# Trawl Costs of Management–Phase Two

*Prepared for*

## Pacific Fishery Management Council

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# Contents

**Table** **Page**

**Figure** **Page**

# Abbreviations

| | |
|---|---|
| DPC | Direct program costs |
| EDC | Economic Data Collection Program |
| EFP | Exempted fishing permit |
| EM | Electronic monitoring |
| EO | Executive Order |
| FISHEyE | FISHeries Economics Explorer |
| FEIS | Final Environmental Impact Statement |
| FMC | Financial Management Center |
| FMP | Fishery Management Plan |
| FRSL | First Receiver Site License |
| FY | Fishing year |
| IFQ | Individual Fishing Quota |
| LAPP | Limited Access Privilege Program |
| LEP | Limited entry permit |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NWFSC | Northwest Fisheries Science Center |
| OLE | NOAA Office of Law Enforcement |
| OMB | Office of Management and Budget |
| PRA | Paperwork Reduction Act |
| PSFMC | Pacific States Marine Fisheries Commission |
| QA | Quality assurance |

| | |
|---|---|
| QC | Quality control |
| RFA | Regulatory Flexibility Act |
| TAC | Total Allowable Catch |
| VMS | Vessel Monitoring System |
| WCGOP | The West Coast Groundfish Observer Program |
| WCR | West Coast Region |

# Executive Summary

The purpose of this project for the Pacific Fishery Management Council is to build on the first phase of work to provide an assessment of key program elements and options to reduce costs associated with the West Coast Groundfish Trawl Catch Share Program. This assessment reviews the original intent of program elements, information on how the context for the element has evolved over time, and trade-offs associated with broad scale options to reduce costs. The intent is to provide clear and unbiased information to the Council that would allow it to make informed decisions regarding future consideration of potential policy actions. The objective is not to direct the Council to specific actions it should take.

The report considers several options in its evaluation of potential cost savings and tradeoffs, these specifically are changes to the Economic Data Collection (EDC) Program and changes to the at-sea and shoreside catch monitoring programs (collectively, monitoring program). Within the EDC program, this report explores tradeoffs associated with three options: reducing the periodicity of data collection from every year to occurring more infrequently, reducing annual data collections using a sampling protocol to focus on certain sectors or issues with a census of participants on all data happening only occasionally, and annually censusing only active participants. For the monitoring program, this report explores two options for modifying the at-sea monitoring requirements and two options for modifying the shorebased requirements. For at-sea monitoring, we examine the potential to reduce monitoring coverage to some fixed level (such as 50%), or changing to a variable coverage rate, where coverage could be higher or lower based on biological or economic conditions. For shoreside monitoring, we explore removing the shorebased catch monitor requirements altogether, or moving to a lower level of coverage. We also briefly explore potential cost savings for other information collection programs.

The evaluation of these options is intentionally high-level and qualitative, with the goal in mind to identify coarse and emergent factors with respect to potential cost-savings and trade-offs. This report is intended to assist the Council in identifying the potential for subsequent action with respect to any of the topics explored, which if and when that occurs, a full analysis of these options, including quantitative modeling of alternatives, where appropriate, would occur.

Here we summarize major results and conclusions from the report for each section, as well as conclusions looking across these options.

## Monitoring Program

The comprehensive industry-funded monitoring program requirements laid out in the implementation of the West Coast Groundfish Trawl Catch Share Program were intended to support

the Council's overall goal related to achieving individual accountability of catch and bycatch and several key objectives including:

- Provide a mechanism for total catch accounting.
- Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.

However, it was also expected that the catch share program would generate additional economic benefits that would offset associated costs, including monitoring costs. Since the program was implemented, discards of all stocks have dropped dramatically and the number of overfished and rebuilding stocks has decreased steadily, with no overfished stocks in 2023 (Figure 2, Figure 1). Despite these biological successes, as noted in the first review of the program conducted in 2017, as subsidies for monitoring costs dissipated, participants found the costs of the program to be burdensome. Fishery participants reported that these costs decrease the profitability, discourage investment in capital repair or improvement, and that these impacts may be felt worse by smaller vessels for whom monitoring costs make up a larger percentage of their gross revenue (PFMC and NMFS 2017).

While electronic monitoring (EM) may be more cost-efficient for some, to date, adoption of EM has been more widespread for whiting vessels. While the data on EM participation precludes counting unique vessels by fishery and gear type, based on information from interviews, the proportion of non-whiting vessels using EM, particularly bottom trawl vessels, is much lower than in the whiting fishery. Reports from industry and EM experts suggest that catch handling and inefficiencies introduced by EM for these vessels makes it a less cost-effective option for at-sea monitoring. In 2022, 26 vessels that delivered whiting to shoreside processors and 18 vessels delivering to motherships used EM (Figure 6). In addition, 18 vessels targeting rockfish using midwater trawl gear have also used EM, while relatively fewer vessels using bottom trawl (10) or fixed gear (8) have participated.

Differences in the use of various monitoring tools by vessels have influenced total and relative costs of monitoring across fleets, particularly between whiting and non-whiting catcher vessels. Overall, shorebased processors, motherships, and catcher-processors pay the lowest proportion of their catch share gross revenues for monitoring services (less than 1%, between 2020 and 2022), while non-whiting trawl and fixed gear vessels pay the most (4.54% and 2.96%, respectively, Table 4 and Table 5). Implementation of the regulatory program for EM has increased incremental costs and cost recovery fees in recent years (Figure 7, Figure 8), which have also influenced costs for industry, particularly for fleets whose fees do not exceed the cost recovery cap.

In the report, we explore several changes to both the shoreside and at-sea monitoring requirements to reduce coverage levels to less than 100%. We generally consider how these changes would impact costs for using at-sea observers or shorebased catch monitors, but also discuss how these changes might affect EM program design and the relative cost-effectiveness of these tools for monitoring. For

shoreside monitoring options, we explore implications for removing shoreside monitoring requirements altogether or reducing to a fixed rate. For at-sea monitoring, we explore similarly reducing coverage rates to a fixed coverage rate (e.g., 50%) or to a variable coverage rate, which could change based on biological or economic conditions.

A primary impact from changing any monitoring program element is how this may affect compliance with reporting requirements and the enforceability of these requirements. While observers' and catch monitors' duties are to generate biological data records and verify catch records, they can report noncompliance to enforcement officials, and as such both work to deter noncompliance and support compliance with reporting requirements.

Relative to changes to the at-sea monitoring program, changes to the shoreside monitoring program may minimize negative compliance and biological impacts, but have the lowest cost saving potential, particularly for fleets that currently pay the highest relative cost for monitoring, such as inshore trawlers. Reducing at-sea monitoring coverage rates has a higher potential for reducing costs, but have greater potential negative compliance and biological impacts, stemming from the difficulty of detecting and quantifying noncompliance at sea, risks of overfishing, and potential biases in biological and harvest data. All monitoring program changes may necessitate revisiting the design of the EM program for meeting a new catch monitoring standard, but variable coverage rates for at-sea or shoreside monitoring may necessitate additional trip-selection, observer deployment, and quota monitoring systems. In addition, regulatory flexibility may need to be reduced as a result of more uncertainty in catch and discard data.

In addition, we also discuss potential negative impacts to sustainability certifications for the Pacific whiting and groundfish trawl fisheries, as well as potential benefits to observer and vessel safety from reducing coverage rates (see the *Other Considerations* section for more information).

Trade-offs and potential impacts by option are summarized in ES Table 1.

**ES Table 1. Summary of Potential Monitoring Program Impacts**

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| **Shoreside Monitoring (Catch Monitors)** | **No Shoreside Monitoring** | Monitoring Cost Savings | Low Positive to Positive | Extent of cost savings depends on sector and fleet. Cost savings may primarily accrue to processors. Higher administrative costs may increase cost recovery fees. |
| | | Compliance and Enforceability | Low Negative to Negative | Enforcement agents may have other mechanisms and presence to detect shoreside violations, but risk for nonreporting or misreporting may still increase. |
| | | Biological Impacts | Low Negative to Neutral | If noncompliance is minimal or does not induce overfishing, minimal impacts may occur. If more noncompliance occurs, especially if/when incentives are higher, biological impacts may be more negative. |
| | | Administrative Impacts | Low Negative | No new catch monitor deployments systems would be needed, but the EM program may need to be redesigned, causing more short-term impacts. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| | | Information and Data Availability | Neutral | Minimal impacts to data streams since catch monitors (other than those used for EM) do not make data records. |
| | **Reduced Fixed Shoreside Coverage Rate** | Monitoring Cost Savings | Neutral to Low Positive | Cost savings may be minimal if catch monitor deployment is separate from and decoupled from at-sea monitoring services. If coupled with at-sea monitoring rate changes, savings are more likely to be positive. Cost savings may only accrue to those using EM if the EM program is redesigned. Higher administrative costs may increase cost recovery fees. |
| | | Compliance and Enforceability | Low Negative to Neutral | Compliance and enforceability may be similar to levels under 100% monitoring if selection is random and not known when a vessel is fishing. If harvesters and processors know when they will be monitored, compliance and enforceability may be negatively affected. |
| | | Biological Impacts | Low Negative to Neutral | If compliance is high, per the compliance and enforceability discussion, biological impacts may be neutral. If harvesters and processors know when they will be monitored, noncompliance and bias in data may occur. |
| | | Administrative Impacts | Negative | New catch monitor deployment and trip selection systems will need to be developed. Additionally, the EM program requirements may need to be redesigned. |
| | | Information and Data Availability | Neutral | Minimal impacts to data streams since catch monitors (other than those used for EM) do not make data records. |
| **At-sea Monitoring Coverage Rate (all three sectors)** | **Reduced Fixed At-Sea Monitoring Coverage Rate** | Monitoring Cost Savings | Low Positive to High Positive | Cost savings may be higher as coverage decreases but may be less than 1:1 due to decreases in efficiency for hiring, maintaining, and deploying observers. Higher administrative costs may increase cost recovery fees. |
| | | Compliance and Enforceability | Low Negative to High Negative | Compliance and enforceability will be more adversely affected as coverage decreases, and when incentives for noncompliance are higher. Substantial changes in compliance may occur with small changes in coverage (see Synthesis and Conclusions section for more information). |
| | | Biological Impacts | Low Negative to Negative | Biological impacts may be more negative at lower levels of coverage. A higher proportion of unobserved trips increases the risk of uncertainty and bias affecting stock assessments and a higher risk of noncompliance increases risks of overfishing. |
| | | Administrative Impacts | Negative | Potentially new catch observer deployment, trip selection and quota monitoring systems/procedures will need to be developed, in addition the EM program requirements may need to be redesigned. Regulatory flexibility may decrease. |
| | | Information and Data Availability | Low Negative to High Negative | Reduced information from observers will decrease information for quota monitoring and information about protected species interactions. |
| | | Other Impacts | Neutral to Negative | MSC certification scores may be negatively affected by uncertainty in data and lower at-sea monitoring requirements. |
| | **Variable At-Sea Coverage Rate** | Monitoring Cost Savings | Uncertain | Will depend on the nature of the program and triggers for determining coverage rates. Due to more administrative costs, cost recovery fees may increase more or over a longer time period. |
| | | Compliance and Enforceability | Uncertain | Will depend on the nature of the program and triggers for determining coverage rates. |
| | | Biological Impacts | Uncertain | Will depend on the nature of the program and triggers for determining coverage rates. |
| | | Administrative Impacts | High Negative | Will incur many of the same negative impacts as described for reduced at-sea monitoring coverage but require more ongoing costs for determining coverage rates and monitoring performance on an ongoing basis. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| | | Information and Data Availability | Uncertain | Will depend on the nature of the program. May be difficult to have variable and uncertain levels of information across years. |
| | | Other Impacts | Neutral to Negative | MSC certification scores may be negatively affected by uncertainty in data and lower at-sea monitoring requirements. |

*Note: Impacts are relative to status quo (i.e., 100% shoreside and at-sea monitoring) and potential cost savings are for vessels and fleets that use humans for monitoring. Changes to the EM program design may be an additional impact. Potential impacts are based on qualitative information from a variety of sources, but primarily from existing literature, expert interviews, and best professional judgement and should be considered rough and high-level.*

*Source: Northern Economics Analysis*

## Economic Data Collection Program

The EDC Program was developed to collect data that provides the necessary information to meet Magnuson-Stevens Fishery Conservation and Management Act (MSA) and other regulatory requirements associated with understanding the groundfish catch share program's impacts. EDC program data are used to understand the economic effects on operating costs, gross revenues, vessel characteristics, and processing facility characteristics. The EDC program also collects data to evaluate the program's goal of providing for a viable, profitable, and efficient groundfish fishery; increased operational flexibility; minimizing adverse effects from an individual fishing quota (IFQ) program on fishing communities and other fisheries to the extent practical; promoting measurable economic and employment benefits through the harvesting, processing, distribution, and support sectors of the industry; providing quality products for consumers; and, increasing safety in the fishery. Having the ability to understand whether these goals are being met was an important consideration by that Council in the development of the EDC program. The requirement that data are collected to evaluate program goals also grants policy makers the authority to determine the data needed to inform their evaluation of the program.

In addition to the status quo, three different collection methodologies are reviewed in this paper to consider whether the tradeoffs between costs and benefits may be sufficient to alter the program. The methodologies considered, in addition to the status quo, include conducting a census less frequently, sampling sector populations to supplement less frequent census, and conducting an annual census of just active participants.

Each sector's annual direct costs of submitting 2022 EDC data is presented in Table 14 and it shows that the total cost for all sectors was about $116k. The average cost per submission was the largest for first receivers/shorebased processors ($744). Catcher vessels cost per submission was next at $541, followed by motherships and catcher-processors ($298) and quota share holders ($52). In terms of overall direct cost, the catcher vessel sector paid $68,702, the first receivers/shorebased processors paid $34,987, quota share holders $7,968, catcher-processors $2,978, and motherships $1,787.

Indirect costs, the payment to reimburse agency costs (cost recovery) are presented in Table 15 by sector for the years 2017 through 2023. Those data indicate that there has been a steady and substantial decline in recoverable EDC costs over that period for all sectors. During 2022 the IFQ sector's EDC program costs were $129k. For all sectors combined, overall costs have declined by 75% during that period.

Total costs associated with the EDC program, direct plus indirect, were $268k in 2022 for all sectors. Whether that total cost is paid by participants in the catch share program depends on whether cost recovery fees are limited by the 3% cap that year. The mothership and catcher-processor sectors were always below the 3% cap from 2017 through 2023, so any indirect cost savings under the changes considered would be realized through cost recovery fee reductions, all else being equal. The IFQ sector would realize indirect cost savings in some years. Table 17 shows that eliminating the EDC recoverable costs would not have changed the indirect cost to the IFQ sector in five of the eight years from 2017 through 2023.

A summary of the directional changes in costs and data loss by sector and option is presented in Table 20. Conducting a census less often will result in data loss the years the surveys are not conducted. Because the fisheries are never the same for two consecutive years, not conducting the survey during a year with substantial changes (COVID year for example) would limit analyst's ability to detail all the economic impacts.

Based on EDC staff's experience, there could be knowledge loss regarding how to complete the survey if it is not collected every year. The loss could be due to more time passing between when the surveys are completed by the same person or employee turnover. Knowledge loss could increase the time it takes to complete the survey and increase quality assurance (QA) and quality control (QC) time required by National Marine Fisheries Service (NMFS) staff for each survey submitted. A reduction in overall QA/QC costs may be achieved since fewer forms need to be checked.

Current EDC submission regulations would need to be modified, which would increase agency costs and indirect industry costs in the short term. Current regulations require the EDC forms to be submitted and completed before a person can participate in fisheries. Consequences for failure to submit a completed EDC survey apply to permit holders, vessel owners, and vessel lessee or charterers and could result in not being issued quota or not having required vessel permits approved.

Changes to the survey would require Office of Management and Budget (OMB) approval of an updated Paperwork Reduction Act (PRA) application. This process would increase agency staff time and costs in the short term.

Moving from a census to a sampling of participants in a sector would only be possible for the IFQ sector. There are too few participants in the mothership and catcher-processor sector to collect a representative sample of the population without triggering confidentiality issues. Sampling the IFQ sector would also pose substantial challenges because of the heterogeneity in the harvesting and

processing sectors. Some individuals would need to be sampled every year or critical data would not be collected for some products or harvest vessel categories. Industry participants may view being selected every year for the survey as unfair.

Moving to a sampling procedure would decrease costs in the long run by some unknown amount and increase agency costs in the short-term (about three years) as regulations are changed, surveys are updated and tested, models are developed to describe the unsampled portion of the population, and paperwork for OMB approval is developed and submitted.

Overall, moving to a sampling model would be expected to have substantial negative impacts on data availability, with small but unquantified cost savings for the IFQ sector in the long run. A sampling procedure would have similar impacts on knowledge loss by the persons submitting the data and QA and QC issues for the agency as a less frequent census.

Conducting a census of just active participants could result in cost savings and limited loss of data quality for the non-IFQ fisheries. For limited entry permit (LEP) holders, it would decrease the reporting burden on individuals not harvesting groundfish under the catch share program. The number of inactive LEP holders varies by year. From 2011 through 2022 the range of catcher vessel LEP permits that had no landings reported was 31 to 42, with an annual average of 35 LEP permits. The direct cost savings would only accrue to LEP holders that did not fish groundfish that year. The administration burden on EDC staff, Permits Office staff, and the Office of Law Enforcement staff to identify and contact individuals that have not submitted their required forms would decrease. Compliance issues associated with holding vessels liable for someone else assigning a permit to their vessel could be reduced. Information from the vessels removed from the survey could impact data for non-IFQ fisheries but still be collected through other surveys conducted by NOAA Fisheries.

Modifying regulations to only require buyers that purchased IFQ groundfish to submit the First Receivers/Shorebased Processors EDC survey rather than all buyers with a first receiver/site license (FRSL) would reduce costs. It is estimated that 15 to 20% of FRSL permits are not used annually to process groundfish harvested under the catch share program. The people holding these inactive permits would directly benefit; people holding and using a FRSL would not realize any direct benefits from this regulatory change.

Not surveying FRSL holders that were inactive in the IFQ fishery could reduce the information available for non-IFQ species. As the number of firms active in the fishery declines, the impact on available information for other fisheries could increase over time.

This option could also introduce reporting issues for first receivers that do their accounting based on a fiscal year that is different from the calendar year. The change could result in the survey only collecting a partial year's information.

Reducing the consistency of when a firm is required to complete the EDC survey could also create confusion in terms of what years the survey is required. Loss of knowledge of how to complete the

survey for bookkeepers that have not had to complete the survey for several years or if there was a new bookkeeper that needed to complete the survey the first time.

