
Morro Bay-Monterey	0.141	0.142	0.106	0.077	0.139	0.209	0.286	0.069	0.092	0.191	0.160	0.174	0.141	0.140
San Francisco	-	-	-	-	0.152	0.161	conf.	conf.	0.116	0.155	conf.	0.101	-	0.148
California	0.168	0.143	-	-	0.167	0.207	0.256	0.166	0.180	0.174	0.183	0.179	0.156	0.175
Astoria	0.232	0.245	0.282	0.313	-	-	0.343	-	-	-	-	-	0.238	0.342
Brookings	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	0.129	-	conf.	conf.	conf.	0.078	0.103	0.116	0.188	0.129	0.110	0.084	-	conf.
Newport	0.194	0.167	0.158	0.202	0.141	0.250	0.240	0.277	0.281	0.301	0.222	0.159	0.181	0.229
Tillamook	-	-	conf.	conf.	conf.								-	conf.
Oregon	0.184	0.192	0.235	0.229	0.230	0.243	0.243	0.264	0.282	0.246	0.219	0.227	0.188	0.242
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.216	0.297	0.274	0.228	0.303	0.275	0.211	0.226	0.234	0.180	0.183	0.210	0.246	0.232
Non-whiting total	0.180	0.178	0.156	0.147	0.210	0.232	0.245	0.235	0.246	0.219	0.206	0.212	0.179	0.209
All vessels														
Crescent City	0.181	0.120	0.096	0.143	0.090	0.140	conf.	0.175	0.184	-	conf.	conf.	0.153	conf.

Eureka	0.178	0.178	0.193	0.145	0.170	0.186	0.217	0.181	0.268	0.185	0.171	0.176	0.178	0.186
Fort Bragg	0.263	0.235	0.278	0.216	0.242	0.273	0.311	0.201	0.205	0.213	0.265	0.249	0.249	0.246
Morro Bay-Monterey	0.141	0.142	0.106	0.077	0.139	0.209	0.286	0.069	0.092	0.191	0.160	0.174	0.141	0.140
San Francisco	0.100	0.091	0.165	0.181	0.152	0.161	conf.	conf.	0.116	0.155	conf.	conf.	0.095	conf.
California	0.171	0.152	0.177	0.151	0.167	0.207	0.256	0.166	0.180	0.174	0.183	0.179	0.162	0.182
Astoria	0.250	0.277	0.351	0.391	0.368	0.385	0.343	0.339	0.349	0.305	0.292	0.238	0.263	0.340
Brookings	0.224	0.254	conf.	conf.	conf.	0.410	0.255	0.311	conf.	0.350	conf.	conf.	0.239	conf.
Coos Bay	0.161	0.159	0.224	0.154	0.095	0.078	0.103	0.116	0.188	0.129	0.110	0.084	0.160	0.132
Newport	0.260	0.345	0.541	0.557	0.613	0.761	0.457	0.526	0.657	0.648	0.617	0.495	0.302	0.586
Tillamook	0.152	0.145	conf.	conf.	conf.				conf.		conf.	conf.	0.149	conf.
Oregon	0.223	0.259	0.382	0.371	0.393	0.454	0.329	0.366	0.450	0.418	0.428	0.380	0.241	0.396
Puget Sound	0.213	0.323	0.458	0.494	0.617	0.592	0.301	0.423	0.519	0.468	0.443	0.390	0.270	0.469
South and central WA coast	0.231	0.433	0.479	0.645	0.608	0.601	0.431	0.630	0.720	0.715	0.715	0.409	0.306	0.597
Washington & Alaska	0.217	0.341	0.461	0.532	0.615	0.594	0.327	0.462	0.555	0.505	0.480	0.393	0.278	0.493
Total	0.207	0.240	0.340	0.334	0.365	0.417	0.314	0.342	0.408	0.387	0.397	0.346	0.223	0.365

Table 8-16 Catcher vessel mean observer and EM cost (millions of 2020 $) by homeport city and state, 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	conf.	conf.											conf.	
Eureka	conf.	conf.											conf.	
San Francisco	conf.	conf.	conf.	conf.									conf.	conf.
California	**-**	**-**	**conf.**	**conf.**									**-**	**conf.**
Astoria	-	-	-	-	conf.	conf.		conf.	conf.	conf.	conf.	conf.	-	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Coos Bay	-	conf.	conf.	conf.									-	conf.
Newport	0.002	0.004	0.005	0.009	0.015	0.025	0.016	0.017	0.022	0.012	0.014	0.009	0.003	0.014
Tillamook	conf.	conf.							conf.		conf.	conf.	conf.	conf.
Oregon	**0.002**	**0.003**	**0.006**	**0.009**	**0.016**	**0.025**	**0.018**	**0.021**	**0.022**	**0.011**	**0.014**	**0.008**	**0.002**	**0.015**
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.003	0.005	0.005	0.010	0.012	0.017	0.016	0.012	0.012	0.013	0.012	0.013	0.004	0.013
Whiting vessels total	**0.002**	**0.003**	**0.005**	**0.009**	**0.014**	**0.022**	**0.017**	**0.017**	**0.018**	**0.012**	**0.013**	**0.010**	**0.003**	**0.014**
Non-whiting vessels														
Crescent City	-	-	0.002	0.004	0.005	0.007	conf.	0.020	0.012	0.005	conf.	conf.	-	conf.
Eureka	-	-	0.003	0.004	0.010	0.013	0.023	0.020	0.029	0.019	0.019	0.020	-	0.015
Fort Bragg	-	-	0.002	0.005	0.011	0.013	0.019	0.009	0.009	0.007	0.015	0.018	-	0.010
Morro Bay-Monterey	-	-	0.002	0.004	0.009	0.016	-	0.007	0.011	-	-	0.026	-	0.007
San Francisco	-	-	-	-	0.008	0.014	conf.	conf.	0.005	-	conf.	0.007	-	0.007
California	**-**	**-**	**-**	**-**	**0.009**	**0.013**	**0.020**	**0.015**	**0.013**	**0.011**	**0.015**	**0.018**	**-**	**0.013**