ES Table 2 provides a high-level overview of options considered. Potential cost savings by sector and a description of the impacts is provided.

**ES Table 2. Summary of Potential Economic Data Collection Program Impacts**

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| Reduced Census | IFQ | Direct Cost Savings (industry) | Low Positive to Positive | The extent of cost savings depends on how often sectors are surveyed and the bookkeeping savings in non-survey years. During non-survey years there would be no cost for either the catcher vessels or first receivers to submit the data, but they may still incur bookkeeping costs. |
| | | Indirect Cost Savings (industry) | Neutral to Low Positive | Lower administrative costs may decrease cost recovery fees during years when they are not at the maximum amount. Cost decreases would be reduced during the years when regulatory changes are developed and implemented, including PRA requirements. |
| | | Agency Cost Savings | Neutral to Low Positive | Agency cost savings would occur, but not be eliminated, during the years the survey is not conducted. Cost savings would not be expected to change during survey years. Cost recovery fee limits impact the cost borne by agencies. |
| | | Data Impacts | Low Negative to Negative | Data would be unavailable for years when it is not collected and would have the greatest impact when substantial changes to the fishery occurred. Could increase QA and QC costs to ensure data are reported correctly. More inconsistent data when person submitting the form must make assumptions and those assumptions change based on the person submitting the data. |
| | | Other Impacts | Low Negative to Negative | Knowledge loss by the person submitting the data could increase the time required to complete the forms. Increased assumptions by analysts that must explain changes in the fishery. Requires regulatory and PRA changes. |
| | Mothership (including the catcher vessels) and Catcher-Processor | Direct Cost (industry) | Low Positive to Positive | Cost savings may be minimal because of the relatively low direct costs incurred by these sectors. The actual savings will depend on the difference in bookkeeping costs during non-survey years. |
| | | Indirect Cost (industry) | Neutral to Low Positive | Lower administrative costs would decrease cost recovery fees. Cost reductions would be greatest after necessary regulatory changes are developed and implemented, including PRA requirements. |
| | | Agency Cost | Neutral to Low Positive | Agency cost savings would be realized, but not be eliminated, during the years the survey is not conducted. Cost savings would not be expected to change during survey years. Cost recovery fee limits have not impacted the cost borne by agencies. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| | | Data Loss | Low Negative to Negative | Data would be unavailable for years when it is not collected and would have the greatest impact when substantial changes to the fishery occurred. Could increase QA and QC costs to ensure data are reported correctly. |
| | | Other Impacts | Low Negative to Negative | Knowledge loss by the person submitting the data could increase the time required to complete the forms. Increased assumptions by analysts that must explain changes in the fishery could be required. Requires regulatory and PRA changes. |
| **Sample of Stratified Sectors** | **IFQ** | Direct Cost Savings (industry) | Low Positive to Positive | Sector will still incur record keeping costs because they will not know if they will be sampled until after the season is over. There could be minor direct cost savings because fewer people would be completing the survey. |
| | | Indirect Cost Savings (industry) | Neutral to Low Positive | Higher administrative costs may increase cost recovery fees during years they are not at the maximum amount. These costs would be greatest during the years when regulatory changes are developed and implemented, including PRA requirements. |
| | | Agency Cost Savings | Neutral to Low Positive | Agency costs associated with data collection and review would decrease because fewer forms are submitted. Costs would increase to develop models to describe unsampled portion of the population. Overall cost savings would be small. |
| | | Data Impacts | Low Negative to Negative | Development of models to estimate values for unsampled portion of the population would increase costs and potentially have large estimation errors. Could reduce confidence in the information provided. Knowledge loss could increase QA/QC issues. |
| | | Other Impacts | Low Negative to Negative | Heterogeneity within the fleet would require development of sampling strata. To collect representative data some firms/individuals would need to be surveyed every year, which may trigger fairness concerns. Requires regulatory and PRA changes. |
| | **Mothership and Catcher-Processor** | Because of the limited number of participants in the fishery, implementing a random sample survey methodology would not be a viable option given confidentiality constraints. | | |
| **Census Active Participants** | **LE Permit Holders** | Direct Cost Savings (industry) | Low Positive to Positive | There will not be any recordkeeping or reporting costs for non-participants during the year. Active participants will realize similar costs to the status quo. Overall, there will be cost savings to industry |
| | | Indirect Cost Savings (industry) | Neutral to Positive | Indirect costs will decline during the years that the cost recovery fee is less than 3%. During years when the full 3% is charged, the cost reductions would not be realized. |
| | | Agency Cost Savings | Low Positive to Positive | Agency cost savings would result from fewer surveys to process and less need to find and contact people that are not active in the catch share program that have not completed the survey. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| | | Data Impacts | Neutral to Low Negative | No impact on the catch share fishery data but could have a minor negative impact on non-catch share fishery data. Other surveys could supplement that data as needed. |
| | | Other Impacts | Neutral to Low Negative | Would require regulatory and PRA changes |
| | FRSL holders | Direct Cost Savings (industry) | Low Positive to Positive | Will reduce costs for FRSL holders that are not active in the fishery that year. Costs for FRSL holders that are active in the catch share program would realize costs like the status quo. |
| | | Indirect Cost Savings (industry) | Neutral to Positive | Indirect costs will decline during the years that the cost recovery fee is less than 3%. During years the full 3% is charged, the cost reductions would not be realized |
| | | Agency Cost Savings | Low Positive to Positive | Agency cost savings would result from fewer surveys to process and less need to find and contact persons not active in the catch share program that have not completed the survey. |
| | | Data Impacts | Neutral to Low Negative | No impact on the catch share fishery data but could have a minor negative impact on non-catch share fishery data. Other surveys could supplement that data as needed. |
| | | Other Impacts | Neutral to Low Negative | Would require regulatory and PRA changes |

## Other Information Collection Programs

Two other information collection programs are briefly considered in this paper to determine whether cost savings might be realized. In both cases, the information collected is considered important and the changes considered in this paper would result in relatively small cost savings. Vessel Monitoring System (VMS) gives management and enforcement agencies the ability to track the time, location, and speed of vessels. That information can be used to validate fishing locations and whether a vessel is fishing, moored, or steaming. That information is useful for managing areas that are closed to fishing or using certain types of gear. Scaling back the VMS requirements would be expected to have a small reduction in costs since the VMS program would not be eliminated. Vessel operators would still be required to maintain the system and have a service agreement. None of the changes would reduce agency costs and to the extent they may increase enforcement costs they could be passed on to industry through cost recovery fees. Reducing the number of VMS submissions and the change in activities that trigger a required submission would reduce the reporting burden for harvesters that must coordinate the transfer of information with their home office.

Mothership and catcher-processor cooperative reports are annually submitted to the Council and provide specific information that the Council has determined to be important to better understand the fisheries. The Council has already removed the requirement for a preliminary report. Representatives for the two sectors have not expressed cost concerns over providing the reports that

have an established template, but some participants have expressed concern about the confidentiality of the data submitted.

## Conclusions

- Total industry costs for the EDC program in 2022 were $268,000 for all sectors and costs have been steadily declining since 2017.
- Average annual industry costs between 2020 and 2022 for the at-sea monitoring program were $2,185,881 and $1,038,668 for shoreside monitoring, for a total of $3,224,549.
- Due to the differences in total industry costs associated with the EDC program and the monitoring program, changes to the monitoring program have a greater potential to reduce costs than changes to the EDC program.
- Major tradeoffs identified vary between these options, with the top trade-offs identified for monitoring program changes including potential negative impacts to compliance and enforceability of reporting requirements and biological impacts resulting from greater uncertainty and bias in discard and landings data. Negative administrative impacts may stem from new observer deployment and quota monitoring systems, redesign of the EM program, and loss of regulatory flexibility for harvesters. Top tradeoffs for changes to the EDC program include the loss of data that help analysts understand factors that contribute to cost changes, regulatory costs associated with changing data submission requirements, inability to model data not collected some years or for some strata, increased QA and QC costs to ensure accurate data, increased enforcement if people are not certain which years they must complete the surveys, and increased concern regarding the representativeness of the data utilized in analyses.

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# Introduction

## Purpose

The purpose of this project for the Pacific Fishery Management Council is to build on the first phase of work (Brannan 2023) to provide an assessment of key program elements and options to reduce industry and agency costs. This assessment reviews the original intent of program elements, ways in which the context for the element has evolved over time, and trade-offs associated with broad scale options to reduce costs.

This project utilizes information collected under Phase 1 of the project to provide greater detail on costs associated with specific elements of the catch share program relative to the benefits derived from those program elements by managers, policy makers, and stakeholders. Using that information and other information from the literature and other available sources, as necessary, we identify tradeoffs associated with either maintaining the current program structure or modifying certain aspects of the program. Program elements and options explored in this report are based on Council and NOAA Fisheries direction. The intent is to provide clear and unbiased information to the Council that would allow it to make informed decisions regarding future consideration of potential policy actions. The objective is not to direct the Council to specific actions it should take.

## Objectives

There are four primary objectives of the study:

1. Expand the discussion of costs borne by catch share participants and agencies associated with specific program elements that were identified as being of primary interest by the Council.

2. Describe tradeoffs associated with possible management changes. In addition to potential cost savings, such tradeoffs may describe potential impacts to data quality and uncertainty, enforceability of regulations, harvest and sustainability of fish stocks, and other potential direct or indirect effects,

3. Organize and present the information to inform any potential future amendments that may consider modifications to the program elements.

4. Present findings to the Council and its advisory bodies.

## Program Elements and Options Explored in This Report

While Phase 1 identified many features of the trawl catch share program that contribute to industry and agency costs, this report focuses on a subset of options to explore further, specifically:

1. **Economic Data Collection Program**
    a. Census every year from all sectors (status quo)
        i. *Limited Entry Trawl Catcher Vessels* - All owners, lessees, and charterers of a catcher vessel registered to a limited entry trawl endorsed permit.
        ii. *Catcher-Processors* - All owners, lessees, and charterers of a Catcher-processor vessel registered to a Catcher-processor-endorsed limited entry trawl permit.
        iii. *Motherships* - All owners, lessees, and charterers of a mothership vessel registered to a mothership permit.
        iv. *First Receivers* - All owners of a first receiver site license.
        v. *Shorebased Processors* - All owners and lessees of a shorebased processor that received round or headed-and-gutted individual fishing quota (IFQ) groundfish species or whiting from a first receiver.
        vi. *Quota Share Owners* - All owners of a Quota Share permit and account.
    b. Full collection periodically - Census of all industry segments listed under part a) but data submittal only required every X years.
    c. Random sample populations to supplement a periodic census or utilize a random sample protocol in place of a census.
    d. Census only active participants in the catch share program

2. **Shorebased and At-Sea Monitoring Programs**
    a. Shorebased catch monitoring program:
        i. Full coverage (status quo, 100%)
        ii. No shorebased monitoring program
        iii. Reduced shorebased monitoring coverage
    b. At-sea catch monitoring program:
        i. Full at-sea coverage (status quo, 100%)
        ii. Reduced at-sea monitoring coverage (fixed, e.g., 50%)
        iii. Variable coverage based on biological, economic or other conditions

3. **Other Information Collection Programs Discussed but Costs Not Analyzed**
    a. Cooperative reports
    b. Vessel Monitoring System (VMS) reports

### Chevron Deference Decision and This Report

In June of 2024, the Supreme Court issued a ruling on *Loper Bright Enterprises v. Raimondo*, overturning a 1984 legal precedent for federal agencies called the Chevron doctrine, where courts would defer to the agency interpretation of vague or ambiguous federal statutes. The case was motivated by a lawsuit in New England over the National Marine Fisheries Services' authority to compel industry to pay for at-sea monitoring services of the Atlantic herring fishery (National Fisherman 2024). This ruling has far-reaching implications for federal agencies and regulations that have not been determined, some of which may impact the ability for the federal government to require industry-funded monitoring. Due to the timing and considerable uncertainty in the effects of this decision, this potential is not considered in this report in the discussion of costs and tradeoffs of different options.

## Report Organization

This report is organized by program element, and each element discussion addresses the following:

- Why was the element included initially?
- Has anything changed since it was included/rationale for the element? How has the problem it sought to address changed?
- What would implications be for changing the element (trade-off analysis)?

## Data and Information Sources

Data on current costs and economic conditions are provided from a few primary sources:

- The Economic Data Collection Program (EDC)/ Fisheries Economics Explorer (FISHEyE)
- Pacific States Marine Fisheries Commission (PSMFC)
- The West Coast Groundfish Observer Program (WCGOP)
- Key informant interviews with NOAA Fisheries and Council staff and others as appropriate
- Interviews and stakeholder input from Phase 1 of this project

### Monitoring Program Information Sources

In addition to the information sources listed previously, we interviewed 21 experts to learn more about potential cost reductions because of monitoring program changes and other tradeoffs. These interviews spanned those knowledgeable about the structure and design of monitoring programs on the West Coast and in other regions, those knowledgeable about electronic monitoring (EM) programs, and those who could speak to unique or specific tradeoffs, such as biological impacts,

compliance and enforceability impacts, or potential impacts to sustainability certification. A summary of the number of interviews by affiliation and expertise is provided in Table 1 and Table 2.

As shown in both tables, interviews were not balanced across stakeholder types or area of expertise. Our goal was to gather targeted, high-level information about the current monitoring program and expectations of what might occur if the program was changed, not to gather systemic and representative information across groups. In some cases, more interviews from some groups or for some areas of expertise were needed to fill key information gaps. This was particularly true for the EM program, which is in its first year of implementation as a formal regulatory program.

**Table 1. Summary of Monitoring Program Interviews by Affiliation**

| Affiliation | Number of Individuals Interviewed |
|---|---|
| Federal Management Agency (e.g., NOAA, PSMFC, PFMC, OLE) | 10 |
| State Management Agency (WDFW, ODFW) | 1 |
| Harvester | 3 |
| Processor | 2 |
| Observer or EM Provider | 2 |
| Sustainability Certification | 3 |
| **Total** | **21** |

**Table 2. Summary of Monitoring Program Interviews by Expertise**

| Expertise | Number of Individuals Interviewed |
|---|---|
| Electronic Monitoring | 3 |
| Monitoring Program Costs | 9 |
| Monitoring Program Administration | 1 |
| Compliance and Enforceability | 4 |
| Sustainability Certification | 3 |
| Biological Impacts | 1 |
| **Total** | **21** |

*Note: People interviewed are assigned to the expertise category that they primarily fit into; however, in many cases interviewees had expertise and provided input across multiple topic areas.*

## Economic Data Collection Program Information Sources

Information sources for this section included those listed above, participants that complete the EDC forms, and NOAA Fisheries staff directly involved overseeing the EDC program. Participants in the fishery were interviewed under Phase 1 of this project and those discussions helped to inform Phase 2. Contributors of information are shown in Table 3.

**Table 3. Summary of EDC Program interviews**

| Affiliation | Number of Individuals Interviewed |
|---|---|
| NOAA Fisheries Staff | 4 |
| Harvester | 11 |
| Processors | 7 |
| Quota holder | 2 |
| **Total** | **24** |

One of the large processing firms had all its facility managers provide comments to a company representative who aggregated and shared them. In total, 24 individuals responded to the request for input. They represent quota holders and catcher vessel owners from California (4), Oregon (5), and Washington (4). Some of the vessel operators only fished non-whiting species with trawl or pot gear. Others fished non-whiting species and whiting. Whiting catcher vessel operators delivered to shoreside processors, to motherships, or both. The first receivers were in California (2), Oregon (4), and Washington (1). Four NOAA Fisheries staff also provided input.

Discussions with NOAA Fisheries staff helped inform the discussion of benefits and costs of tradeoffs across options. Those discussions also helped identify the issues that might arise when trying to stratify sectors under a survey sampling protocol.

# Monitoring Program

## Monitoring Program Structure

The catch share program requires 100% industry-funded at-sea observer coverage for all catcher vessels, motherships, and catcher-processors while fishing or processing at sea (referred to as at-sea monitoring in this report) as well as 100% shorebased catch monitoring coverage for vessels that deliver to shorebased processors or other first receivers (called "catch monitors" in this report) (PFMC and NMFS 2017). Harvesters and at-sea processors are responsible for arranging and paying for observers while shorebased processors are officially responsible for paying for catch monitors.

Observers are employed by private third-party companies ("observer providers"). The West Coast Groundfish Observer Program (WCGOP) trains, certifies, and equips catch share observers; ensures data quality; and stores, maintains, and analyzes data collected by observers (NOAA Fisheries 2024b). Observers are biologists who work independently onboard fishing vessels to estimate bycatch, collect biological samples, and monitor for other fishery interactions with protected or endangered species. Most relevant for the catch share program, observers quantify discards of quota managed stocks. Observers focus on scientific data collection at sea, while catch monitors ensure compliance with landed fish sorting requirements (NOAA Fisheries 2012). For vessels that deliver to shorebased processors and use an observer for their at-sea monitoring, the observer typically serves as the catch monitor for the trip.

First receivers are required to have a catch monitor present for the entire duration of the landing. The catch monitor confirms that the total landings are accurately sorted, weighed, and recorded on fish tickets. Catch monitors independently report catch data to PSMFC and NOAA Fisheries catch accounting databases (NOAA Fisheries 2024b).

Motherships and catcher-processors are required to have two observers onboard, while catcher vessels are only required to have one observer, including the catcher vessels that deliver to motherships. While motherships and catcher-processors already had 100% monitoring prior to the implementation of the catch share program in 2010, non-whiting catcher vessels only had 14–24% coverage prior to the program (Somers et al. 2018). To assist with the sudden increase in monitoring costs, the National Marine Fisheries Service (NMFS) subsidized the program for catcher vessels and shorebased first receivers in the first five years of the program. For catcher vessels, the subsidy declined from $330 per day in 2011 to $0 in 2016. For shorebased first receivers, it decreased from a maximum of $328 per day ($41 per hour) in 2011 to $0 in 2016 (Warlick, Steiner, and Guldin 2018).

In recent years, EM has been formally approved as an alternative to human observers for at-sea monitoring purposes. EM was first introduced through an exempted fishing permit (EFP) program starting in 2015. In 2015, 34% of shorebased whiting vessels used EM and increased to 42% in 2016 (PFMC and NMFS 2017), EM was approved as an option for at-sea monitoring for both whiting

catcher vessels (midwater trawl vessels targeting Pacific whiting) and fixed gear vessels in the IFQ program in 2019 (84 FR 31146), for non-whiting midwater trawl and bottom trawl in 2022 (87 FR 59705), and it was offered as a formal option for these vessels to use starting in 2024 (88 FR 81354). A recent regulatory amendment revised some aspects of the EM program to address operational challenges associated with formally implementing the EM program, specifically, that some regulatory specifications may have been too restrictive and may lead to higher costs and lower net benefits (NMFS 2023a). At its March 2023 meeting the Council selected final preferred alternatives that would clarify regulatory deadlines and requirements and minimize cost increases as the industry transitioned from the EFP program (where video review was funded by NMFS) to bearing full costs of the program (NMFS 2023a), at this time a 10% video review rate for non-midwater trawl fleets was also selected (a decrease from 25%).

## Purpose of the Monitoring Program

The increased monitoring coverage rates under the catch share program were developed to meet the Council's management goal and objectives, and were accompanied by specific expectations about costs and benefits that increased monitoring coverage would yield. In this section we briefly review these goals, objectives, and expectations as important context for considering if and how to change the program.

### Fishery goals and objectives related to monitoring

The Council's main management goal for the catch share program highlighted the importance of monitoring, specifically through ensuring individual accountability of catch and bycatch:

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

In addition, eight objectives were described to support the management goal of the program. At least three of these could be interpreted as relating to the monitoring program, specifically:

- Provide a mechanism for total catch accounting.
- Promote practices that reduce bycatch and discard mortality and minimize ecological impacts.
- Provide for a viable, profitable, and efficient groundfish fishery.

These objectives relate to the monitoring program requirements in several ways: Firstly, observer coverage was the main mechanism proposed to achieve total catch accounting; secondly, it was expected that as a result of this total catch accounting, the program would reduce bycatch and discard

mortality; and finally, the last highlighted objective for viable, profitable, and efficient fisheries relates to multiple aspects of the program, but one component that is relevant here is the monitoring costs borne by industry, which can negatively impact profitability.

The action furthermore stipulated that the goals and objectives should be achieved subject to seven constraints and guiding principles, of which five could relate to the monitoring program and its associated costs:

- Take into account the need to ensure that the total optimum yields and allowable biological catch are not exceeded.
- Account for total groundfish mortality.
- Provide efficient and effective monitoring and enforcement.
- Design a responsive mechanism for program review, evaluation, and modification.
- Take into account the management and administrative costs of implementing and oversee the IFQ or co-op program and complementary catch monitoring programs, as well as the limited state and federal resources available.

### Rationale for the Original Program Design

Before the fishery was rationalized, it was plagued by persistently overfished stocks, despite a variety of measures designed to reduce overcapacity and improve stocks status, including a buyback program and a system of trip limits, gear restrictions, and closed areas (PFMC and NMFS 2010c). The primary rationale for design of the monitoring components of the catch share program was to enhance conservation efforts through a mechanism for individual accountability of catch and bycatch:

> One major source of concern stems from the management of bycatch, particularly of overfished species. Over the past several years, the Council's groundfish management efforts have focused on drafting rebuilding plans for overfished species, minimizing bycatch, and specific management of overfished species. The trawl rationalization program is expected to provide individual fishery participants more flexibility and more individual accountability for their impact on overfished species, other groundfish species, and possibly Pacific halibut. (PFMC and NMFS 2010c, p. 4)

Prior to rationalization, at-sea monitoring coverage rates were set to determine discard rates for each species and varied between 14% and 24% of trips from 2002 to 2010 (Somers et al. 2018). As discussed in the Final Environmental Impact Statement (FEIS), it was expected that this shift to 100% would resolve biological and economic problems under the previous program design:

> Under [the pre-catch share] system, there is little direct incentive for individual vessels to do everything possible to avoid take of species for which there are conservation concerns, such as overfished species. In an economically stressed environment, uncertainties about average bycatch rates become highly controversial. As a consequence, members of fishing fleets tend to place pressure on managers to be less conservative in their estimates of bycatch. Given all of these factors, in the current system there are uncertainties about the accuracy of bycatch estimation, few incentives for the individual to reduce personal bycatch rates, and an associated loss of economic opportunity related to the harvest of target species." (PFMC and NMFS 2010b, Appendix D, p. 4)

### Expected Benefits

It was expected that the increased accountability generated through the combination of tradeable allocations and comprehensive monitoring would minimize bycatch and increase the success of species rebuilding (PFMC and NMFS 2010c). Specifically, at-sea monitoring would monitor catch sorting, discarding, and shoreside landings, while "plant monitors", or catch monitors, would ensure that information reported on fish tickets would be accurate (PFMC and NMFS 2010c, p. X).

In addition to the primary benefits of individual accountability and total catch accounting, the FEIS described other indirect benefits of increased monitoring. One expected indirect benefit of the program was that comprehensive monitoring would lead to better total catch estimates and reduced time lags, which could be used to better manage the stock:

> Improved monitoring allows more accurate estimation of total catch, which can improve stock assessments, leading to better specification of harvest levels. It also makes it less likely that harvest limits will be exceeded because of inaccurate catch estimates and/or a lag between actual catch and post-hoc estimation of total catch. (PFMC and NMFS 2010c, p. 578)

In addition to the biological benefits of total catch accounting, bycatch reduction was also expected to generate positive economic benefits. Reducing bycatch of rebuilding species was expected to result in increased catch of underutilized species, thereby increasing total catch and gross revenues over time. Another anticipated benefit was that eventually, rebuilt species would allow for greater fishing opportunities for harvesters (PFMC and NMFS 2010b, Appendix D, p. 381). Additionally, while the costs of the monitoring program were expected to decrease profits in the fishery (by approximately $2 million), increased harvests and efficiencies were anticipated to exceed these costs, increasing the industry's ability to handle the change. These expected costs are discussed more in the next section.

## Expected Costs

The primary expected costs discussed in the FEIS concern the monetary costs to vessels and processors associated with increases in coverage levels, as well as the administrative costs of overseeing the program.

### *Harvesting Costs*

Increased monitoring was expected to decrease profits in the non-whiting fishery by around $2.2 million, if the daily cost for an observer was $350 per day as assumed during development of the catch share program. It also was expected to increase expected levels of consolidation and increase the size of remaining vessels in the fleet:

> At-sea monitoring costs add an additional cost burden to vessels that is not currently incurred. If at-sea monitors cost vessels $350 per day, this may tend to reduce the size of the fleet from the 40 to 60 vessels expected and increase the average size of vessels remaining. This is because additional costs of fishing will mean the optimal fleet size is smaller. The average size of vessels in the fleet is increased with a daily observer cost because such costs comprise a larger portion of small vessels costs than that of larger vessels. At-sea observers will also reduce fleet-wide profits. The fleet reduction and cost efficiency model illustrates that at-sea observers may cost the non-whiting fleet $2.2 million if all vessels in the fishery operate near capacity. If some relatively marginal producers remain in the fishery, the cost will be higher (PFMC and NMFS 2010c, p. 291)

### *Processor costs*

At the time of writing the FEIS, it was not known whether vessels or processors would ultimately bear the costs for catch monitors, so these impacts were discussed qualitatively. The FEIS posits that even though the regulations would require processors to arrange for and pay for catch monitors, cost sharing could be negotiated between harvesters and processors depending on bargaining power, or that processor's costs could be passed on through the price paid for deliveries:

> If harvesters are in a relatively stronger position they could demand that a processor pay part of the cost of at-sea monitoring as an incentive to make deliveries, for example. In contrast, if processors have relatively more bargaining power, they could demand that harvesters pay part of the cost of shoreside compliance monitors. (PFMC and NMFS 2010c, p. 427).

Additionally, the FEIS discusses potential indirect costs to processors, stemming from workspace requirements for the catch monitor or other costs associated with coordinating monitor coverage with the timing of deliveries.

### *Administrative Costs*

The FEIS also described and quantified expected administrative costs for state and federal management agencies, enforcement agencies, and the Council to implement and maintain the new program elements. While specific costs associated with the monitoring program are not described, the total annual expected amount for both the Northwest Fisheries Science Center (NWFSC) observer program and the EDC program was estimated to be $3.15 million (PFMC and NMFS 2010c, p. 575). These expenditures are included in the amount subject to the cost recovery fee, which is capped at 3% of recoverable costs.

In addition to the increased costs, some cost savings were also expected from reduced inseason management responsibilities to track harvests and implement closures. It was expected that this would be reallocated to other management tasks:

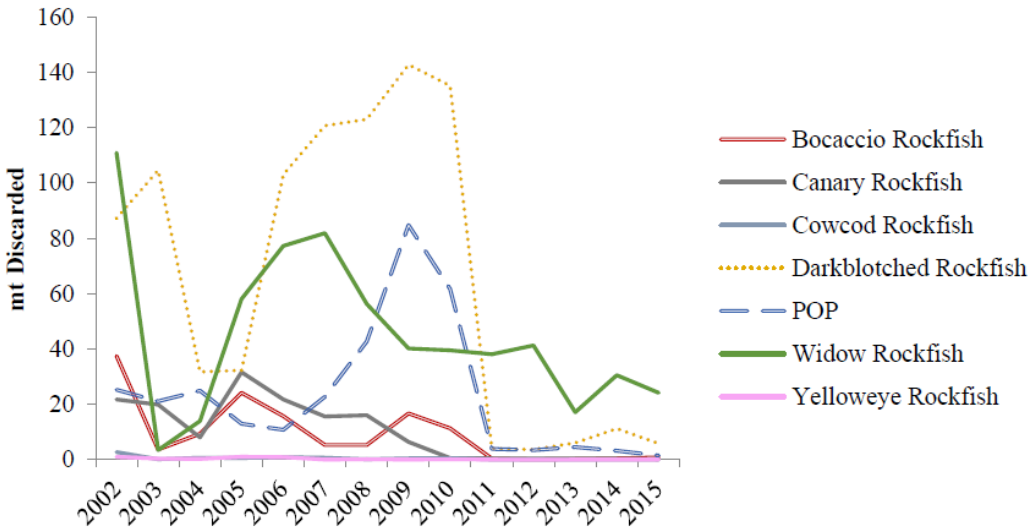
> Rationalization is expected to decrease the high level of inseason management done under status quo; however, savings in this area would likely go towards other groundfish management tasks, such as inseason QS/QP transfers, dealing with the nuances of the carryover and AMP provisions, and continued monitoring of in-season performance by other groundfish sectors. (PFMC and NMFS 2010c, p. 575)

## Changes Since Implementation

Increases to monitoring were included in the trawl catch share program to address several key objectives and management goals for the fishery. These included creating mechanisms for total catch accounting, promoting practices to reduce bycatch and discard mortality, minimizing ecological impacts, and providing for an efficient, profitable, and sustainable groundfish fishery. As discussed in the *Rationale for the original program design* section, prior to rationalization, multiple key groundfish stocks were consistently overfished, and monitoring was implemented to create conservation benefits through individual accountability of catch and bycatch. This section addresses how well bycatch and discard mortality goals have been achieved and how groundfish stocks have changed since implementation of the program.

Under the catch share program, bycatch and discard mortality has generally decreased (Figure 1). By 2017, the program had exceeded Council goals for overfished species and achieved significant reductions in catch and discards (PFMC and NMFS 2017). Prior to implementation, bottom trawl gear had accounted for at least 90% of discards for the 7 historically overfished rockfish species. In the 5 years following program implementation, discards for 6 out of 7 of those species decreased by 90% or more (Figure 1). While there are various contributing factors to this decrease, such as changes in fishing behavior, changes in gear, and decreases in overall fishing effort, one of the major objectives of Amendment 20 was to promote practices that reduce discard mortality, particularly for overfished and rebuilding species. Part of this intent included ensuring vessel-level accountability through continued tracking of total groundfish mortality (PFMC and NMFS 2017).

**Figure 1. Discards of Historically Overfished Rockfish Species 2002-2016**




*Note: Data includes at-sea, shoreside midwater trawl, and bottom trawl gear types and after 2010 comes from catch share sectors only.*

*Source: PFMC and NMFS 2017, figure 89, section 3.3, p. 374*

Data collected from the WCGOP plays a large role in creating vessel-level catch and discard accountability. WCGOP data help track total fishing mortality through both discards and landings across the at-sea, limited entry bottom trawl, and shoreside midwater trawl sectors (PFMC and NMFS 2017). Currently, the WCGOP, in conjunction with EM, are the only active sources for data on discard rates in the Pacific groundfish fisheries Somers et al. 2023; PSMFC 2012). Additionally, while the increased monitoring coverage rates implemented as part of the Catch share program impact the quality of discard estimates by facilitating the collection of more comprehensive discard and landing rates across gear, area, and time, there is also evidence that the presence of observers can influence fishing behavior. In a survey conducted of fishermen in the Pacific groundfish trawl fishery, 41.2% agreed that the presence of observers was likely to reduce regulatory violations, such as for discards and bycatch (Porter 2010). Observers may also report discard or retention violations that are difficult for other traditional dockside or at-sea enforcement resources to identify (Porter 2010), further increasing discard accountability mechanisms within the fishery and creating visibility on behaviors like high-grading that were significant issues prior to rationalization (PFMC 2022).

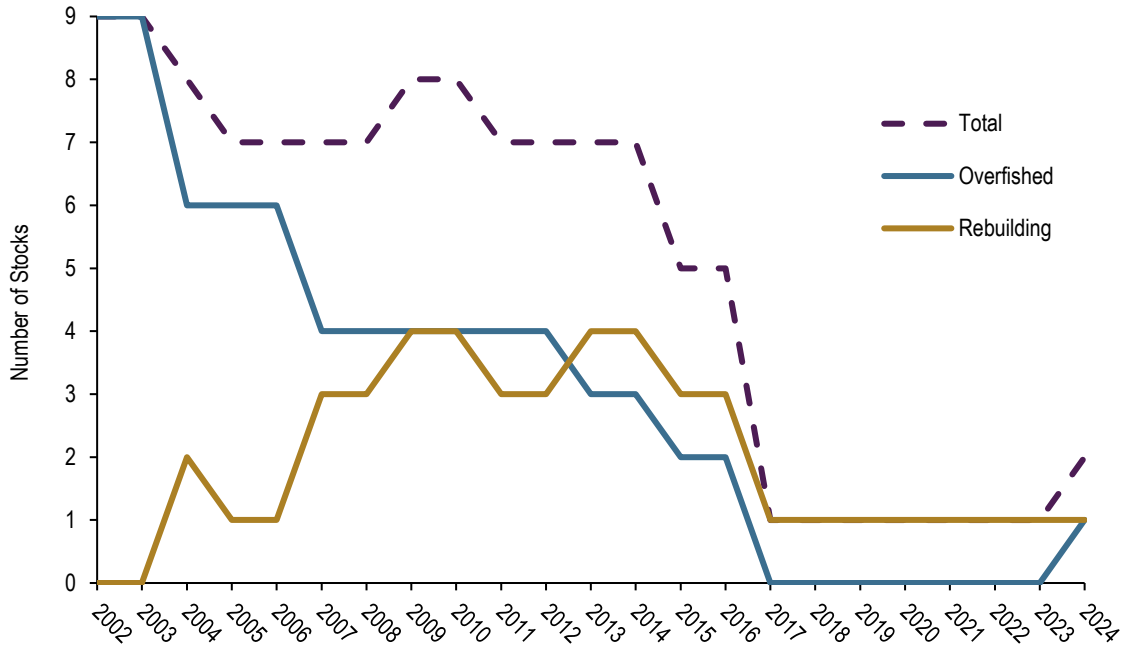
It is worth noting that recorded bycatch of some protected species has increased since the implementation of trawl rationalization. From 2011 to 2014, recorded lethal interactions with Stellar sea lions and California sea lions increased to 6.8 mortalities each per year (up from <2 and 2.5 respectively from 2002 to 2010) (PFMC and NMFS 2017). Marine bird interactions also increased during this period, particularly among western gulls and black-footed albatross (PFMC and NMFS 2017).

However, the increased reports from both align with what is expected from increased observer coverage, along with increased use of non-trawl gear, particularly increased use of hook-and-line when more vessels were switching gear at the beginning of the program, which also may account for increased bird interactions (PFMC and NMFS 2017).[1] In 2011 and 2012, there were 9 observed deaths of black footed albatross and 30 western gull deaths on vessels using hook and line gear. On vessels using trawl gear, there were no deaths of either species observed (Table 142, PFMC and NMFS 2017).

Changes in discard mortality for quota managed stocks may also support species rebuilding. In 2002, prior to the implementation of the catch share program, 9 fish stocks in the West Coast groundfish fishery were considered overfished (PFMC and NMFS 2017). While the number of overfished or rebuilding stocks began decreasing before program implementation in 2011 (see Figure ), the total number continued to drop after implementation. Overfished stocks dropped from 4 to 2 within 5 years, and by 2017, rebuilding stocks dropped from 3 to 1. Petrale sole moved from rebuilding to rebuilt and canary rockfish moved fully from overfished to rebuilt by 2015. In 2017, there were no stocks considered overfished, and yelloweye rockfish was the only rebuilding rockfish stock (PFMC 2022), with a projected > 50% chance of rebuilding by 2028 (Wallace 2023). However, in December of 2023, the California quillback rockfish was declared overfished, making it the first groundfish species to be declared overfished since 2016 (NOAA 2023). As of 2024, one groundfish species is considered overfished (California Quillback) and one species (yelloweye rockfish) is rebuilding but not overfished. More detailed information about overfished groundfish stocks during the 2002–2024 period can be found in the *West Coast Groundfish Stock Status* appendix (PFMC and NMFS 2017; Phillips 2024).

[1] In recent years, majority of gear-switchers have utilized pot gear (Doerpinghaus 2024)

**Figure 2. Status of Overfished and Rebuilding Stocks 2002-2024**




*Note: The dotted black line represents the implementation of the Catch share program. The groundfish stocks represented in this figure include California quillback rockfish, lingcod, whiting, widow rockfish, bocaccio, darkblotched, petrale sole, cowcod, canary rockfish, POP and yelloweye rockfish.*

*Source: PFMC and NMFS 2017; Phillips 2024b*

## Status Quo Costs and Drivers of Costs

Implementation of the West Coast Groundfish Trawl Catch Share Program also incurred new costs centered around the full at-sea and shoreside coverage requirements. To help meet program goals and objectives, such as individual accountability for discards and bycatch mortality, industry is required to fund observer and EM monitoring efforts. NMFS agency branches are also responsible for administering the monitoring programs, the cost of which is partially reflected in cost recovery fees billed to the industry. This section discusses the current monitoring costs both industry and agency branches incur under the catch share program, as well as drivers of changing costs for both sectors.