Astoria	-	-	0.004	0.009	-	-	0.030	-	-	-	-	-	-	0.016
Brookings	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	-	-	-	-	0.005	0.007	0.009	0.009	0.014	0.013	0.011	0.012	-	0.009
Newport	-	-	0.001	0.004	0.007	0.011	0.015	0.018	0.022	0.025	0.019	0.015	-	0.015
Tillamook	-	-	conf.	conf.	conf.								-	conf.
Oregon	**-**	**-**	**0.003**	**0.006**	**0.012**	**0.015**	**0.020**	**0.024**	**0.026**	**0.025**	**0.023**	**0.044**	**-**	**0.019**
Puget Sound	-	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	-	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	-	conf.
Washington & Alaska	**-**	**-**	**0.002**	**0.005**	**0.012**	**0.014**	**0.019**	**0.027**	**0.019**	**0.014**	**0.017**	**0.025**	**conf**	**0.013**
Non-whiting total	**-**	**-**	**0.002**	**0.004**	**0.011**	**0.014**	**0.020**	**0.022**	**0.022**	**0.020**	**0.020**	**0.035**	**-**	**0.016**
All vessels														
Crescent City	-	-	0.002	0.004	0.005	0.007	conf.	conf.	0.012	0.005	conf.	conf.	-	conf.
Eureka	-	-	0.003	0.004	0.010	0.013	0.023	0.020	0.029	0.019	0.019	0.020	-	0.015
Fort Bragg	-	-	0.002	0.005	0.011	0.013	0.019	0.009	0.009	0.007	0.015	0.018	-	0.010
Morro Bay-Monterey	-	-	0.002	0.004	0.009	0.016	-	0.007	0.011	-	-	0.026	-	0.007
San Francisco	-	-	0.002	0.004	0.008	0.014	conf.	conf.	0.005	-	conf.	0.007	-	conf.
California	**-**	**-**	**0.002**	**0.004**	**0.009**	**0.013**	**0.020**	**0.015**	**0.013**	**0.011**	**0.015**	**0.018**	**-**	**0.011**
Astoria	-	-	0.004	0.009	0.018	0.023	0.030	0.036	0.035	0.033	0.034	0.033	-	0.025
Brookings	-	-	conf.	conf.	conf.	0.015	0.020	0.025	conf.	0.017	conf.	conf.	-	conf.
Coos Bay	-	-	0.004	0.004	0.005	0.007	0.009	0.009	0.014	0.013	0.011	0.012	-	0.008
Newport	0.001	0.002	0.004	0.008	0.013	0.021	0.016	0.017	0.022	0.017	0.016	0.012	0.002	0.015
Tillamook	-	-	conf.	conf.	conf.				conf.		conf.	conf.	-	conf.
Oregon	**0.001**	**0.001**	**0.004**	**0.007**	**0.013**	**0.018**	**0.020**	**0.023**	**0.025**	**0.021**	**0.020**	**0.031**	**0.001**	**0.018**
Puget Sound	0.002	0.003	0.003	0.007	0.010	0.015	0.018	0.014	0.013	0.013	0.013	0.015	0.003	0.012

South and central WA coast	-	-	-	0.011	0.017	0.021	0.012	0.021	0.019	0.018	0.015	0.017	-	0.015
Washington & Alaska	**0.002**	**0.004**	**0.003**	**0.008**	**0.012**	**0.016**	**0.017**	**0.016**	**0.014**	**0.014**	**0.013**	**0.015**	**0.003**	**0.013**
Total	***0.001***	***0.001***	***0.003***	***0.006***	***0.012***	***0.016***	***0.019***	***0.020***	***0.021***	***0.018***	***0.018***	***0.026***	***0.001***	***0.015***

Table 8-17 Catcher vessel mean cost recovery fee (millions of 2020 $) by homeport and state

	2014	2015	2016	2017	2018	2019	2020	Average 2014-20
Whiting vessels								
Crescent City								
Eureka								
San Francisco								
California								
Astoria	conf.		conf.	conf.	conf.	conf.	conf.	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Coos Bay								conf.
Newport	0.041	conf.	0.031	0.038	0.033	0.039	0.025	conf.
Tillamook				conf.		conf.	conf.	conf.
Oregon	0.041	0.024	0.031	0.037	0.034	0.038	0.025	0.032
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.039	0.016	0.031	0.024	0.020	0.025	0.017	0.026
Whiting vessels total	0.040	0.020	0.031	0.032	0.028	0.032	0.021	0.029
Non-whiting vessels								
Crescent City	0.007	conf.	0.008	0.011	-	conf.	conf.	conf.
Eureka	0.011	0.015	0.014	0.025	0.013	0.011	0.011	0.013