### Direct Industry Costs

At-sea observers, shoreside monitors, and under the new regulatory program,[2] EM systems, are paid for by industry, meaning that monitoring makes up a portion of daily activity costs for participants in the catch share program. Implementation of Amendment 20, which increased at-sea and dockside monitoring rates to 100%, also increased monitoring-related costs for fishery participants. Under

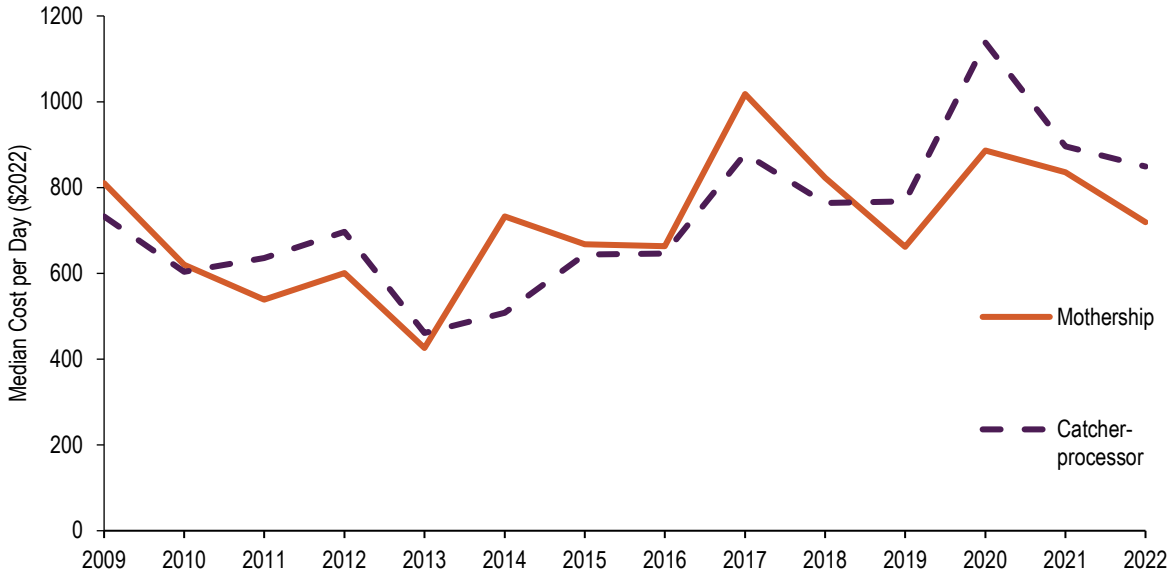
[2] EM system costs and review costs were originally covered under the EFP for EM but are transitioning to industry-funded under the new regulatory program for EM, implemented in 2024. EM review costs in 2024 continue to be covered by a grant for PSMFC but may not continue beyond 2024.

rationalization, vessels and processors cannot participate in the fishery without mandatory independent monitoring of catch and discards with the aim of creating individual accountability for discard mortality, creating conservation benefits for the fishery, and generating more comprehensive data to help manage the fishery. More detailed discussion of industry monitoring costs in the catch share program can be found in the following sections.

### *Costs for vessels using human monitors*

Current industry monitoring costs for using human observers can be variable and dependent on multiple factors including vessel location, activity, and lengths of fishing trips. While all vessels are billed on a per-day basis, meaning observer costs are the same for small and large vessels (PFMC 2024), regulations require different numbers of observers depending on fishing activity. For instance, motherships and catcher-processors are required to carry two observers, meaning the cost per day is greater than for vessels who are only required to carry at most one observer. Due to these similar coverage requirements, the observer costs for both motherships and catcher-processors as reported through FISHEyE have tracked each other closely from 2009 to 2022 (Figure 3). From 2018 to 2022, average annual monitoring costs were $883/day for catcher-processor vessels and $785/day for mothership vessels. While the catcher vessel sector also employs human observers to meet mandatory coverage rates, the allowance of EM for some gear types means the cost of human observers cannot be isolated from the aggregated FISHEyE sector monitoring cost data. More discussion of catcher vessel monitoring costs can be found in *Average Costs by Sector* below.

**Figure 3. Median At-sea Monitoring Costs per Day for Mothership and Catcher-Processor Vessels**

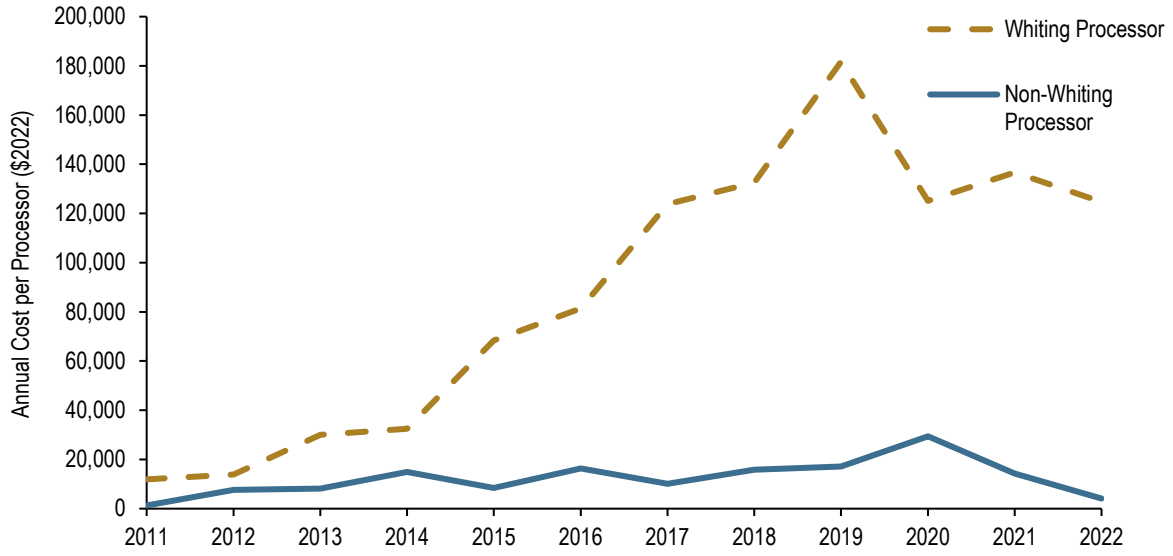



*Note: Mothership monitoring costs were found by querying the FISHEyE mothership cost database using the terms: "cost category: Observers" and "Statistic: median per vessel/day". Catcher-processor monitoring costs were found by querying the FISHEyE Catcher-processor cost database using the terms: "cost category: Observers" and "Statistic: median per vessel/day"*

*Source: FISHEyE catcher-processor data accessed 7/1/2024, mothership data accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

Daily shoreside monitoring costs are not estimated through FISHEyE, so annual monitoring costs for first receivers in both the whiting and non-whiting sectors are reported here instead (Figure 4). Costs for both have increased since 2011, though whiting monitoring costs have increased more dramatically. The whiting fishery is a much higher volume fishery, both in volume of landings and in number of trips that need to be monitored during offload, which may be part of these greater costs, alongside the use of EM by the shoreside whiting fleet, and the increased duties of catch monitors for EM vessels. Both sectors also reported a drop in monitoring costs in 2020 for whiting processors and in 2021 for non-whiting processors. These sudden decreases match drops in gross revenue as reported through FISHEyE, meaning they are likely the result of decreased processing activity rather than changes in monitoring activity.

**Figure 4. Shoreside Processor Monitoring Costs by Sector**




*Note: FISHEyE categorizes any vessel that targeted whiting as a whiting vessel. Any vessel that participated in at least one non-whiting groundfish trawl fishery and did not target whiting is a non-whiting vessel. Whiting processor costs were found by querying the FISHEyE shorebased processors cost database using the terms: "cost category: Shoreside monitoring", "Statistic: median per processor", "production activities: All Production" and "processor type: Whiting processors". Non-whiting processor costs were found by querying the FISHEyE shorebased processors cost database using the terms: "cost category: Shoreside monitoring", "Statistic: median per processor", "production activities: All Production" and "processor type: Non-whiting processors".*

*Source: FISHEyE, non-whiting and whiting processor accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

In 2021, NMFS estimated an observer cost of $525 per seaday if the EM EFP (exempted fishing permit) fleet were to return to using observers full time. This rate assumes 2,596 seadays of monitoring effort and was based on the average costs reported in the 2015–2019 EDC Program and from feedback from observer providers (NMFS 2021a). However, more recent estimates collected through interviews with service providers in 2024 suggest current rates are higher. Quoted seaday

rates varied by provider from $585 to $645, for an average of $615/day per trip.[3] Interviews also provided some insight into the daily rates for shoreside monitoring. Since both at-sea and shoreside monitoring are often composed of the same workforce, quoted wage rates were the same between both duties, apart from providers that charge shoreside monitoring at an hourly rate, which was $90.

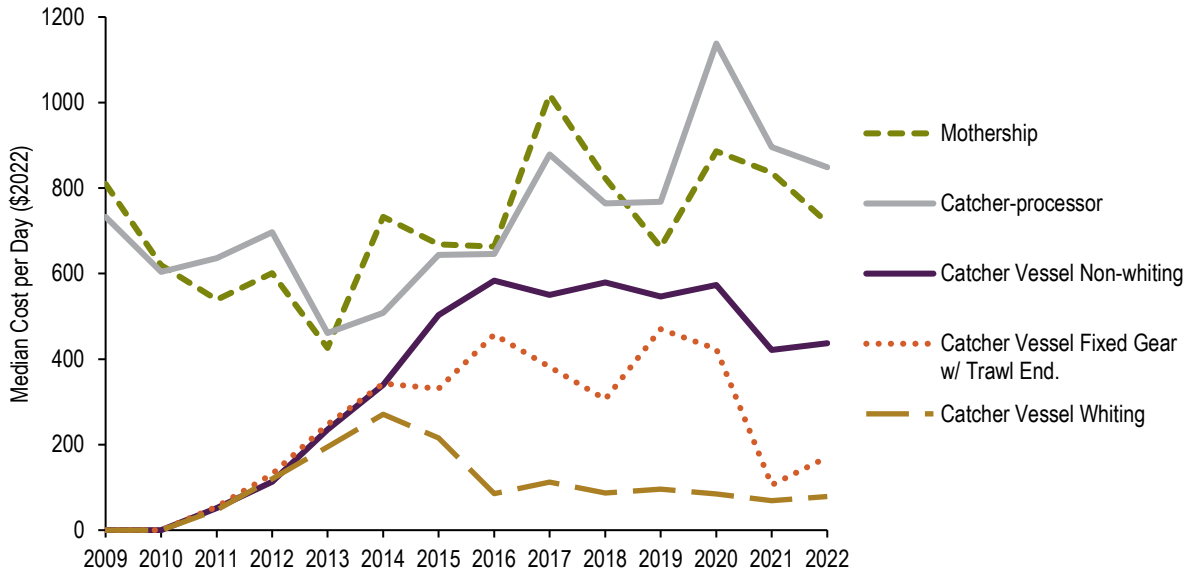
It should be noted that the industry costs of using human monitors also reflect changes in observer providers' costs. Multiple factors affect seaday rates, such as the cost of recruiting, training, and deploying enough observers and catch monitors to sufficiently provide coverage for trips along the entire coast. As indicated in interviews with observer providers, EM adoption also indirectly influences costs for human observers as it changes the number of seadays needed overall, and for some remote port areas, it can be difficult to have enough seadays to make fulltime observer work available. If an observer is not available locally, additional travel costs may be incurred in getting an observer where they are needed. For at least one observer provider, travel costs are not billed individually, and instead seaday rates are set based on expectations about total expected travel costs. Other factors, such as decreases in the number of vessels fishing, have also been noted to increase the cost of monitoring as observer providers cannot profitably maintain enough observers in remote ports to accommodate multiple vessels that may only want to fish a few days a month (PFMC and NMFS 2017).

### *Average Costs by Sector*

Since human observer costs and EM costs are aggregated in FISHEyE, this section examines the average aggregate monitoring costs across sectors. Whiting, non-whiting and fixed gear with trawl endorsement catcher vessel monitoring costs were similar between 2011 and 2014, with costs increasing in tangent with the stepped decrease in monitoring subsidies until the monitoring costs were transferred fully to the industry in 2016 (Figure 5). However, from 2014 onward, costs between these sectors diverged. By 2016, the reported per-day monitoring costs for non-whiting vessels more than doubled those of whiting vessels. This difference is partially due to more whiting catcher vessels using EM with partially subsidized costs while non-whiting catcher vessels mainly continued to pay for human at-sea observers (Brannan 2023). Comparatively, catcher-processor and mothership vessels have also consistently had higher monitoring costs than any catcher vessel, due to the requirement to carry and pay for two observers where catcher vessels carry at most one.

[3] At the time we were finalizing this report, we learned that at least one provider had increased their seaday rate to $700/day, effective August 16, 2024 (Sommer 2024)

**Figure 5. Median Monitoring Costs Across Sectors**




*Note: In FISHEyE any vessel that targeted whiting is categorized as a whiting vessel. Any vessel that participated in at least one non-whiting groundfish trawl fishery and did not target whiting is a non-whiting vessel. Catcher vessel non-whiting, whiting, and fixed gear w/ trawl endorsement monitoring costs were found by querying the FISHEyE catcher vessel cost database using the terms: "cost category: Observers/EM", "Statistic: median per vessel", "Fisheries: All catch share fisheries combined" and "Vessel type: Non-whiting vessels and whiting vessels". Fixed gear w/ trawl endorsement monitoring costs were found by querying the FISHEyE catcher vessel cost database using the terms: "cost category: Observers/EM", "Statistic: median per vessel", "Fisheries: fixed gear with trawl endorsement" and "Vessel type: Non-whiting vessels". Mothership and catcher-processor vessel monitoring costs were found by querying "cost category: Observers" and "Statistic: median per vessel".*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

Table 4 provides an all-fleet snapshot of recent (2020–2022) reported at-sea monitoring costs, representing both observer costs and EM costs. For catcher vessels, the non-whiting sector has the largest monitoring cost burden due to the use of human observers, especially when compared to the whiting sector which has been allowed the use of EM systems which, through 2023, were partially subsidized (Brannan 2023). Monitoring costs are highest proportionally for non-whiting vessels, at 4.54% of median gross revenue, compared to 2.96% of gross revenue for fixed gear vessels fished with a trawl endorsement, and 0.58% of whiting vessel annual gross revenues. Motherships and catcher-processors, which each carry 2 observers during operations, had the largest gross monitoring burden, with an average median cost of $961 and $814/vessel/day, respectively. However, these fleets also had the lowest net burden compared to other sectors, averaging 0.51% and 0.37% of gross revenue, for catcher-processors and motherships respectively. More sector specific breakdowns of monitoring costs can be found in the Industry Monitoring Costs appendix.

**Table 4. All Fleet At-Sea Monitoring Cost Summary (2020-2022)**

| Fleet | Average Median Monitoring Cost per Vessel/day ($2022) | Avg. Median Standard Deviation ($2022) | Average Median 25th Quartile ($2022) | Average Median 75th Quartile ($2022) | % of Median Total Variable Costs per Vessel/day | % of Median Gross Revenue per V/day | % of Median Annual Gross Revenue per Vessel | Average Annual Sector-wide Cost ($2022) | Average Number of Vessels |
|---|---|---|---|---|---|---|---|---|---|
| Catcher Vessel Whiting | 71 | 65 | 42 | 154 | 0.93% | 0.58% | 0.64% | 366,170 | 31.7 |
| Catcher Vessel Non-whiting Trawl | 478 | 258 | 243 | 628 | 9.49% | 6.07% | 4.54% | 1,074,596 | 54 |
| Catcher Vessel Fixed Gear with Trawl Endorsement | 234 | 216 | 71 | 335 | 4.68% | 2.74% | 2.96% | 86,074 | 9.7 |
| Catcher-Processor | 961 | 316 | 711 | 1119 | 0.95% | 0.43% | 0.51% | 515,254 | 9.7 |
| Mothership | 814 | 93 | 712 | 920 | 0.60% | 0.37% | 0.34% | 143,787 | 5.3 |
| **Total** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2,185,881** | **110.4** |

*Note: "-" indicates not calculated for the metric. Costs represent averages of median-level observer and EM costs for each year between 2020 and 2022. For Catcher Vessel Whiting, Catcher Vessel Non-whiting, and Catcher Vessel fixed gear with trawl endorsement fleets, monitoring costs represent mixed observer and EM costs. The mothership fleet monitoring costs represent observer costs. Variable costs include fuel, observers/EM, labor, cost recovery fees, and other expenses that vary with activity (FISHEyE).*

*Source: FISHEyE*

Among first receivers, whiting processors reported both the highest shoreside monitoring costs (Table 5) and a higher percentage of annual gross revenue going to monitoring than non-whiting processors. Part of this reason may be the increased duties for shorebased catch monitors for vessels using EM to record prohibited and protected species catch (84 FR 31146). However, whiting processors also reported lower monitoring costs per metric ton produced. Overall, shoreside monitoring costs for both whiting and non-whiting processors is lower than for at-sea monitoring costs in any sector, at 0.32% of whiting gross revenue and 0.12% of non-whiting gross revenue.

**Table 5. Shoreside Monitoring Cost Summary (2020-2022)**

| Processor Type | Average Annual Monitoring Cost per Processor ($2022) | Standard Deviation ($2022) | 25th Quartile ($2022) | Average Median 75th Quartile ($2022) | Average Median Monitoring Cost per Metric Ton Produced ($2022) | % of Total Variable Costs per Processor | % of Median Annual Gross Revenue per Processor | Average Annual Sector-wide Total Cost ($2022) | Average Number of Vessels |
|---|---|---|---|---|---|---|---|---|---|
| Whiting Processors | 128,800 | 63,764 | 67,695 | 185,162 | 7.20 | 0.35% | 0.32% | 880,673 | 7 |
| Non-whiting Processors | 15,934 | 29,557 | 3,174 | 33,457 | 10.03 | 0.13% | 0.12% | 157,995 | 13 |
| **Total** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1,038,668** | **20** |

*Note: "-" indicates not calculated for the metric. The processor costs listed here are for first receivers purchasing fish as part of the catch share program. Costs represent averages of median-level observer and EM costs for each year between 2020 and 2022. Monitoring costs are allocated to production activity by fish purchase weight. Variable costs include fish purchases, production supplies, freight & trucking, labor, and other expenses that vary with activity (FISHEyE).*

*Source: FISHEyE*

Industry participants report that the cost of full-coverage on-the-water and offload monitoring, coupled with the cost recovery fee, impacts their operations in a variety of ways. Fishery participants report that these costs decrease profitability and discourage investment in capital repair or improvement. Additionally, these impacts may be felt more severely by smaller vessels for whom monitoring costs make up a larger percentage of their gross revenue (PFMC and NMFS 2017). Fixed-gear and small vessel fishermen indicated that observer costs challenged their ability to profitably participate in the fishery. In interviews conducted for this report, participants and other experts discussed how EM is less cost-effective for these vessels, due to necessary operational challenges and catch handling requirements.