Fort Bragg	0.012	0.015	0.009	0.012	0.009	0.014	0.011	0.011
Morro Bay-Monterey	0.009	0.009	0.004	0.003	0.004	0.005	0.003	0.004
San Francisco	0.005	conf.	conf.	0.005	0.004	conf.	0.003	0.004
California	0.010	0.012	0.009	0.012	0.008	0.009	0.008	0.009
Astoria	-	0.019	-	-	-	-	-	0.021
Brookings	-	-	-	-	-	-	-	-
Coos Bay	0.004	0.005	0.006	0.010	0.006	0.005	0.005	0.005
Newport	0.014	0.013	0.018	0.019	0.018	0.013	0.009	0.017
Tillamook								conf.
Oregon	0.013	0.014	0.016	0.018	0.014	0.013	0.009	0.014
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.014	0.012	0.015	0.013	0.011	0.009	0.010	0.011
Non-whiting total	0.012	0.013	0.014	0.016	0.012	0.012	0.009	0.012
All vessels								
Crescent City	0.007	conf.	0.008	0.011	-	conf.	conf.	conf.
Eureka	0.011	0.015	0.014	0.025	0.013	0.011	0.011	0.013
Fort Bragg	0.012	0.015	0.009	0.012	0.009	0.014	0.011	0.011
Morro Bay-Monterey	0.009	0.009	0.004	0.003	0.004	0.005	0.003	0.004
San Francisco	0.005	conf.	conf.	0.005	0.004	conf.	conf.	conf.
California	0.010	0.012	0.009	0.012	0.008	0.009	0.008	0.009
Astoria	0.020	0.019	0.020	0.022	0.017	0.017	0.014	0.018
Brookings	0.022	0.017	0.022	conf.	0.020	conf.	conf.	conf.
Coos Bay	0.004	0.005	0.006	0.010	0.006	0.005	0.005	0.005

Newport	0.034	0.019	0.026	0.030	0.027	0.026	0.019	0.027
Tillamook				conf.		conf.	conf.	conf.
Oregon	0.022	0.016	0.020	0.023	0.020	0.020	0.015	0.019
Puget Sound	0.031	0.013	0.025	0.018	0.015	0.018	0.015	0.020
South and central WA coast	0.032	0.023	0.036	0.033	0.028	0.028	0.018	0.027
Washington & Alaska	0.032	0.015	0.027	0.021	0.017	0.020	0.016	0.021
Total	0.020	0.015	0.019	0.020	0.017	0.018	0.014	0.017

Table 8-18 Catcher vessel mean labor cost (millions of 2020 $) by homeport and state

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	conf.	conf.											conf.	
Eureka	conf.	conf.											conf.	
San Francisco	conf.	conf.	conf.	conf.									conf.	conf.
California	0.157	0.174	conf.	conf.									0.166	conf.
Astoria	0.395	0.428	0.690	0.729	conf.	conf.		conf.	conf.	conf.	conf.	conf.	0.411	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Coos Bay	0.230	conf.	conf.	conf.									-	conf.
Newport	0.189	0.247	0.466	0.441	0.555	0.621	0.358	0.440	0.651	0.552	0.687	0.519	0.218	0.530
Tillamook	conf.	conf.							conf.		conf.	conf.	conf.	conf.
Oregon	0.182	0.224	0.447	0.436	0.543	0.576	0.359	0.407	0.586	0.534	0.635	0.473	0.202	0.500
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.

Washington & Alaska	0.132	0.195	0.439	0.511	0.462	0.431	0.197	0.324	0.442	0.389	0.399	0.276	0.166	0.388
Whiting vessels total	0.165	0.211	0.430	0.444	0.509	0.518	0.290	0.372	0.526	0.471	0.524	0.389	0.188	0.449
Non-whiting vessels														
Crescent City	-	-	0.105	0.099	0.062	0.126	conf.	conf.	0.160	-	conf.	conf.	-	conf.
Eureka	-	-	0.134	0.097	0.109	0.122	0.140	0.118	0.180	0.118	0.105	0.125	-	0.122
Fort Bragg	0.234	0.204	0.244	0.181	0.194	0.222	0.270	0.175	0.171	0.225	0.274	0.211	0.219	0.213
Morro Bay-Monterey	0.073	0.073	0.061	0.049	0.071	0.112	0.230	0.065	0.047	0.140	0.129	-	0.073	0.083
San Francisco	-	-	-	-	0.098	0.097	conf.	conf.	0.094	0.138	conf.	0.061	-	conf.
California	0.109	0.090	-	-	0.094	0.116	0.158	0.103	0.104	0.106	0.104	0.094	0.100	0.102
Astoria	0.158	0.158	conf.	conf.	-	-	0.207	-	-	-	-	-	0.158	conf.
Brookings	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	0.089	-	-	-	0.048	0.042	0.070	0.081	0.132	0.086	0.080	0.067	-	0.069
Newport	0.122	0.093	0.111	0.167	0.100	0.180	0.161	0.192	0.181	0.192	0.140	0.098	0.108	0.154
Tillamook	-	-	conf.	conf.	conf.								-	conf.
Oregon	0.112	0.111	0.129	0.124	0.123	0.130	0.137	0.149	0.155	0.133	0.115	0.087	0.111	0.129
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	-	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	-	conf.
Washington & Alaska	0.142	0.251	0.175	0.152	0.240	0.198	0.182	0.159	0.185	0.124	0.131	0.164	0.182	0.166
Non-whiting total	0.113	0.109	0.088	0.082	0.118	0.130	0.145	0.137	0.141	0.125	0.114	0.094	0.111	0.117
All vessels														
Crescent City	0.139	0.095	0.105	0.099	0.062	0.126	conf.	0.167	0.160	-	conf.	conf.	0.119	conf.
Eureka	0.139	0.141	0.134	0.097	0.109	0.122	0.140	0.118	0.180	0.118	0.105	0.125	0.140	0.122
Fort Bragg	0.234	0.204	0.244	0.181	0.194	0.222	0.270	0.175	0.171	0.225	0.274	0.211	0.219	0.213
Morro Bay-Monterey	0.073	0.073	0.061	0.049	0.071	0.112	0.230	0.065	0.047	0.140	0.129	-	0.073	0.083

San Francisco	0.062	0.043	0.085	0.095	0.098	0.097	conf.	conf.	0.094	0.138	conf.	0.061	0.052	0.115
California	0.108	0.091	0.108	0.083	0.094	0.116	0.158	0.103	0.104	0.106	0.104	0.094	0.100	0.106
Astoria	0.171	0.175	0.205	0.225	0.215	0.219	0.207	0.198	0.196	0.169	0.148	0.131	0.173	0.194
Brookings	0.153	0.188	0.286	0.203	0.329	0.259	0.158	0.194	0.234	0.226	0.275	0.135	0.171	0.226
Coos Bay	0.104	0.102	0.123	0.088	0.048	0.042	0.070	0.081	0.132	0.086	0.080	0.067	0.103	0.081
Newport	0.155	0.187	0.358	0.342	0.406	0.468	0.264	0.318	0.425	0.395	0.394	0.341	0.170	0.371
Tillamook	0.082	0.074	conf.	conf.	conf.				conf.		conf.	conf.	0.078	conf.
Oregon	0.131	0.143	0.221	0.206	0.227	0.253	0.182	0.205	0.262	0.234	0.248	0.211	0.137	0.225
Puget Sound	0.120	0.175	0.276	0.299	0.398	0.343	0.160	0.250	0.334	0.258	0.270	0.245	0.148	0.282
South and central WA coast	0.202	0.408	0.485	0.560	0.498	0.494	0.378	0.540	0.560	0.566	0.644	0.356	0.279	0.509
Washington & Alaska	0.125	0.189	0.277	0.325	0.382	0.340	0.176	0.268	0.339	0.276	0.294	0.242	0.156	0.292
Total	0.123	0.134	0.200	0.190	0.214	0.234	0.176	0.195	0.240	0.217	0.233	0.196	0.129	0.210

Table 8-19 Catcher vessel mean fuel cost (millions of 2020 $) by homeport and state

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-10	Average 2011-20
Whiting vessels														
Crescent City	conf.	conf.											conf.	
Eureka	conf.	conf.											conf.	
San Francisco	conf.	conf.	conf.	conf.									conf.	conf.
California	0.127	0.181	conf.	conf.									0.154	conf.
Astoria	0.134	0.237	0.383	0.447	conf.	conf.		conf.	conf.	conf.	conf.	conf.	0.186	conf.
Brookings	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.

Coos Bay	0.113	conf.	conf.	conf.									-	conf.
Newport	0.084	0.160	0.179	0.218	0.195	0.250	0.174	0.176	0.190	0.232	0.230	0.137	0.122	0.198
Tillamook	conf.	conf.							conf.		conf.	conf.	conf.	conf.
Oregon	0.086	0.139	0.190	0.225	0.201	0.246	0.169	0.167	0.182	0.235	0.224	0.131	0.111	0.197
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
Washington & Alaska	0.079	0.141	0.212	0.267	0.216	0.210	0.126	0.140	0.170	0.240	0.157	0.099	0.113	0.182
Whiting vessels total	0.087	0.143	0.191	0.230	0.207	0.232	0.150	0.155	0.177	0.237	0.193	0.118	0.115	0.189
Non-whiting vessels														
Crescent City	-	-	0.024	0.066	0.040	0.050	conf.	0.030	0.022	0.021	conf.	conf.	-	conf.
Eureka	-	-	0.061	0.052	0.060	0.052	0.046	0.033	0.053	0.036	0.035	0.041	-	0.047
Fort Bragg	0.053	0.062	0.054	0.056	0.055	0.052	0.038	0.028	0.026	0.035	0.059	0.061	0.057	0.046
Morro Bay-Monterey	0.061	0.043	0.019	0.023	0.046	0.044	0.084	0.015	0.025	0.060	0.038	-	0.054	0.034
San Francisco	-	-	-	-	0.055	0.059	conf.	conf.	0.025	0.033	conf.	conf.	-	0.044
California	0.037	0.031	-	-	0.042	0.040	0.035	0.021	0.022	0.027	0.032	0.035	0.034	0.030
Astoria	0.051	0.067	conf.	conf.	-	-	0.044	-	-	-	-	-	0.058	conf.
Brookings	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coos Bay	0.029	-	-	-	conf.	0.019	0.014	0.010	0.023	0.019	0.018	0.013	-	0.019

Newport	0.061	0.062	0.039	0.055	0.034	0.048	0.030	0.025	0.033	0.050	0.034	0.024	0.062	0.036
Tillamook	-	-	conf.	conf.	conf.								-	conf.
Oregon	0.040	0.049	0.055	0.055	0.057	0.046	0.030	0.026	0.034	0.036	0.034	0.049	0.044	0.042
Puget Sound	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.
South and central WA coast	-	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	conf.	-	conf.
Washington & Alaska	0.073	0.112	0.073	0.057	0.103	0.055	0.024	0.025	0.029	0.021	0.024	0.038	0.087	0.046
Non-whiting total	0.041	0.045	0.037	0.036	0.054	0.044	0.031	0.024	0.030	0.032	0.032	0.044	0.043	0.036
All vessels														
Crescent City	0.047	0.041	0.024	0.066	0.040	0.050	conf.	conf.	0.022	0.021	conf.	conf.	0.044	conf.
Eureka	0.036	0.041	0.061	0.052	0.060	0.052	0.046	0.033	0.053	0.036	0.035	0.041	0.038	0.047
Fort Bragg	0.053	0.062	0.054	0.056	0.055	0.052	0.038	0.028	0.026	0.035	0.059	0.061	0.057	0.046
Morro Bay-Monterey	0.061	0.043	0.019	0.023	0.046	0.044	0.084	0.015	0.025	0.060	0.038	-	0.054	0.034
San Francisco	0.041	0.041	0.087	0.091	0.055	0.059	conf.	conf.	0.025	0.033	conf.	0.029	0.041	conf.
California	0.040	0.038	0.042	0.045	0.042	0.040	0.035	0.021	0.022	0.027	0.032	0.035	0.039	0.035
Astoria	0.055	0.079	0.091	0.106	0.094	0.083	0.044	0.037	0.048	0.051	0.051	0.038	0.067	0.066
Brookings	0.060	0.063	conf.	conf.	conf.	0.124	0.051	0.062	conf.	0.100	conf.	conf.	0.062	conf.
Coos Bay	0.040	0.043	0.068	0.046	0.035	0.019	0.014	0.010	0.023	0.019	0.018	0.013	0.041	0.029