### *EM costs*

As with the cost of using human monitors, the industry costs of using EM systems are affected by factors such as vessel participation, gear type, and fishing sector (NMFS 2022a). In 2021, NMFS, together with prospective EM service providers, and members of the fishing industry, developed updated cost estimates for the West Coast Groundfish EM program. Estimates were derived from 3,883 sea days of EFP participation during 2019 and 2020 across a mix of vessels, including midwater trawl, bottom trawl and fixed gear vessels. The total annual cost to industry once the EM program transitioned to regulations was divided into 4 main categories: equipment ($113,568), video review ($347,180), program management ($75,744) and service and maintenance ($130,704). The total estimated annual cost from these services to the fleet is $667,196 per year. For comparison, the same report estimated that monitoring an equivalent number of sea days (3,882) at a rate of $512/day using observers would cost the industry $1,988,638 (NMFS 2022a). If we use an updated cost estimate from 2024 observer provider interviews ($615/day), the estimated annual industry cost would be $2,387,430.

As seen in Table 6, per seaday costs of using EM were also estimated for different gear types, ranging from $142/seaday for midwater trawl vessels to $390/seaday for fixed gear vessels. Gear types and fishery have a large effect on the cost efficiency of EM systems. Selective gear and homogenous target species (such as midwater whiting) require less complex EM systems and shorter video review times than less selective gear and fisheries with more diverse species, such as bottom trawl (NMFS 2022a). The costs listed here include totals for all components of the EM program based on estimated cost quotes from service providers, but it is worth noting that the transition from EM EFP to regulation on January 1, 2024 (NOAA Fisheries 2023) changed which components the industry was financially responsible for. Under EFP, vessel owners were only responsible for the purchase or lease, installation, and maintenance of EM systems. Under the newly implemented EM regulation, vessel owners are additionally responsible for covering the cost of video data review, reporting data to NMFS, and storage of EM data (NMFS 2022a). For another point of comparison, Brannan (2023) estimated the per seaday cost of EM to be about $431/seaday for whiting catcher vessels in 2021. This estimate takes into account both reported costs to industry and the program costs of the EM EFP, which the industry will be responsible for under regulation. While this cost estimate is higher than the 2021 NMFS estimates provided in Table 6, it is still 30% lower than the current $615/day estimate for human monitoring.[4]

**Table 6. Per Seaday cost of EM to Individual Vessels by Gear Type ($2021)**

| | Gear Type | | |
|---|---|---|---|
| Cost Component | Bottom Trawl | Midwater Trawl | Fixed Gear |
| EM Unit and Installation (amortized over 5 years) | $57 | $22 | $120 |
| Video Review | $165 | $74 | $161 |
| Program Management | $54 | $95 | $35 |
| Service and Maintenance | $66 | $25 | $85 |
| Average Total Seaday Cost w/out Equipment and Installation | $285 | $120 | $316 |
| **Average Seaday Cost** | **$342** | **$142** | **$390** |

*Source: NMFS 2022a*

While these estimates do not include estimated cost recovery fees, the industry's fees are expected to increase[5] with the end of the EFP whether vessels continue using EM systems or not. Additionally, the estimated increase in cost recovery fees for the shorebased IFQ sector are expected to be equal between EM or a return to using observers (NMFS 2022a). EM associated cost recovery fees are estimated to be approximately $20,000 higher than using observers for the mothership sector (NMFS 2022a).

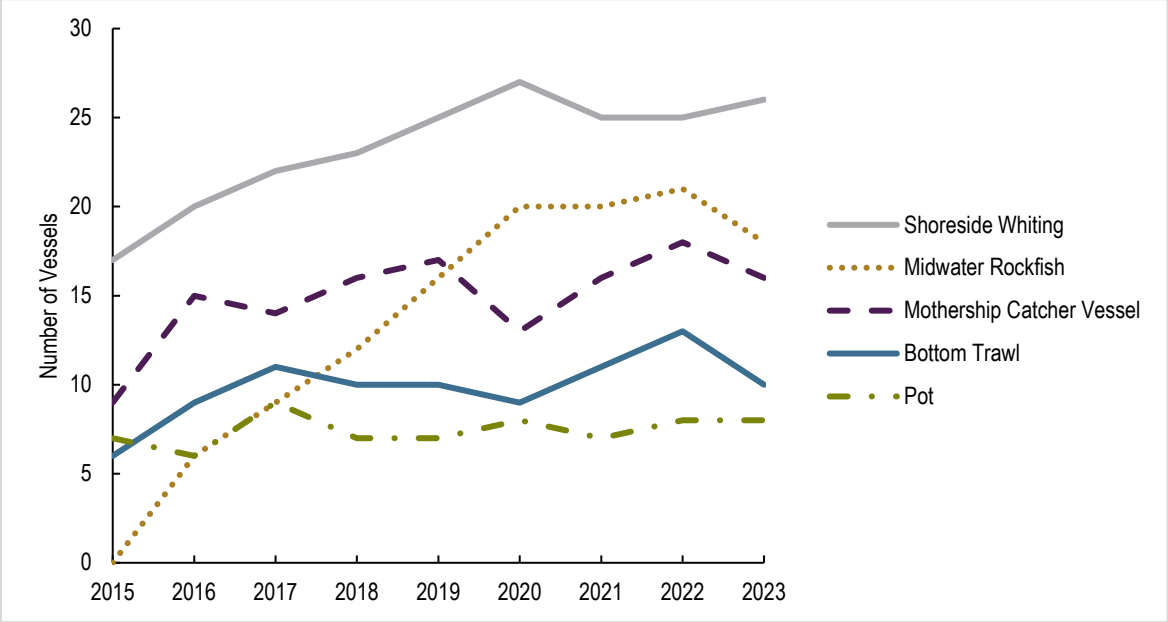
[4] At the time we were finalizing this report, we learned that at least one provider had increased their seaday rate to $700/day, effective August 16, 2024 (Sommer 2024), this is not factored into our analysis but it is worth noting that even since spring of 2024 seaday rates may be higher than estimated here

[5] Cost recovery fees may only increase in years where the cost recovery fee is not already capped at 3%

However, vessels that participated in EM EFPs and made investments in EM hardware and training for crew will likely continue using EM. Even if the net cost to using observers was equal, EM also provides additional benefits to vessel operations, such as less reliance on observer deployments. Further, NMFS anticipates that the cost of administering the catch share observer program are expected to decrease as more vessels adopt EM over human observers (NMFS 2022a).

As seen in Figure 6, the number of catch share vessels using EM has increased across all gear types from 2015 to 2023. While these may not each represent unique vessels, as each vessel may use several gear types or participate in multiple fisheries, the total number of vessels using EM in the groundfish catch share fishery has also increased since 2015 (Table 7).

**Figure 6. Number of Vessels Using EM by Gear Type**




*Source: Kavanaugh 2024*

*Note: Number of vessels may not represent the number of unique vessels since vessels may utilize multiple gear types*

The largest driver in savings for EM systems over observers is the number of days fished. Vessels fishing more sea days are able to spread the fixed costs of EM installation and maintenance to create lower average seaday rates (NMFS and NOAA 2019). For vessels that fish relatively few days, observers may ultimately be cheaper because initial and annual costs of EM are higher. For non-whiting vessels, observers may also be superior monitoring tools given the number of species that need to be accurately identified for IFQ discards, and for which video technology may not currently be accurate enough (PFMC and NMFS 2010a). Additionally, under the EM program, observers cannot be phased out completely. Human observers will still be necessary for collecting biological samples and fishery-dependent information, like documenting protected species interactions, though similar to the non-catch share programs, these are not industry-funded (PFMC 2024a).

While EM may be more cost-efficient for some operations, to date and relative to the size of the fleet, adoption of EM has been more widespread for whiting vessels than bottom trawl vessels. In 2022, 26 vessels that delivered whiting to shoreside processors and 18 vessels delivering to motherships used EM, and in total there were 32 unique whiting vessels in that year (Figure 6, Table 7). In the same year, 21 vessels targeting rockfish using midwater trawl gear have also used EM, while relatively fewer vessels using bottom trawl (10) or fixed gear (8) have participated. While the data on EM participation preclude counting unique vessels by fishery and gear type, based on information from interviews, the proportion of non-whiting vessels using EM, particularly bottom trawl vessels, is much lower than in the whiting fishery. Reasons for lower EM adoption in the bottom trawl fleet include higher costs for catch handling and inefficiencies in showing fish to the cameras, limited market opportunities, as well as limited hold capacity for fish that previously would have been discarded.

**Table 7. Reported Total Number of Vessels Using EM Compared to Fleet Size**

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|
| Total Number of Vessels Using EM | 32 | 40 | 45 | 43 | 46 | 47 | 47 | 49 | 47 |
| Total Number of Catcher Vessels | 96 | 97 | 99 | 100 | 98 | 87 | 83 | 87 | - |
| **% of Catcher Vessels Using EM** | **33.3%** | **41.2%** | **45.5%** | **43.0%** | **46.9%** | **54.0%** | **56.6%** | **56.3%** | **-** |
| Number of Non-Whiting Catcher Vessels | 70 | 69 | 70 | 70 | 66 | 54 | 53 | 55 | - |
| Number of Whiting Catcher Vessels | 26 | 28 | 29 | 30 | 32 | 33 | 30 | 32 | - |

*Note: 2023 data are not yet available in FISHEyE Any vessel that targeted whiting is categorized as a whiting vessel. Any vessel that participated in at least one non-whiting groundfish trawl fishery and did not target whiting is a non-whiting vessel.*

*Source: Kavanaugh 2024, FISHEyE accessed 7/25/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Agency Costs and Indirect Costs

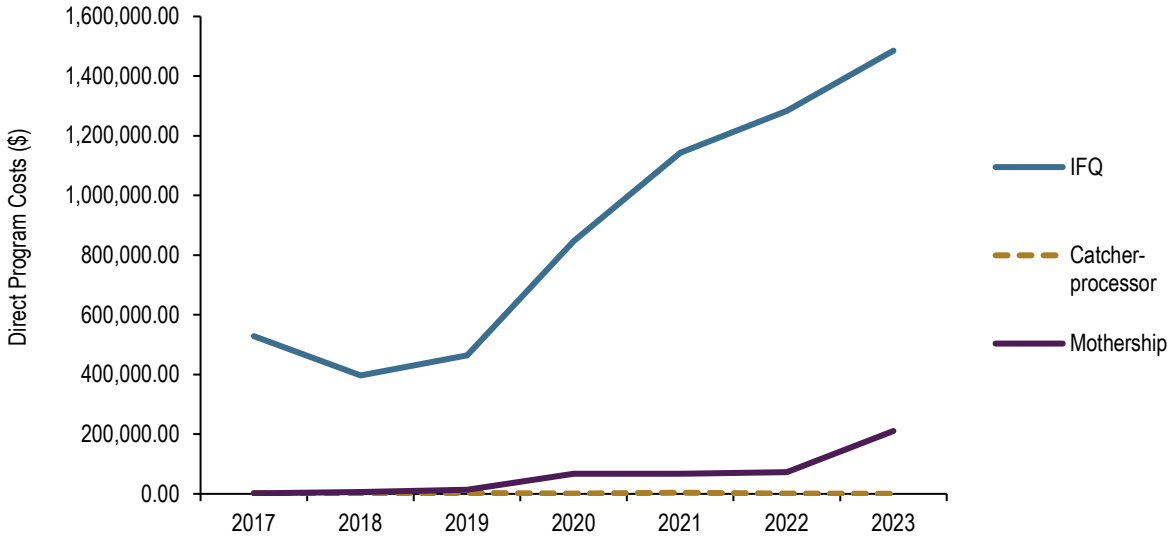
While catch share participants are responsible for funding at-sea and shoreside monitors, NMFS and its various branches are responsible for administering the catch share monitoring program and analyzing and managing the data collected. Additionally, the industry is mandated to recoup a portion of the agency costs associated with administering the catch share program, including monitoring program costs. This section discusses incremental costs associated with administering the catch share monitoring program, the specific agency branches which incur monitoring program costs, and indirect costs to industry in the form of cost recovery fees.

As mandated by the Magnuson-Stevens Act, NMFS is required to collect fees to recover costs directly related to management, data collection and analysis, and enforcement of the Pacific Coast Groundfish Trawl Rationalization Program. The mandatory cost recovery fee was implemented in 2014 and calculated annually by sector. The fee is levied by sector as either the annual ratio of direct program

costs (DPC) to total ex-vessel value or as 3% of total ex-vessel value that year, whichever is lower (NMFS 2024).

Monitoring-related agency costs are included in the annual cost recovery fee calculation. These costs are reported as DPC, or incremental costs, which are defined as costs which would not have occurred but for the implementation of the catch share program (NMFS 2024). These costs are compiled each year and used to calculate the cost recovery fee billed to the industry in the following year to help offset the agency costs of administering the program. DPC are incurred between 3 Financial Management Centers (FMCs), with each FMC responsible for administering various components of the Catch share program. The FMCs are the West Coast Region (WCR), the NWFSC, and the Office of Law Enforcement (OLE), though only the WCR and the NWFSC incur monitoring-related costs billable to industry through the cost recovery fee. For calculating the cost recovery fee, incremental tasks are divided between sectors: the Shorebased IFQ, the Mothership Co-op Program, and the Catcher-Processor Co-op program (NMFS 2024). The total incremental costs incurred by specific branches that conduct monitoring-related tasks are reported by sector. As seen in Figure 7, across all branches, the IFQ sector has consistently incurred the highest DPC, and from 2019 onward, has also had the greatest increases in costs. Summaries of monitoring-related responsibilities by FMC and branch are provided below. Tables of annual agency costs by branch and sector can be found in the Agency Costs by Sector appendix.

**Figure 7. Direct Program Costs Incurred by Agency Branches that Conduct Monitoring-Related Tasks**




*Note: Costs have not been adjusted for inflation. Data for this figure only include DPC, or incremental costs reported from branches that conduct monitoring-related tasks for the Catch share program and represents combined costs from all of those branches. This includes the WCR Permits & Monitoring branch, the WCR PSMFC Grant, and the NWFSC Fisheries Observation Science branch. NOAA OLE is not included since monitoring related enforcement activities are not reported separately from all activities. The cost recovery reports for 2014-2016 do not provide specific sector cost breakdowns and were not included.*

*Source: Pacific Coast Groundfish Trawl Rationalization Program Cost Recovery Annual Report (2017-2024)*

### *West Coast Region*

The WCR administers aspects of the catch share program such as policy issues, drafting and implementing regulations, tracking the fishery, and issuing permits. This work is split between 3 branches: Groundfish, Permits and Monitoring, and Operations and Policy (NMFS 2024). Monitoring costs included in cost recovery are primarily incurred though administration of the shorebased catch monitor program by the Permits and Monitoring branch, though WCR costs also include costs for work done by PSMFC for the shorebased catch monitor program. These tasks are performed on an annual or ongoing basis for which staff time fluctuates minimally. A summary of which monitoring-related tasks branches are responsible for is provided below.

### *Permits and Monitoring Branch*

This branch is responsible for updating the catch monitor plan guidelines and templates for first receivers.

### *Pacific States Marine Fisheries Commission*

The PSFMC works on catch monitor program management. This includes training and overseeing catch monitor certification, debriefing catch monitors, conducting quality assurance/quality control of data, reviewing monitoring plans for first receiver site license applications and conducting site inspections, and participating in the development and implementation of program policies and protocols. It should be noted that through 2023, this branch was also responsible for EM video review. However, with end of the EFP program, the costs of EM data review and storage will be shifted to the industry (NMFS 2022a).

### *Northwest Fisheries Science Center*

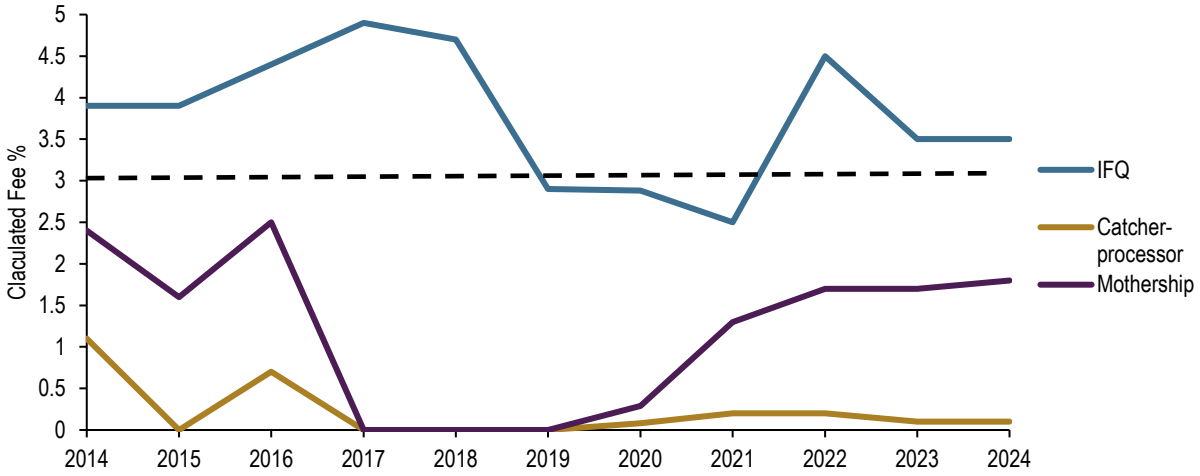
The NWFSC is responsible for collecting and analyzing at-sea observer data for vessels in the catch share program. All monitoring tasks are carried out by the NWFSC Fisheries and Observation Science branch. Notably, both mothership processing vessels and catcher-processors were fully observed with mandatory observers and debriefers prior to the implementation of the catch share program. Observer-related costs for these vessels are covered under the At-Sea Hake Observer Program (A-SHOP) instead and are not included in cost recovery fees. The Fisheries and Observation Science branch is responsible for data review, reporting, and observer debriefings, observer trainings, managing and error checking trawl catch data, managing observer program data systems and databases, and developing EM program secondary review capabilities.

### *Cost Recovery Fees*

Cost recovery fees are calculated and billed to the industry by sector. While the proportion of the cost recovery fee that is attributable to agency monitoring-related tasks is not specified in cost recovery reports, monitoring-related activities make up a portion of WCR and NWFSC branch activities and contribute to the final cost recovery fee assigned to the industry (NMFS 2024). As seen in Figure 8, the IFQ program consistently accrues the highest cost recovery fee and consistently has the highest ratio of agency costs to ex-vessel value, usually exceeding the 3% annual cost recovery fee cap. This

component of the program is more costly due to NOAA Fisheries being responsible for more of the day-to-day activities of the program and needing to collect data for more vessels and processors. In comparison, the mothership and catcher-processor programs have fewer vessels and use cooperative structures that allow for more self-management of allocations, resulting in lower agency costs (Brannan 2023). More detailed recoverable agency expenditures can be found in the *Total Agency Incremental Costs* appendix.