Newport	0.071	0.120	0.139	0.165	0.143	0.182	0.111	0.109	0.117	0.154	0.127	0.088	0.095	0.132
Tillamook	0.073	0.088	conf.	conf.	conf.				conf.		conf.	conf.	0.081	conf.
Oregon	0.053	0.075	0.094	0.101	0.092	0.100	0.059	0.058	0.071	0.086	0.084	0.074	0.064	0.082
Puget Sound	0.078	0.128	0.133	0.162	0.184	0.168	0.092	0.109	0.122	0.153	0.107	0.088	0.104	0.131
South and central WA coast	0.072	0.181	0.191	0.236	0.226	0.184	0.148	0.143	0.198	0.259	0.207	0.112	0.113	0.193
Washington & Alaska	0.070	0.126	0.130	0.163	0.176	0.157	0.094	0.105	0.123	0.155	0.111	0.084	0.097	0.130
Total	0.052	0.071	0.086	0.095	0.091	0.095	0.060	0.059	0.069	0.088	0.081	0.069	0.061	0.080

8.1.3 Mothership mean cost and revenue

Note that fishing gear is included in the fixed costs for the mothership category even though by definition a mothership takes deliveries from another vessel and processes the fish at-sea. Therefore, the fishing gear costs are associated with vessel activity when not operating as a mothership. The EDC forms request fishing gear costs for fishing gear used in both U.S. West Coast, Alaska, and other fisheries, and fishing gear used only on the U.S. West Coast. In the context of the EDC Program, fishing gear includes the purchases of nets, doors, traps, pots, cables, and fishing machinery used in U.S. West Coast fisheries, as well as repairs or maintenance of the fishing gear. Fishing gear that is only used in Alaska is not requested.

Table 8-20 mothership mean cost and revenue data (millions of 2020 1st wholesale $), 2009 through 2020

Costs and revenues	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-2010	Average 2011-2020
Motherships (count)	6	6	5	5	5	5	3	6	4	5	6	5	5.1	4.9
Total cost net revenue	0.236	0.644	1.109	0.000	0.362	0.000	0.000	1.031	2.815	1.456	0.000	0.000	0.638	0.677
Revenue	3.598	5.599	8.944	6.879	7.942	9.969	7.333	7.714	11.477	9.703	6.892	5.353	7.617	8.220
Fishing gear	0.089	0.000	0.212	0.106	0.058	0.094	0.205	0.082	0.308	0.180	0.117	0.116	0.131	0.148
On-board equipment	0.425	0.589	0.479	1.289	1.068	1.579	1.789	0.542	0.398	0.621	0.407	0.414	0.800	0.858

Other fixed costs	0.320	0.310	0.410	0.413	0.337	0.506	0.654	0.374	0.287	0.299	0.271	0.253	0.369	0.380
Processing equipment	0.305	0.404	0.143	0.289	0.294	0.235	0.374	0.281	0.193	0.479	0.265	0.134	0.283	0.269
All fixed costs	1.131	1.441	1.108	1.955	1.633	2.234	2.824	1.176	1.021	1.413	0.918	0.796	1.471	1.508
Fish purchases	0.784	1.456	2.647	2.088	2.507	2.881	1.891	2.038	3.075	2.523	1.828	1.540	2.105	2.302
Fuel	0.312	0.459	1.213	0.848	0.876	1.113	0.714	0.648	0.886	0.955	0.646	0.263	0.744	0.816
Labor	0.835	1.113	1.723	1.378	1.549	1.929	1.787	1.832	2.196	2.105	1.638	1.247	1.611	1.738
Observers	0.019	0.020	0.042	0.037	0.032	0.041	0.035	0.042	0.063	0.053	0.036	0.029	0.038	0.041
Other variable costs	0.258	0.439	0.934	0.681	0.824	1.030	0.890	0.813	1.218	0.996	0.693	1.813	0.883	0.989
All variable costs	2.230	3.513	6.728	5.207	5.947	7.215	5.549	5.507	7.641	6.834	5.009	5.013	5.533	6.065

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435

8.1.4 Catcher-processor mean cost and revenue

Information for the catcher-processor is not broken out by vessel size or geographic area due to the limited number of vessels participating in the fishery and the fact that they are of similar size and are homeported in the same geographic region.

Table 8-21 Catcher-processor mean cost and revenue data (millions of 2020 1st wholesale $), 2009 through 2020

Cost/Revenue	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009 to 2010	Average 2011 to 2020
Catcher-processors (Count)	5	6	9	9	9	9	9	9	9	9	9	10	5.5	9.1
Total cost net revenue	2.141	5.472	2.672	2.093	3.614	5.898	2.823	4.252	4.936	4.874	6.111	5.444	3.807	4.272
Revenue	7.776	10.705	7.642	6.428	8.052	12.082	7.729	10.477	12.480	12.119	12.646	11.565	9.240	10.122
Fishing gear	0.123	0.124	0.136	0.172	0.085	0.145	0.143	0.101	0.192	0.159	0.174	0.211	0.124	0.152
On-board equipment	0.669	0.528	0.645	0.658	0.606	0.608	0.693	0.761	0.630	0.995	0.855	0.805	0.598	0.726
Other fixed costs	0.245	0.221	0.223	0.247	0.243	0.312	0.456	0.531	0.377	0.253	0.280	0.327	0.233	0.325
Processing equipment	1.164	0.224	0.276	0.270	0.420	0.276	0.324	0.381	0.606	0.416	0.457	0.462	0.694	0.389
All fixed costs	2.215	1.117	1.284	1.299	1.286	1.206	1.378	1.496	1.653	1.764	1.672	1.689	1.666	1.473
Cost recovery fees	0.000	0.000	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
Fuel	0.907	1.019	1.418	0.918	0.895	1.321	0.885	0.989	1.185	1.250	1.170	0.850	0.963	1.088
Labor	1.739	2.131	1.545	1.449	1.648	2.435	1.672	2.305	3.156	2.812	2.466	2.322	1.935	2.181
Observers	0.037	0.044	0.041	0.025	0.025	0.036	0.041	0.052	0.069	0.054	0.056	0.063	0.041	0.046
Other variable costs	0.751	0.943	0.686	0.597	0.517	1.009	0.692	1.106	1.328	1.305	1.241	1.227	0.847	0.971
All variable costs	3.420	4.116	3.686	3.036	3.153	4.978	3.528	4.729	5.891	5.480	4.863	4.432	3.768	4.378

Sourced from the FISHEyE application (http://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/PerformanceMetrics/) maintained by NOAA Fisheries NWFSC. Technical information can be found here: https://repository.library.noaa.gov/view/noaa/31435

8.1.5 Shoreside processor mean cost and fish sales revenue

Category	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-2010	`Average 2011-2020
All Processors														
Processor (Count)	19	20	18	18	19	17	18	16	16	14	13	12	19.5	16.1
Total Net Revenue	0.033	(0.206)	1.075	1.055	0.859	0.688	(0.097)	(0.202)	(0.238)	0.337	(2.030)	1.437	-0.087	0.288
Seafood Sales	7.375	-	9.002	7.914	8.183	8.805	6.743	8.267	11.207	12.455	14.073	12.621	na	9.927
Fixed Costs	1.626	1.408	0.766	0.473	0.547	0.736	0.736	0.864	1.493	2.375	3.949	1.340	1.517	1.328
Variable Costs	5.720	4.843	7.265	6.501	7.167	7.444	6.152	7.627	10.035	9.777	12.184	10.066	5.282	8.422
Non-Whiting Processors														
Processor (Count)	7	8	9	10	11	9	10	8	8	6	6	5	7.5	8.2
Total Net Revenue	0.498	0.505	0.522	0.319	(0.035)	0.122	(0.043)	0.099	0.087	0.521	0.227	(0.362)	0.501	0.146
Seafood Sales	-	-	4.381	3.704	2.806	3.908	3.576	4.530	4.815	5.019	4.449	2.205	na	3.939
Fixed Costs	0.189	0.132	0.168	0.156	0.179	0.185	0.155	0.182	0.161	0.161	0.201	0.144	0.161	0.169
Variable Costs	3.192	2.575	3.727	3.234	2.670	3.607	3.477	4.253	4.594	4.374	4.044	2.216	2.883	3.620
Whiting Processors														
Processor (Count)	12	12	9	8	8	8	8	8	8	8	7	7	12	7.9
Total Net Revenue	(0.239)	(0.681)	1.627	1.974	2.088	1.324	(0.165)	(0.502)	(0.563)	0.199	(3.965)	2.465	-0.460	0.448
Seafood Sales	-	-	13.622	13.177	15.577	14.315	10.702	12.004	17.598	18.031	22.322	20.061	na	15.741
Fixed Costs	2.463	2.259	1.363	0.870	1.052	1.356	1.462	1.547	2.824	4.035	7.162	2.023	2.361	2.369
Variable Costs	7.195	6.355	10.803	10.585	13.351	11.761	9.496	11.001	15.476	13.829	19.160	15.674	6.775	13.114

Note that the processor counts and groupings are different for monitoring costs and the table above. These differences result from using a different data set and the reporting of monitoring costs in the EDC reports.

Table 8-22 Count of processors and mean shoreside monitoring cost per processor (2020 $), 2009 through 2020

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average 2009-2010	Average 2011-2020
Total Processors	11	11	14	15	17	16	17	16	16	12	11	10	11	14.4
Large Processors	5	5	5	6	6	6	6	6	6	6	5	5	5	5.7
Medium Processors	6	6	6	5	5	5	5	6	6	6	6	5	6	5.5
Small Processors			3	4	6	5	6	4	4					3.2
Large Processor	10,714	22,272	22,041	18,024	32,851	38,219	71,324	86,978	120,658	122,810	145,866	16,493	16,493	67,526
Medium Processor	8,874	22,095	4,007	7,601	18,488	20,381	40,335	35,279	46,566	44,322	55,090	47,217	15,485	31,929
Small Processor	-	0	0	2,372	5,746	7,211	6,638	7,923	5,603	0	0	-	-	3,549

8.2 NE Sector Cost Data

8.2.1 SSB Survey Data

Information from the SSB cost surveys for 2011, 2012, and 2015 are presented in this section. Each of the cost categories are described and the mean cost per vessel is reported. Note that the survey also includes crew and captain payments. That information is also included.

Total Fixed Cost

Total fixed cost is the sum of all the reported cost categories except labor. These groupings included Repair/Maintenance, Upgrade/Improvement, Vessel Fees and Insurance, Business Costs by Vessel, Other Costs, and Value of Vessel and Associated Permits.

Repair/Maintenance

A fishing vessel and its various equipment will require repairs due to general wear and tear. The 2011 and 2012 surveys, asked for the cost of repairs for engine, hull, and electronics components separately. A composite value across all vessel components was queried for the 2015 survey. The 2012 survey included a separate line item for "Other Repair/Maintenance Costs". To maintain consistency in the repair/maintenance category for the other years, these costs were included in the Other Costs category. Finally, the 2011 and 2012 surveys queried only vessel-level repair/maintenance costs, while the 2015 survey queried these costs at the vessel-level and business-level. This created confusion among respondents, so only vessel-level costs are summarized.