**Figure 8. Annual Cost Recovery Fee Percentages by Sector**




*Notes: Calculated fee percentages include all adjustments to DPC. Any fee percentages above 3% were capped at 3%, as represented by the dotted black line.*

*Source: NMFS 2024*

## Recent Drivers of Costs

Both agency and industry costs of monitoring have changed in recent years. This section reviews factors affecting these changes, principally, EM implementation, as well as broader changes affecting observer providers around the country, including difficulties hiring and maintaining enough observers across ports.

### *Agency Costs*

While monitoring responsibilities only make up a portion of agency tasks that industry is responsible for helping recoup, cost recovery reports show that monitoring program changes impact agency implementation costs and are reflected in cost recovery fees. EM administration and preparation for EM implementation has been a large component of those costs. Most of these recent costs have been related to EM implementation in the IFQ and mothership sectors and accrued through the WCR Permits and Monitoring Branch, PSMFC, and the NWFSC Fisheries Science and Observation Branch (NMFS 2024; 2023b; 2022b; 2021b; 2020).

Across NMFS branches, EM implementation has added new tasks and costs. For the WCR Permits and Monitoring branch, cost recovery reports began reporting new or ad-hoc costs associated with EM

implementation beginning with fishing year (FY) 2019 and 2020 (NMFS 2020; 2022b). These costs included implementation of the EM program for the whiting and fixed gear fisheries, development of EM regulations for the bottom-trawl and non-whiting mid-water trawl fisheries, development of the EM "clean-up" amendment, and development of EM delay rulemaking. For both FY 2022 and FY 2023, the Permits and Monitoring branch continued to report new costs for EM program implementation as well as costs for EFP program implementation (NMFS 2023b; 2024). The PSMFC also began reporting new costs associated with EM video review for both the IFQ and mothership sectors in FY 2021 (NMFS 2022b). These costs increased by 61.6% from FY 2022 to FY 2023 due to staff increases to focus on EM video review and backlog review (NMFS 2024). For the WCR Groundfish branch, beginning in FY 2019, the branch began reporting EM rulemaking, attendance of Groundfish EM Policy Advisory Committee and Council meetings, and support for EM changes development as new or ad-hoc tasks. In FY 2020, the NWFSC Scientific Data Management branch included EM drive report database costs and EM permit provider online applications as recoverable tasks. Additionally, the purchase of EM-related supplies and equipment costs such as EM interpretation software, training, and hard drives were reported in total costs across branches with EM-related tasks in FY 2021.

### *Industry costs*

In interviews, observer providers and other contacts described a shifting and unpredictable landscape of observer costs. This is partially due to high turnover rates and difficulties hiring and maintaining observers—especially in some southern port areas—as well as changes to the EM program, which both influence observer providers' expectations about service levels and rates charged to vessels.

Observer providers described how it is increasingly difficult to keep observers in more remote ports, typically in California, where the cost of living is high and trips may be more infrequent. They described that it can be hard to have enough work to keep observers employed in these areas and to pay a wage that makes it worthwhile for them.

The recent regulatory amendment for EM explored options for reducing EM monitoring costs by reducing EM review rates and exploring options for third-party video review, among other changes (NMFS 2023a). The regulatory amendment reduced video review rates for the non-whiting bottom trawl and fixed gear fleets to 10% but maintained 100% review rates for the midwater rockfish and whiting fleets. The formal EM program requires video review costs to be borne by industry, and vessels could either choose PSMFC or a third-party company to provide these services. However, these costs have yet to be borne by industry, since a grant provided to the PSMFC covered costs for third-party review in the first year of the formal EM program. If industry were paying for the program, it would cost $100 per haul for review from PSMFC; however, according to interviews with PSMFC representatives for this report, these cost rates could change based on the experiences in the first year under the regulatory program and result in new video review rates for some fleets. These

changes may affect all vessels, particularly non-whiting vessels, in their decision-making about whether or not to use EM and may influence participation rates as costs evolve over time.

## Options to Reduce Costs

To reduce industry costs, this report explores two potential options: 1) reducing or removing shoreside monitoring requirements, and 2) reducing at-sea monitoring requirements on either a fixed or variable basis. In this section, we discuss the potential for each option to reduce costs. In the following sections, we discuss any major potential differences across sectors, as well as other potential economic, biological, or administrative trade-offs. It should be noted that this evaluation is high-level and based on qualitative information derived from the literature, expert interviews, and analyses developed for other monitoring programs. This is intended to give a general sense of the potential for various options to reduce costs as well as identify any major potential impacts; however, specific impacts will depend on the construction of alternatives, which will permit detailed and quantitative assessment of impacts. The information presented here does not replace or substitute for a full impact assessment, which would be included if the Council decided to formally initiate a management action and develop alternatives related to monitoring and monitoring coverage rates.

### Shoreside Monitoring

For sectors that deliver to shorebased dealers or processors and use observers for their at-sea monitoring, the current monitoring program requires that all offloads be monitored and that fish ticket landing weights are verified by a certified catch monitor.

As mentioned previously, for vessels that use human at-sea observers, this duty is typically fulfilled by the person monitoring the at-sea portion of the trip. Because of this and the similar duties and required knowledge of the fishery, observer providers hire people who are trained to provide both at-sea and shoreside duties and may deploy them to serve both roles, or, in the cases where EM is used, just as the shoreside monitor. Unsurprisingly, because the workforce is composed of the same individuals for both duties, based on interviews with observer providers, the wage rate for both positions is the same and is mirrored in the fee charged to vessels. The fee structure for shoreside monitoring services varies across observer providers. For some, it is the same fee structure and rate as the at-sea rate, while for others it is a lower, hourly rate with a not-to-exceed amount of the daily rate. Additionally, for providers that charge by the calendar day, if the boat fishes and offloads in the same day, the cost is split between the processor and the boat. Travel costs may be extra, such as when travel is required from their assigned duty station port to another port. At the time that interviews were conducted for this report (spring of 2024), seaday rates varied across providers ranging from $585 to $645 in 2024, for an average of $615. For observer providers that charge an hourly shoreside monitoring rate, this rate was $90. In some cases, the clock for an observer would start at the time the vessel begins its trip, while in other cases it is billed per calendar day, starting at midnight. For vessels using EM, the catch monitor must be deployed specifically to monitor the

offload, and duties are expanded in order to account for discards that are retained for catch accounting shoreside (84 FR 31146).

The amount of time needed to monitor offloads can vary across fisheries and ports. The introduction of EM has reduced the amount of work available for observers in some ports, leading to people being underutilized and contributing to turnover. This can also increase costs associated with shoreside monitoring if an observer from a more distant port needs to travel to observe an offload. Thus, according to observer providers, seaday rates for monitoring depend on the number of vessels using EM in any year.

Observer providers noted that their expectations for the total number of trips that need to be monitored at-sea and shoreside, turnover, travel costs, and wage expectations in more expensive areas all influence the rates charged for at-sea monitors. One observer provider noted that it would be difficult to maintain the viability of their west coast operations if not for the shoreside monitoring requirements for the shoreside whiting fleet using EM, since it provides stability and reliability to their operations. Overall, observer providers noted that multiple factors are leading to difficulty maintaining a viable business and increases in seaday rates, including high turnover, inflation, and the difficulty of maintaining available observers in remote ports, especially when the number of trips in remote ports has declined over time.

### *No Shoreside Monitoring*

Observer providers noted that removing shoreside monitoring requirements may lead to seaday rate increases, particularly if shoreside monitoring requirements are removed for the fleets using EM, such as the shoreside whiting fleet, since it is a major source of stability for their business operations. On average, in 2022 shoreside monitoring costs for non-whiting processors were $4,185, while for whiting processors, the average was $124,705 (according to data downloaded from FISHEyE).[6] Reported cost data in 2022 show that approximately 65% of total shoreside monitoring costs were associated with whiting production while 35% were non-whiting production, illustrating the significant difference in shoreside monitoring program revenue that the whiting sector generates for observer providers. On top of this, observer providers spoke about how the reliability of the whiting season additionally contributed to stability, in contrast with the non-whiting fleet, where operations may be spread out throughout the year.

Previous analyses of shoreside monitoring costs have assumed that costs are based on the at-sea monitoring seaday rate and the specific cost incurred to vessels for a given trip would be influenced by several factors: 1) the time it takes for a trip to fully offload its catch at port 2) time spent communicating or coordinating with the vessel prior to offloading, and 3) any travel time to/from the offload (NEMFC 2022).

[6] Noting that whiting processors may process both whiting and non-whiting species, while non-whiting processors do not process whiting.

Ultimate costs, and therefore cost savings of removing the shoreside monitoring program, will also depend on requirements and tools available for at-sea monitoring purposes. At present, costs are already influenced by the number of vessels using EM, since catch monitors at a given port may only need to be available for a fraction of the time that they would otherwise if they were also observing a given trip at sea. Similarly, if at-sea monitoring coverage rates are reduced in the future, keeping shoreside monitoring at 100% coverage would likely increase costs for shoreside monitoring.

Additionally, as discussed more in the *Administrative Impacts* section, changes to the monitoring program standard may also require changes to the EM program as a result, since the program was designed to achieve a similar level of high accountability as the human-based monitoring program. However, here we are not able to determine if and how shoreside monitoring requirements may need to change for vessels using EM if the requirement for those using humans is removed, mostly because of the slightly different roles that these monitors have for catch accounting in the EM program. Specifically, catch monitors are required for EM trips to record prohibited and protected species catch (84 FR 31146). Therefore, cost savings may be reduced if harvesters that continue to use EM must still arrange for catch monitors.

The two processing representatives interviewed for this report described cost savings associated with removing shoreside monitoring requirements as helpful but unlikely make or break considering the other pressures affecting their businesses. For processors between 2017 and 2021, shoreside monitoring costs were estimated to be 0.7% of total whiting production gross revenue and 0.4% of total non-whiting production gross revenue (NOAA Fisheries 2024, FISHEyE). However, as noted in the *Expected Costs* section, if processors pass on some or all of these costs to harvesters, there may be some benefits to harvesters as well. For the three non-whiting harvesting sector representatives interviewed, removing shoreside monitoring requirements was something that could potentially save costs, but was unlikely to have considerable cost savings, in contrast to at-sea monitoring costs.

### *Reduced Shoreside Monitoring Coverage*

Reducing shoreside monitoring coverage to something less than 100% may also not result in substantial cost savings, though cost savings would depend on how a reduction was designed and implemented, since potential cost savings associated with 10% shoreside monitoring could be substantially different than 50% coverage. Observer providers noted that again, this could increase monitoring rates for both at-sea and shoreside monitoring services because of additional training, travel, or turnover implications, as well as reduced efficiencies compared to the current program. However, reduced shoreside monitoring could have some benefits relative to removing the program altogether—specifically, reduced shoreside monitoring to minimal level of randomized spot checks could decrease the risk of non-compliance, since it would increase the probability of detection of violations (see the *Compliance and Enforceability* section for more information). Like removing the shoreside monitoring program altogether, the EM program may need to be similarly redesigned and it may not be feasible to remove catch monitor requirements for these vessels, due to their different role.

## At-Sea Monitoring

As described previously, in spring of 2024, west coast groundfish catch share observer providers charged an average of $615 a day for at-sea monitoring services. In the previous section, Figure 3 shows how monitoring costs, inclusive of EM, shoreside monitoring, and at-sea monitoring costs have changed over time. Between 2020 and 2022, the average cost of all at-sea monitoring (including EM) was $2,185,881. In the following sections, we describe how changes to the at-sea monitoring coverage rate may change harvester costs.

### *Reduced Fixed Coverage (e.g., 50%)*

A reduced and fixed at-sea monitoring coverage rate would decrease the at-sea monitoring coverage level to something less than 100%. This could be something like 25%, 50%, or 75% coverage. Specific cost estimates for reduced target coverage levels are not produced in this report and it is worth noting that to do so, significant quantitative effort is required and even then, considerable uncertainties may remain. This is exemplified by the efforts for the NEFMC and NOAA to model and predict at-sea monitoring costs under a suite of alternatives to increase coverage rates in a recent management action (NEMFC 2022; Ardini, Demarest, and McArdle 2020). Demarest et al. 2019 describe:

> Since there has been limited variability in [at-sea monitoring coverage rates], there is some level of uncertainty regarding how costs change when coverage is increased or decreased. We expect that higher coverage rates will decrease observer travel costs since there will be a greater pool of available observers to cover trips. The analyses are less certain how a change in coverage may affect sea day rates.

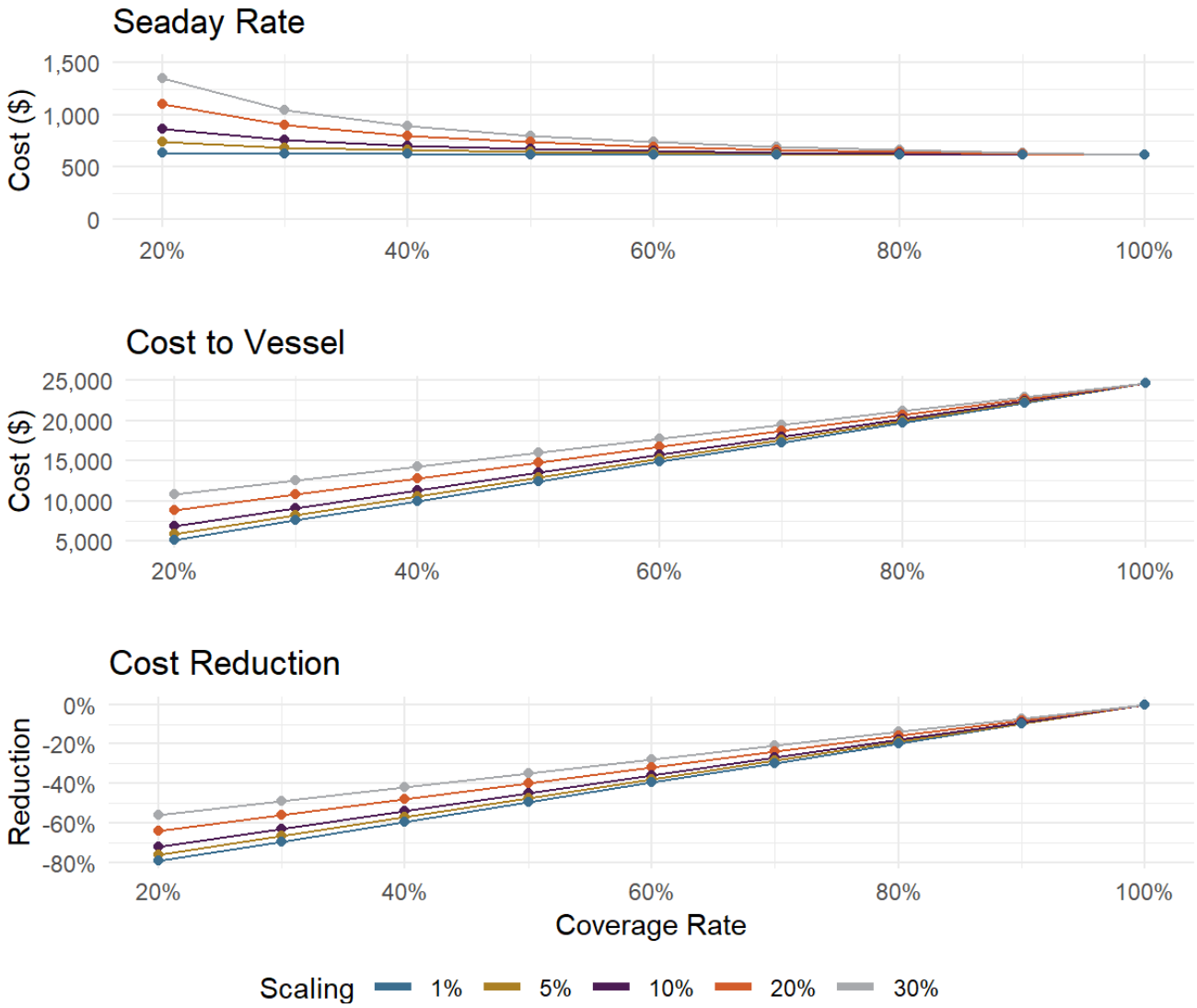
This was also reflected in interviews for this report with the west coast groundfish catch share observer providers. While they were able to provide general indications of factors that influence costs and a general sense of how costs might be affected, they also noted that they felt uncertain about the impact of reduced coverage rates on seaday rates, in part to the general uncertainties about EM and the number of trips (especially non-whiting trips) needing to be covered.

Ultimately, in New England, the models used to predict sea day rates under higher levels of coverage assumed that as the coverage rate increased seaday rates would decrease, due to efficiencies deploying observers across ports in the region, and applied a scaling function to estimate how these costs would change from the status quo rates of around 20% coverage up to 100% coverage:

> The model estimates costs at increased rates as a function of the current contracted rates, with the following assumptions: 70% of the sea day cost is fixed to cover the actual cost of having a monitor at sea, 10% scales based on the number of trips covered, 10% scales based on the total number of observers required to cover the specified level of coverage and 10% of the cost scales based on the coverage rate. (NEMFC 2022)

Figure 9 presents several hypothetical examples of how seaday rates could change under different at-sea observer coverage rates, assuming sea day rates of $615, no additional travel costs, and all other factors held constant. The various scenarios depict how costs and as a result, cost savings relative to status quo, would change assuming different scaling assumptions ranging from an assumption that seaday rates would be nearly identical under all coverage rates (1% scales with coverage rate) to 30% of the rate scales based on coverage rate. The higher the amount of the current rate that scales based on coverage rate, the lower the cost savings overall. This means that for a 50% coverage rate, which would be a 50% reduction in the current at sea monitoring rate, cost savings would be less than 50%, but how much less depends on the scaling assumption. Under a 30% scaling assumption, total annual cost savings to a vessel could be 35%, and under 20% coverage, or a reduction of 80%, cost savings could be 56%. This depiction is for illustrative purposes only and is not a prediction of costs or cost savings under various coverage rate scenarios. Ultimate costs and costs savings will depend on a variety of factors, including travel costs, the number of trips and days at sea vessels need, demand for services in west coast and other markets that observer providers serve, the use of EM and EM services that observer providers may provide, labor costs, among other factors. Notably, as discussed in the shoreside monitoring sections, changes to the shoreside monitoring program also influences the workforce available for at-sea monitoring, which could also put upward pressure on seaday rates.