Upgrade/Improvement

Vessel upgrades were separated from repairs since they increase the value of the capital stock associated with the vessel. Like for Repair/Maintenance, the 2011 and 2012 asked for the cost of each component that was upgraded or improved and a composite value across all vessel components was requested in 2015. A separate line item for "Other Upgrade/Improvement Costs" was included in the 2012 survey and those costs were included in "Other Costs".

Since the method for querying upgrade/improvement costs varied across the three survey years, the same depreciation factors could not be applied (i.e., the lifespan/rate of depreciation for various vessel components will differ). To maintain a consistent approach across the 3 surveys, upgrade/improvement values simply represent the upfront cost to the vessel owner.

As with repair/maintenance costs, the 2011 and 2012 surveys queried only vessel level upgrade/improvement costs, while the 2015 survey queried these costs at the vessel-level and business-level. The apparent confusion resulted in only vessel-level costs being reported.

Vessel Fees and Insurance

Vessel permit fees, mooring fees, and vessel insurance premiums were queried separately for all three surveys. Since these are all true fixed costs—expenses that would be expected to be incurred even if the vessel was inactive in a given year— they were grouped together into the Vessel Fees and Insurance category.

Business Costs by Vessel

Vessel owners incur business costs that are independent of vessel-related costs. Business costs include principal and interest paid on loans, vehicle usage costs (for transport of unloaded catch), association fees (such as groundfish sector fees), and advertising costs. These costs must be apportioned to vessels if a firm owns more than one. For the 2011 survey, owners of multiple vessels were instructed to only report their business costs associated with the vessel specified at the beginning of the survey (i.e., vessel owners were asked to apportion a percentage of their total business cost to the specified vessel). For the 2012 and 2015 surveys, owners of multiple vessels were instructed to report their cumulative business costs across all vessels and to provide the number of vessels owned. Average business cost per vessel was calculated by dividing the reported costs by the number of vessels included in the survey.

Other Costs

Vessel owners were given the option to note additional costs in all three survey years. The vast majority (95%) of respondents across the 3 survey years did not list any additional costs in this section. A slightly higher proportion of respondents filled in Other Costs for the 2015 survey compared to 2011 and 2012. For the 2015 survey, haul-out costs were the most frequent other cost listed

Value of Vessel and Associated Permits

This information was collected to help determine the economic health of a fishing business. Vessel owners were asked to provide the current combined market value of the vessel and its associated fishing permits.

Total Payment to Crew/Hired Captain and Crew Payment System

Vessel payments to crew/hired captain and benefits paid to crew/hired captain were collected all 3 survey years. The vast majority of vessel owners across all years (~90%) indicated they did not provide benefits to crew. Crew payments and benefits were aggregated to form the total payment to crew/hired captain category.

A share system was determined to be the most likely form of payment. For the 2015 survey, vessel owners were asked directly if their method of crew payment was a share system, a flat rate, or a combination. Additionally, for all survey years, the vessel owner was asked whether the vessel listed was run owner-operator or if a captain was hired.

The table below is presented to show the number of surveys sent out and the response rate. Because it was a voluntary survey the response rate declined each year the survey was conducted.

Table 8-23 SSB (Northeast) fixed cost survey sample size and response, by strata.

	2011			2012			2015		
	Sample	Response	% Response	Sample	Response	% Response	Sample	Response	% Response
Dredge_Large	144	29	20.1%	83	16	19.3%	123	7	5.7%
Dredge_Small	82	11	13.4%	86	4	4.7%	119	5	4.2%
Gillnet_Large	60	24	40.0%	61	14	23.0%	96	3	3.1%
Gillnet_Small	58	16	27.6%	62	12	19.4%	84	7	8.3%
Handgear_Large	32	4	12.5%	27	7	25.9%	87	7	8.0%
Handgear_Small	114	43	37.7%	186	45	24.2%	140	14	10.0%
Longline & Seine	25	8	32.0%	38	6	15.8%	58	5	8.6%
Pot/Trap_Large	276	80	29.0%	380	92	24.2%	618	36	5.8%
Pot/Trap_Small	295	96	32.5%	657	128	19.5%	918	60	6.5%
Trawl_Large	101	33	32.7%	86	22	25.6%	97	7	7.2%
Trawl_Small	100	28	28.0%	112	12	10.7%	149	9	6.0%
Total	1,287	372	28.9%	1,778	358	20.1%	2,489	160	6.4%

Source: NOAA Technical Memorandum NMFS-NE-278

Table 8-24 NE Sector participants survey mean cost per vessel data, 2011, 2012, and 2015

	2011		2012		2015		Mean	
Strata	N	$/Vessel	N	$/Vessel	N	$/Vessel	N	$/Vessel
Large Trawl								
Total Fixed Cost	30	212,079	18	169,089	5	86,669	18	155,946
Repair & Maintenance	30	79,197	20	51,554	3	22,088	18	50,946
Upgrades/Improvements	27	31,617	17	29,169	4	22,376	16	27,720
Vessel Fees and Insurance	29	46,919	20	43,663	5	19,643	18	36,742
Vessel Permit Value	29	61,018	18	46,608	5	35,874	17	47,834
Crew & Captain Payments	29	257,128	20	178,908	5	81,848	18	172,628
Small Trawl								
Total Fixed Cost	28	56,128	10	72,031	7	48,718	15	58,959
Repair & Maintenance	27	23,121	12	12,932	7	27,797	15	21,283
Upgrades/Improvements	26	10,876	11	14,353	7	12,574	15	12,601
Vessel Fees and Insurance	26	8,310	12	8,022	8	8,442	15	8,258
Vessel Permit Value	25	17,758	9	36,043	7	7,147	14	20,316
Crew & Captain Payments	22	59,518	12	35,102	8	52,360	14	48,993

8.2.2 Trip Level Cost Data

Additional data on trip level costs will be provided in the final draft of this document.

8.3 BC Groundfish Catch Share Costs

Table 8-25 BC Groundfish Program fleet-wide costs under catch share program in 2009 (as reported in Nelson 2011)

Groundfish Trawl Fleet	Bottomfish Only	Hake Only	Bottomfish and Hake	Fleet Total
Number of Vessels	31	8	25	64
Landings (kg) – All Species	15,391,467	14,053,325	56,521,398	85,966,190
Vessel Price (per kg)	$1.10	$0.25	$0.46	$0.54
Gross Revenue (Gross Stock)	$16,948,640	$3,501,510	$26,253,956	$46,704,106
Less: Fishery Specific Expenses				
Fuel	2,708,250	360,000	4,229,250	7,297,500
At-sea monitoring	961,875	27,000	931,050	1,919,925
Offload Monitor	127,245	51,637	274,704	453,586
License / Co--management Fees	490,350	123,049	758,602	1,372,001
License / Quota lease	712,105	327,828	1,646,183	2,686,115
Ice	252,500	120,000	759,913	1,132,413
Gear Maintenance/replace	--	--	--	--
Total Fishery Specific Expenses	5,252,325	1,009,514	8,599,702	14,861,540
Net Revenue (Net Stock)	11,696,315	2,491,996	17,654,255	31,842,565
Less:				
Captain's Bonus	652,434	124,600	1,051,920	1,828,954
Deckhand Shares	5,189,542	996,798	7,893,075	14,079,415
Fishery Contribution (Boat Share)	5,854,339	1,370,598	8,709,259	15,934,196
Vessel Fixed Expenses				
Insurance	465,000	120,000	375,000	960,000
Repairs & Maintenance	3,300,000	600,000	3,525,000	7,425,000
Moorage	62,000	16,000	50,000	128,000
Miscellaneous	155,000	40,000	125,000	320,000
Total Vessel Expenses	3,982,000	776,000	4,075,000	8,833,000
Earnings (EBITDA)*	$1,872,339	$594,598	$4,634,259	$7,101,196

Source: Nelson, S. 2011.
* EBITDA: Earnings before interest, taxes, depreciation, and amortization.

Table 8-26 BC Groundfish Program mean vessel costs and revenue under catch share program in 2009 (converted to 2020 US $)

Groundfish Trawl Fleet	Bottomfish Only	Hake Only	Bottomfish &Hake	Fleet Total
Number of Vessels	31	8	25	64
Landings (lbs) – All Species	1,094,591	3,872,780	4,984,328	2,961,293
Vessel Price (per lb)	$0.43	$0.10	$0.18	$0.21
Gross Revenue (Gross Stock)	$468,030	$376,350	$891,237	$621,590
Less: Fishery Specific Expenses (variable costs)				
Fuel	$74,867	$38,563	$144,973	$97,714
At-sea monitoring	$26,590	$2,892	$31,915	$25,708
Offload Monitor	$3,518	$5,531	$9,416	$6,074
License / Co--management Fees	$13,555	$13,181	$26,004	$18,371
License / Quota lease	$19,685	$35,117	$56,429	$35,967
Ice	$6,980	$12,854	$26,049	$15,163
Gear Maintenance/replace	$0	$0	$0	$0
Total Fishery Specific Expenses (non-crew variable costs)	$145,195	$108,140	$294,785	$198,997
Net Revenue minus non-crew variable costs	$323,333	$266,944	$605,163	$426,374
Less crew costs:				
Captain's Bonus	$18,036	$13,347	$36,058	$24,490
Deckhand Shares	$143,460	$106,778	$270,563	$188,524
Gross ex-vessel revenue less all variable costs	$161,837	$146,819	$298,541	$213,360
Vessel Fixed Expenses				
Insurance	$12,854	$12,854	$12,854	$12,854
Repairs & Maintenance	$91,225	$64,272	$120,832	$99,421
Moorage	$1,714	$1,714	$1,714	$1,714
Miscellaneous	$4,285	$4,285	$4,285	$4,285
Total Vessel Expenses (fixed costs)	$110,078	$83,126	$139,685	$118,274
Mean Earnings Per Vessel (EBITDA)*	$51,759	$63,694	$158,856	$95,085

Converted to 2020 $ using: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000501
Converted to US dollars using an exchange rate of $1.0 Canadian equals $0.75 US dollar using: https://www.exchangerates.org.uk/CAD-USD-spot-exchange-rates-history-2020.html
* EBITDA: Earnings before interest, taxes, depreciation, and amortization.

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Table 8-27 Percent of gross revenue by cost and earnings, 2009

Item	Bottomfish Only	Hake Only	Bottomfish and Hake	Fleet Total
Fuel	16.0%	10.3%	16.1%	15.6%
At-sea monitoring	5.7%	0.8%	3.5%	4.1%
Offload Monitor	0.8%	1.5%	1.0%	1.0%
License / Co-management Fees	2.9%	3.5%	2.9%	2.9%
License / Quota lease	4.2%	9.4%	6.3%	5.8%
Ice	1.5%	3.4%	2.9%	2.4%
Captain's Bonus	3.8%	3.6%	4.0%	3.9%
Deckhand Shares	30.6%	28.5%	30.1%	30.1%
Insurance	2.7%	3.4%	1.4%	2.1%
Repairs & Maintenance	19.5%	17.1%	13.4%	15.9%
Moorage	0.4%	0.5%	0.2%	0.3%
Miscellaneous	0.9%	1.1%	0.5%	0.7%
Earnings (EBITDA)*	11.0%	17.0%	17.7%	15.2%

* EBITDA: Earnings before interest, taxes, depreciation, and amortization.