**Figure 9. Hypothetical Seaday Rates, Annual Costs to Vessels, and Cost Reductions Under Different Scaling Scenarios**




*Note: All curves are for illustrative purposes only and do not predict seaday rates or cost savings under various coverage rates.*

*Source: Northern Economics Analysis*

### *Variable Coverage*

Instead of a fixed coverage rate, another possibility is to create a rate that is variable based on certain conditions. As detailed by Brannan (2023), in the New England multispecies sector program, the original design of the program included a variable at-sea monitoring coverage rate based on species-specific discard rates and determining what level of coverage was needed to obtain accurate and precise estimates of discards across fleets. This was changed in 2022 to a 100% fixed target coverage rate, as long as government funding was available to support it. Part of the reason that the program moved from a variable coverage rate to a fixed coverage rate was because there was evidence of bias in the fishery and that observed trips were not representative of unobserved trips, which reduced

the efficacy of the variable rate coverage model to produce accurate and unbiased discard estimates to manage the stock (NEFMC 2022). While bias may be the result of a combination of conscious and subconscious decisions by harvesters on when, where, and how to fish in the presence of an observer, one conscious factor leading to changes in behavior is that the presence of an observer may increase the likelihood that illegal fishing behaviors (including misreporting or non-reporting of catch and discards) may be detected and reported to enforcement officials, leading to potential enforcement actions. In New England, the presence of several constraining stocks with high quota lease price to ex-vessel price ratios was found to generate economic incentives to engage in noncompliant behavior, which if not detected, could contribute to inaccurate estimates of catch and discards (NEFMC 2022).

While there are methods available to correct for bias in catch and estimate "missing catch", in New England, the magnitude of missing catch was generally unable to be quantified, confounding efforts to correct stock assessments and provide catch advice (NEFMC 2022), leading in part to ultimate Council action to select a static high level of monitoring coverage that would minimize bias.

On the west coast, a variable coverage rate could hypothetically be designed to minimize the likelihood of bias introduced by observer effects. Such a program could introduce higher levels of coverage where the risk of noncompliance is high, such as with constraining or quota limited stocks or incentives for high-grading (discarding lower value market grades to increase catch of higher value grades). As of 2023, there were relatively few constraining IFQ species, though incentives to high-grade sablefish or other species might exist (more information is provided in the *Compliance and Enforceability* section).

While such a program could reduce costs when the risk of noncompliance is relatively low by setting a low at-sea monitoring coverage rate, it is difficult to estimate or approximate to what extent this could reduce costs. In interviews, observer providers discussed how the current system already has uncertainty with respect to how many observers might be needed and where, just in terms of how many days at sea and trips might be needed in any given port. They also noted that variable coverage rates, especially large changes, could be challenging operationally. Such a system could introduce multiple sources of instability and uncertainty for industry and observer providers about costs if coverage rates were to change suddenly. Variable coverage rates may have a suite of other administrative challenges as well, as discussed in the *Administrative Impacts* section. In particular, in New England, observer providers found it challenging to recruit and train enough observers to meet increased coverage level requirements (Martins 2022).

## Potential Tradeoffs Across Options

In addition to the potential for each option to reduce industry costs, each option may have other tradeoffs, including impacts to compliance with fishery regulations and enforceability of those

requirements, biological impacts to target and incidental species, administrative impacts, as well as potential implications to maintaining sustainability certifications.

## Compliance and Enforceability

A key aspect of the current monitoring program is that it supports individual accountability of catch and discards through the presence of at-sea observers and shorebased catch monitors. Changes to the monitoring program coverage rates, either at-sea or shoreside, can reduce individual accountability by affecting compliance with reporting requirements and the enforceability of these requirements.

As noted throughout the previous sections on the ability for program modifications to reduce costs, a key tradeoff for selecting either lower rates of monitoring at-sea or shoreside are potential changes to noncompliance and enforceability of reporting requirements. In this section we first review current compliance trends in the fishery, followed by a discussion of implications for compliance and enforceability if shoreside or at-sea monitoring levels were changed, specifically stemming from changes to economic incentives for noncompliance and compliance ethics in the fishery.

While observer and catch monitoring requirements are primarily to support science and management, in this section we assume that the presence of an observer deters noncompliance or increases the probability that noncompliance will be detected and reported to enforcement officials. This primarily stems from the amount of information made available for potential enforcement actions as collected by observers; however, as discussed below, the requirements for carrying observers are other regulatory requirements that may be violated by vessels, and reducing these requirements may have other benefits. Here we review current information on compliance rates under the program, discard incentives, and information gathered from interviews and other sources about how changes to the program may affect compliance and enforceability.

### *Current Compliance with Reporting and Monitoring Requirements*

In its 2023 annual report, NOAA OLE provided a summary of enforcement actions relating to participants in the trawl catch share program (NOAA OLE 2024). This represented permit and law enforcement data between calendar years 2021 through 2023 and separate information for the non-whiting and whiting sectors (NOAA OLE 2024). Violations relevant to either reporting and monitoring requirements for both sectors are shown in Table 8 and Table 9. Such incident data include incidents that were referred by state enforcement agencies, while Coast Guard data are reported separately and not included here.

For 2023, observer-related incidents (*Observer-Impede/Interfere/Resist/Oppose/Refusal*) was the category with the second highest number of violations in the non-whiting trawl sector, with 11 recorded violations. Across all years, this violation type is one of the most common, especially with respect to reporting and monitoring requirements, with 6 and 7 violations in 2021 and 2022, respectively. Other more frequent violations include fishing in deficit (6 violations in 2021 and

4 violations in 2022). Less frequent violations for the trawlers include sexual harassment and intimidation of observers (one of each in 2022), general reporting and recordkeeping violations, retention of prohibited species, and noncompliant discards and overages.

For the shoreside non-whiting sector, there were a handful of relevant violations specifically where the catch monitor was not present for an offload, with 1 violation in 2021 and 4 violations in 2022.

**Table 8. Relevant Enforcement Violations for Non-Whiting Vessels and First Receivers 2021-2023**

| | Non-whiting Trawl | | | First Receiver Sites | | |
|---|---|---|---|---|---|---|
| **Violation Type** | **2021** | **2022** | **2023** | **2021** | **2022** | **2023** |
| Observer–Impede / Interfere / Resist / Oppose / Refusal | 6 | 7 | 11 | | | |
| Observer–Sexual Harassment | | 1 | | | | |
| Observer–Intimidate/Harassment | | 1 | | | | |
| Fishing in Deficit | 6 | 4 | 2 | | | |
| Recordkeeping and Reporting Requirements | 3 | | | | | |
| Retention of Prohibited Species | 2 | | | | | |
| Catch Monitor Not Present During Offload | | | | 1 | 4 | |
| Noncompliant Discard | 1 | | | | | |
| Overage | | 1 | 1 | | | |
| **Compliance Rate** | **96%** | **90%** | **88%** | **82%** | **87%** | **89%** |
| **Closed Enforcement Incidents** | **67** | **62** | **83** | **11** | **23** | **9** |

*Note: Empty cells represent zeros. The sector compliance rate is calculated as the ratio of the number of incidents that did not result in enforcement actions beyond compliance assistance* - such as a written warning, Notice of Violation and Assessment (NOVA), summary settlement, or settlement agreement - to the total number of closed OLE investigations.*

*Source: NOAA OLE 2024*

For the whiting sectors, there are similar types of violations that were recorded between 2021 and 2023, with again, impeding observers in their duties as the most numerous (7), followed by fishing in deficit (4). Other violations included "failure to provide reasonable assistance" to observers (3), sexual assault/harassment of observers (1), and catch monitor not present during offload (1).

**Table 9. Relevant Enforcement Violations for Whiting Vessels 2021-2023**

| | Catcher Vessels | | | Mothership Vessels | | | Catcher Processor Vessels | | |
|---|---|---|---|---|---|---|---|---|---|
| Violation Type | 2021 | 2022 | 2023 | 2021 | 2022 | 2023 | 2021 | 2022 | 2023 |
| Observer- Failure to provide Reasonable Assistance | | 1 | | | | 1 | | 1 | |
| Observer- Impede/Retain Prohibited Species | 1 | | 2 | | | 2 | | | 2 |
| Observer- Sexual Assault/Harassment | | | | | | 1 | | | |
| Catch Monitor not Present During Offload | | | 1 | | | | | | |
| Fishing in Deficit | | 4 | | | | | | | |
| **Compliance Rates** | **93%** | **97%** | **81%** | **N/A** | **N/A** | **80%** | **N/A** | **100%** | **100%** |
| **Closed Enforcement Incidents** | **14** | **31** | **32** | **N/A** | **N/A** | **5** | **N/A** | **3** | **6** |

*Note: : Empty cells represent zeros. The sector compliance rate is calculated as the ratio of the number of incidents that did not result in enforcement actions beyond compliance assistance* - such as a written warning, Notice of Violation and Assessment (NOVA), summary settlement, or settlement agreement - to the total number of closed OLE investigations.*

*Source: NOAA OLE 2024*

In interviews for this report, three enforcement officials each noted that while the role of the observer and catch monitoring requirements are primarily to support science and management, they are helpful at providing information of potential violations for enforcement action, and reducing these requirements would lead to less information available for detecting noncompliance with fishery regulations, and possibly higher rates of noncompliance that would go undetected. Enforcement officials also noted that compliance with the catch share fishery regulations is considered to be high, with many actors who consistently abide by fishery regulations and have positive attitudes toward management rules, though there are instances of bad actors.

Information on recent violations also draws attention to a potential positive impact of reducing observer coverage rates, which is that it may reduce the exposure of observers to safety risks, as it reduces the number of people and days at sea needed to be on board fishing vessels. In addition to observers being exposed to the same hazards that make fishing one of the most dangerous occupations in the country, there have been numerous instances of harvesters impeding the duties of observers, as well as outright harassment and intimidation in both the whiting and non-whiting sectors, as shown by the number of observer-related violations. Wang and DiCosimo (2019) surveyed current and former observers across the US and found that approximately half of the respondents had experienced harassment, but only a third reported it every time it occurred, indicating that harassment and other observer-related violations may be underreported.

### *Incentives for Noncompliance*

Lower levels of monitoring coverage will reduce the ability of the program to ensure individual accountability of catch and bycatch, by reducing the probability that noncompliance will be deterred or detected. With respect to the likelihood that noncompliance in the fishery would occur under lower levels of observer coverage rates, both at-sea and shoreside, important economic indicators are economic incentives for misreporting catch, including landings and discards.

While many things may affect the ultimate decision for fishery participations to abide by fishery regulations including social norms and attitudes towards management (as discussed in the next subsection), the economic costs and benefits of noncompliance can be gauged by looking at expected costs and benefits for landing a given stock, the probability that noncompliance will be detected, and the amount of any fines or penalties (NEMFC 2022).

In particular, the ratio of the quota price to the ex-vessel price may be informative to identify which stocks are constraining or expected to be constraining to the fishery and where the costs of landing the stock likely exceed the value to land it, and thus a harvester may be better off discarding and not reporting its catch than landing it (see Henry et al. 2019 in NEMFC 2022 for more information). Additionally, if the harvester cannot acquire quota to cover its catch, it may incur overage penalties or be required to stop fishing for the rest of the season, increasing costs associated with landing the constraining stock (Singh and Weninger 2015). Additionally, where considerable ex-vessel price variability exists across market grades, there may be incentives to illegally discard or misreport catch of lower value grades to substitute for those of higher value, a practice called high-grading (Batsleer et al. 2015).

Two primary ways to misreport discards and landings to avoid incurring quota-related costs include illegally discarding catch at sea and misreporting landings at the dealer—for example, substituting the quota-limited stock for a stock that is not limited. Misreporting landings at the dealer is generally considered to be less likely since it requires coordination and collusion with the dealer or first receiver in order for the fish ticket or landings record to align with the logbook records, which may not be a problem for vertically integrated firms. Additionally, shoreside enforcement officials may have additional mechanisms to detect violations in the course of their typical duties, increasing the probability of detection of these activities, as opposed to illegally discarding catch at sea, which may be difficult to detect. In New England, such misreporting was infamously detected by undercover IRS agents who learned of misreporting practices while posing as buyers to purchase a large fishing business (White 2016). In the west coast catch share program, the current monitoring requirements deter both forms of misreporting; at-sea monitoring helps deter illegal discarding at sea, while shoreside catch monitors help ensure that the information reported on fish tickets is accurate. If monitoring requirements for either component are reduced, risks of noncompliance may increase.

Here we examine changes in quota prices for quota-managed stocks over time as well as available information on ex-vessel prices across market grades for sablefish, to assess potential risks of noncompliance stemming from incentives to illegally discard or misreport catch and landings.

Quota price data for the fishery from the implementation of the program in 2010 through 2023 show that between 2019 and 2023 an average of 1.6 stocks had a quota price to ex-vessel price ratio greater than 1, indicating an incentive for noncompliance. Quota prices can exceed ex-vessel prices for a variety of reasons, either by demand for quota (such as for constraining stocks), inefficiencies in the quota market, or high option value (e.g., for potential lightning strikes, PFMC and NMFS 2017). In any

case, a stock that can cost harvesters more to land than it can receive by selling can indicate that there are incentives for noncompliance. Between 2021 and 2023 there was only one stock, yelloweye rockfish, with a ratio greater than 1 (Table 10). This marks a decrease from the 2011–2018 period where on average, 3.5 stocks had ratios greater than 1, and ranged from between 2 and 5 in any given year. This likely reflects the continued rebuilding success of groundfish stocks and indicates that if this should continue, there may be lower risks of non-compliance as compared to years with more constraining species.

**Table 10. Quota Price to Ex-Vessel Price Ratios**

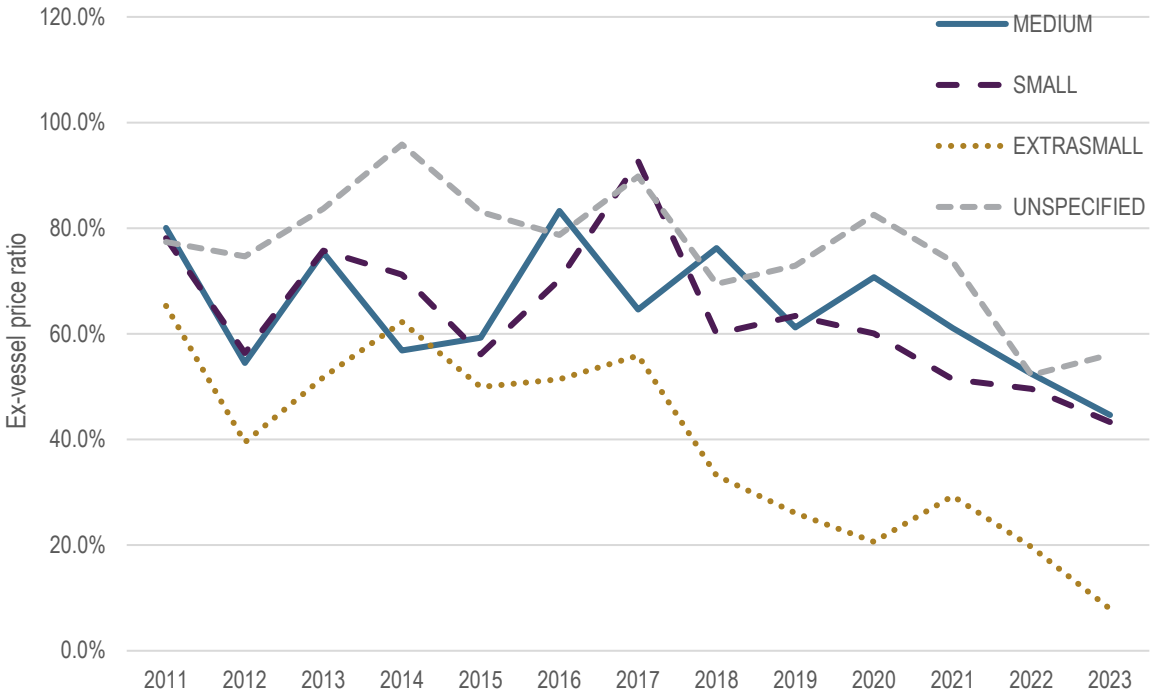
| IFQ Species | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arrowtooth flounder | - | 0.16 | 0.09 | - | 0.10 | 0.10 | - | - | - | | - | - | - |
| Bocaccio rockfish S.of 40°10'N. | 0.75 | - | 0.25 | 0.42 | 0.38 | 0.30 | 0.48 | 0.28 | 0.17 | 0.30 | 0.20 | 0.19 | 0.24 |
| Canary rockfish | 2.24 | 2.91 | 6.20 | 3.88 | 2.05 | 2.49 | 0.19 | 0.94 | 0.50 | | 0.48 | 0.57 | 0.42 |
| Chilipepper rockfish S.of 40°10'N. | 0.08 | 0.04 | 0.03 | 0.04 | 0.03 | - | - | - | 0.02 | 0.03 | 0.03 | 0.04 | 0.02 |
| Cowcod S.of 40°10'N. | - | - | - | - | - | 2.57 | 5.69 | 4.39 | 7.46 | 6.02 | - | - | 2.74 |
| Darkblotched rockfish | 0.84 | 0.45 | 1.11 | 2.43 | 1.15 | 1.21 | 0.84 | 1.20 | 0.95 | 1.81 | 0.91 | 0.96 | 1.09 |
| Longspine thornyheads N.of34°27'N. | 0.09 | 0.11 | 0.11 | 0.14 | 0.07 | 0.04 | 0.04 | - | - | | - | - | - |
| Minor shelf rockfish N.of40°10'N. | - | - | - | - | - | - | 0.03 | 0.04 | 0.06 | 0.07 | 0.24 | 0.28 | 0.24 |
| Minor shelf Rockfish S.of 40°10'N. | - | - | 0.02 | 0.02 | - | - | - | - | - | | - | - | 0.34 |
| Minor slope Rockfish N.of40°10'N. | - | 0.08 | 0.06 | 0.08 | 0.06 | 0.03 | 0.11 | 0.22 | 0.25 | 0.34 | 0.29 | 0.41 | 0.46 |
| Minor slope Rockfish S.of 40°10'N. | 0.06 | 0.03 | 0.06 | - | 0.03 | - | 0.03 | 0.02 | - | | - | - | - |
| Pacific cod | 0.09 | 0.03 | - | 0.04 | 0.02 | - | - | - | - | | - | - | - |
| Pacific ocean perch N.of40°10'N. | 0.28 | - | 1.58 | 2.30 | 1.14 | 1.18 | 1.51 | 2.42 | - | | - | - | - |
| Pacific whiting | 0.18 | 0.28 | 0.33 | 0.27 | - | 0.14 | 0.13 | 0.13 | 0.11 | 0.16 | 0.12 | 0.20 | 0.24 |
| Petrale sole | 0.24 | 0.27 | 0.20 | 0.25 | 0.29 | 0.28 | 0.32 | 0.31 | 0.36 | 0.36 | 0.22 | 0.21 | 0.24 |
| Sablefish N.of 36°N. | 0.38 | 0.52 | 0.50 | 0.46 | 0.49 | 0.45 | 0.52 | 0.64 | 0.48 | 0.53 | 0.27 | 0.44 | 0.44 |
| Sablefish S.of 36°N. | 0.33 | 0.51 | 0.13 | 0.06 | 0.06 | 0.08 | 0.03 | - | - | | 0.07 | - | - |
| Shortspine thornyheads N.of 34°27'N. | 0.10 | 0.06 | 0.06 | 0.07 | 0.05 | 0.04 | 0.03 | 0.02 | - | | 0.05 | 0.07 | - |
| Widow rockfish | 1.01 | 0.81 | 1.18 | 0.53 | 0.37 | 0.36 | 0.10 | 0.12 | 0.15 | 0.25 | 0.21 | 0.21 | 0.22 |
| Yelloweye rockfish | 60.43 | 46.07 | 52.32 | 62.08 | 35.11 | - | 21.88 | - | 34.86 | 40.92 | 75.31 | 46.89 | 102.29 |
| Yellowtail rockfish N. of 40°10'N. | - | 0.02 | 0.06 | 0.04 | 0.02 | 0.02 | 0.10 | 0.11 | 0.16 | 0.33 | 0.29 | 0.20 | 0.26 |

*Note: Stocks in years where the quota price to ex-vessel price ratio exceeds 1 are highlighted. Stocks with limited to no quota price information removed (includes starry flounder, shortspine thornyheads (S.of 34°27'N), splitnose rockfish (S.of 40°10'N), other flatfish, Pacific halibut IBQ (N.of40°10'N.), Dover sole, English sole, and all lingcod stocks).*

*Source: Holland and Steiner (in prep), reproduced with author's permission.*

However, fishery experts interviewed for this report mentioned that while improving stock status may be reducing incentives to misreport constraining stocks, there may be considerable incentives to high-grade others. In particular, they noted that in recent years sablefish has had strong year classes of younger, smaller fish, which receive lower ex-vessel prices than larger fish. Average ex-vessel price ratios across market grades show that medium, small, and extra-small fish typically receive lower prices relative to large fish; however, the difference between prices received for different grades has increased in recent years. Between 2011 and 2017, extra small fish received between 55% and 65% of the price for large fish, but in 2023 they received roughly 8% of the price, or $0.16 per pound. In the same year, the average quota price was $0.36 per pound (Holland 2024).

**Figure 10. Market Grade Price Ratios for IFQ Sablefish North**




*Note: Includes ex-vessel price for all gear types on IFQ trips, including fixed gear. Similar price differentials were observed for trawl-gear and fixed-gear types alone. Ex-vessel price ratios represent the average price by market grade as a proportion of the average price for large fish landed by IFQ vessels.*

*Source: Holland 2024*

Unreported or misreported catch information can bias information streams in stock assessments and lead to inaccurate estimates of biomass and quota-setting processes, and ultimately contribute to overfishing and the stock becoming overfished, which is discussed more in the *Biological Impacts* section.

It should be noted, however, that while it is generally assumed that the presence of observers deters noncompliance, complete compliance with fishery regulations is not guaranteed in the presence of an observer, since observers may make mistakes in their records, there may be pressure for the

observer to omit data in their records, or observers may not witness instances of noncompliance. In each of the three interviews conducted for this report with representatives from the harvesting sector, interviewees spoke about the imperfections of observer data and the potential for vessels to evade reporting requirements with an observer on board. This was generally intended to illustrate that the system could still work well in the presence of imperfect data and possible noncompliance with reporting requirements.

### *Compliance Ethic*

In addition to individual and short-term changes in incentives and compliance with fishery regulations, a possible long-term change is with respect to attitudes and ethics in the fishery. As noted previously, enforcement agents interviewed for this report described attitudes towards compliance in the fishery as being generally good, with general respect for fishery management rules and regulations. However, as described in the recent regulatory amendment for EM, changes to review rates, video review turnaround, and other EM program features were evaluated for possible impacts on compliance social tipping points. These social tipping points indicate where if some people are successful at evading rules, or there is a perception that others are evading rules, then others are more likely to follow suit, which can shift the ethics of a community from general compliance to non-compliance (see Bretreger et al. 2021 and Hatcher et al. 2000, cited in NMFS 2023a). Changes to at-sea monitoring coverage rates and/or the shoreside monitoring program both have the potential to similarly affect perceptions of noncompliance across the industry and social norms with respect to the willingness to engage in noncompliant behavior; however, these risks may be hard to predict without additional information on current attitudes of fishery participants and expectations about compliance under different monitoring coverage rate scenarios.

## Biological Impacts

As discussed in the *Changes Since Implementation* section, since the catch share program has been implemented there have been stark changes to the number of species that are overfished and in rebuilding plans. Part of the success in rebuilding overfished stocks, may be due to the increased accountability for catch of these stocks leading to reduced catch and discards:

> One of the primary intentions of Amendment 20 was to reduce bycatch and discard mortality for all species (Section 3.3.2(a)). The vessel-level accountability provided by catch shares has resulted in significant reductions in the catch and discards of overfished species, exceeding Council goals for overfished species. (PFMC and NMFS 2017)

Changes to the current monitoring program requirements may reduce individual accountability and influence the way that harvesters fish when they do not have an observer on board, introducing bias in the information collected by observers and catch monitors if observed trips are not representative of unobserved trips. If the source and magnitude of bias in catch data (including landings and

discards) cannot be identified and corrected for in stock assessment models, this can contribute to overfishing, misspecification in the models, incorrect quotas, and overfished stocks.

These issues were comprehensively described and evaluated in New England in their recent monitoring action, Amendment 23 to the Northeast Multispecies Fishery Management Plan (FMP).

> …improvements in monitoring which reduce fishing mortality through better catch accounting should produce positive biological impacts in the short-term. In the longer-term analytical assessments should improve with better catch data which should lead to subsequent improvements in groundfish catch advice and management. (NEMC 2022, p. 294)

Specifically, it was found that if bias was static over time (a consistent level of 'missing catch') assessments would underestimate spawning stock biomass and recruitment but fishing mortality estimates would not be affected; however, if the level of bias would change over time (called 'changepoint bias'), such as if the result of changing incentives to misreport landings or discards, then assessments would exhibit errors in increasing magnitude with the level of missing catch, and errors in the estimation of spawning stock biomass and recruitment would increase over time (NEMFC 2022, Appendix VIII).

Other issues described in Amendment 23 included how issues in stock assessments could lead to changes in the stock assessment models or approaches used. In New England, as a result of persistent issues in several stock assessments, several analytical assessments were rejected and changed to empirical assessments, which are unable to produce biological reference points and determine stock status. It was expected that under higher levels of monitoring that catch information would improve, leading to improved stock assessment quality over the long term (NEMFC 2022).

Changes in fishing behavior may also result in less information about interactions with nontarget species as well, which may be a distinct biological impact from interactions with target species and IFQ/catch share managed stocks. This might impact information about protected species, as well as other nontarget fisheries.

## Administrative Impacts

Changes to the monitoring program have the potential to also affect the agencies involved in the management and enforcement of fishery regulations, ranging from deploying observers and monitors to the amount of information available for quota monitoring, stock assessments, and discard estimation, which in turn, have implications for industry costs through changes in recoverable costs. Here we briefly summarize some potential administrative trade-offs as identified in interviews and other information sources.

### *Structure of the Observer Program*

Changes to the monitoring program that would consider moving to a lower monitoring coverage target level (either at-sea or shoreside) would also need to consider what this would mean for the

structure of the current monitoring program, since at present, the current monitoring program does not need a specific mechanism to select trips for observer coverage since all trips are observed. Anything less than 100% coverage would need to implement a separate system for selecting trips, implementing a new sampling plan, and ensuring that different fleets are meeting the required target coverage rate[7], which could result in one-time implementation costs as well as ongoing agency staff time, which in turn could increase recoverable costs for the agency. While this may not result in an increase in the cost recovery fee for sectors that are at the cost recovery fee cap (i.e., the IFQ sector), this could change the fee for the mothership or catcher-processor sectors, if monitoring program changes were instituted across all three sectors.

In addition, if a variable rate coverage program was implemented where the target coverage rate could vary from year to year, additional changes and flexibility on the agency's side to train observers may be required, as well as adapting to varying levels of data availability. Additionally, as discussed in the cost sections, lower and variable coverage rates may also impact the ability to recruit and maintain enough observers.

### *Information and Data Availability*

Additionally, the current program provides comprehensive catch and discard information which is used by managers and industry alike to monitor quota utilization and bycatch hotspots, which for the at-sea whiting fleet has been used to inform in-season management adjustments and allow industry to avoid areas where constraining stocks or species of concern (such as salmon) have been encountered. Reductions in at-sea or shoreside monitoring may reduce the ability to have this information, and result in other management changes to account for more uncertainty in catch and discard estimates. In interviews with WCGOP staff, it was noted that many aspects of the current program and management have evolved around this level of information and data availability, and that without comprehensive monitoring more conservative regulations and/or additional data and quota monitoring programs may be required to ensure catch limits are not exceeded for target and incidentally caught stocks.[8] Since the implementation of the IFQ program, fishery management decisions large and small made by the Council have relied on 100% catch accounting. For example, the opening of previously closed areas to bottom-trawl fishing under Amendment 28 introduced greater uncertainty in potential catch composition and quantity and was predicated partially on the ability of managers to track total catch in-season. Such examples of flexibility illustrate that the high level of accountability under the program allows for additional regulatory and operational flexibility that may be diminished if the monitoring requirements were changed.

[7] While such a system would be similar to both the program in place before the catch share program and the non-catch share observer program, their design is not appropriate for catch accounting and could not be a model for deploying catch share observers under <100% coverage.

[8] The EM program and recent changes to the EM program to change video review rates have similar considerations, especially for non-quota managed species, since only quota monitored stocks are accounted for using EM.

Additionally, as discussed in the *Biological Impacts* section, reduced at-sea or shoreside monitoring coverage rates could lead to increased uncertainty and bias in catch, effort, and discard data, which affects the agency's ability to debit IFQ accounts and monitor utilization, which could in turn negatively impact stock assessments and their ability to estimate biological reference points and determine stock status.

### *EM Program Design & Administration*

Another possible trade-off associated with changing monitoring coverage rates associated with the human-based components of the monitoring program, is that this may also necessitate further changes to the design of the EM program, which was designed to meet the comprehensive monitoring coverage rate standard. Any changes to the EM programs for various fleets may require considerable effort across the agency to design and implement.

In interviews with WRCO and PSMFC staff, no other immediate trade-offs were identified with respect to changes to the monitoring program and administration of the EM program. While it is possible that if the EM program is not modified that the relative costs of having EM or taking human observers may change, and as a result change how many vessels use EM, it was not expected that changes in the amount of video reviewed or the number of participating vessels would change administrative operations. For PSMFC specifically this was because of similar video review duties that PSMFC has for the Alaska region.

## Other Considerations

### *Safety*

As discussed in the *Compliance and Enforceability* section, changes in observer coverage rates may have some safety benefits, specifically for human observers themselves, where some of the most common violations are instances of intimation, harassment, or sexual assault of fisheries observers (Table 8, Table 9), particularly in the course of at-sea monitoring duties. These benefits would stem from a reduction in the amount of time that observers are on board, potentially reducing the likelihood of such events; however, these benefits might be minimized if instead these events were more likely to occur, based on shifts in attitudes towards compliance, as discussed in the *Compliance Ethic* section.

In addition, reducing coverage rates may also increase safety for both observers and harvesters. As discussed in the first review of the program, after the implementation of the program it was found that a higher proportion of trips began between midnight and 2:00 AM, potentially in order to reduce monitoring costs (PFMC and NMFS 2017). While not all observer providers charge based on calendar day, some do, which can incentivize starting a trip in suboptimal conditions in order to reduce costs. Reducing at-sea monitoring coverage rates may reduce these incentives on the trips that harvesters are not observed, but such changes in fishing behavior are also the types of changes that can induce

bias in catch and effort data, and lead to negative biological impacts (see the *Biological Impacts* section for more information).

### *MSC Certification*

Along with broader compliance, biological, and administrative impacts, another potential trade-off associated with changing monitoring coverage rates is how this could indirectly affect the non-whiting and whiting fisheries in their ability to receive sustainability certifications, which can affect prices received for products as well as determine what markets harvesters can sell their catches to. The West Coast limited entry groundfish trawl fishery and Pacific whiting fishery are both currently Marine Stewardship Council (MSC) certified, along with other notable West Coast fisheries like the pink shrimp trawl fishery (MSC 2024c). Here we examine how the current monitoring program affect certification scores and discuss how changes to the program could influence the fishery's ability to maintain certification, especially given recent changes to MSC's standard which emphasizes monitoring requirements. The is an international non-profit that administers a voluntary certification program that independently assesses fishery health and sustainable management. Fisheries that meet certification standards are awarded an ecolabel that marks their commercial fishery products as coming from a well-managed and sustainable fishery. While certification standards do not explicitly require a specific level of monitoring coverage, monitoring efforts are considered during assessment and high levels of coverage are incentivized where they are needed (MSC 2024a). Currently, more than 400 fisheries are engaged globally with the MSC program (MSC 2024f) and over 80% of US landings are MSC certified (MSC 2023a).

Certification is based upon three governing principles: 1) sustainable fishing stocks; 2) environmental impact of fishing; and 3) effective management (MSC 2023b). Individual metrics within these frameworks are known as performance indicators (PIs). Multiple PIs factor in monitoring activities when determining the certification score (MRAG 2024). A list of the MSC PIs and their parts impacted by monitoring relevant for the West Coast Groundfish fishery's certification are listed below. Notably, these PIs were specifically identified as relevant for monitoring levels in the groundfish trawl fishery, but the same monitoring-related PIs are applied when evaluating the Pacific whiting fishery as well.

- **Principle 1**
  - *PI 1.2.1- Harvest Strategy*
    - (a) There is a robust and precautionary harvest strategy in place
    - (c) Harvest strategy monitoring
  - *PI 1.2.3- Information and Monitoring*
    - (b) Monitoring
    - (c) Comprehensiveness of information

- **Principle 2**
  - *PI 2.1.2- Primary Species Management*
    - (d) Shark finning
  - *PI 2.2.2- Secondary Species Management*
    - (d) Shark finning
  - *PI 2.2.3- Secondary Species Information*
    - (a) Information adequacy for assessment of impacts on main secondary species
    - (b) Information adequacy for assessment of impacts on minor secondary species
  - *PI 2.3.3- Endangered, Threatened and Protected (ETP) Species Information*
    - (a) Information adequacy for assessment of impacts
    - (b) Information adequacy for management strategy
  - *PI 2.4.3- Habitats information*
    - (b) Information adequacy for assessment of impacts

- **Principle 3**
  - *PI 3.2.3- Compliance and Enforcement*
    - (a) Monitoring, control and surveillance (MCS) system
    - (c) Compliance

For each part of these PIs, there are three scoring levels: minimum acceptable performance (60), global best practice (80), or state of the art (100) (MSC 2024e). To be certified, fisheries must score a minimum of 60 on each PI and score an average of 80 across all PIs. Based on an ongoing assessment of the U.S. West Coast Limited Entry Groundfish Trawl Fishery, the fishery is currently scoring between 80 and 100 on each of the above PIs (MRAG 2024). However, it should be noted that the current 100% at-sea and shoreside monitoring coverage rate was discussed in the rationales for the scores assigned to each of these PIs. Lowering the monitoring coverage rate would likely result in lower scores for the specific PIs identified above and lower the average total score for determining MSC certification. However, score decreases may not necessarily jeopardize certification. In interviews with three MSC certification contacts for this report it was indicated that while the comprehensive monitoring program supports strong scores, minor to moderate changes in the monitoring coverage rate, particularly the at-sea monitoring coverage rate, are unlikely to risk the certification for the fishery.

While there are new monitoring coverage rate thresholds in latest MSC fisheries standard, first deployed in May 2023 (MSC 2024d), these thresholds apply only to Regional Fishery Management Organization fisheries, and thus do not apply here (Atcheson 2024). Specifically, for these fisheries when assessing the fishery against Endangered, Threatened and Protected, and Out-of-Scope Species,

fisheries must demonstrate at least 30% coverage of annual fishing operations. Only fisheries with full coverage of independent observation will be scored at state-of-the-art level (100) (MSC 2024b).

# Synthesis and Conclusions

The previous sections have focused on describing current costs of the monitoring requirements under the program, implications for potential cost savings if monitoring program requirements were changed, as well as other compliance, biological, administrative, or other impacts. In this section, we build on this information to summarize how the options to change to shoreside and at-sea monitoring requirements may result in various positive or negative impacts with respect to the options for changing to the program explored in this report.

## Shoreside Monitoring Options

Overall, removing or changing the current human-based shoreside monitoring program requirements may be the most feasible in terms of minimizing negative compliance and biological trade-offs. However, changes to the shoreside monitoring program may also be the least effective in terms of reducing costs, particularly for sectors that are hardest hit by the current monitoring program requirements, such as small inshore trawlers.

Specifically, tradeoffs with compliance and enforceability are expected to be less negative when compared to reducing at-sea monitoring levels, in part because of the level of redundancy in monitoring and enforcement mechanisms for landed catch, as opposed to discards at sea. Specifically, fish tickets can be compared to logbooks and enforcement has mechanisms other than catch monitor reports to detect noncompliance with misreporting or nonreporting of landings (for example, Stewart 2024 describes a case in Maine involving conspiracy and fraud). Thus, while removing shoreside monitoring requirements might increase the risk of noncompliance with reporting requirements, the probability of detection for these events is nonzero, which helps to deter violations. This sentiment was described in interviews with both harvesting and processing sector representatives, that even without shoreside monitors there would be risks for anyone trying to evade reporting rules.

However, removing shoreside monitoring requirements may not have considerable cost savings if at-sea monitoring coverage rates are left unchanged (i.e., remain at 100%), since the at-sea observer may also act as the catch monitor. In the current program, shorebased whiting processors pay the second-highest amount for monitoring services at an average of $880,673 between 2020 and 2022 (the highest is the non-whiting trawl fleet at $1,074,596, Table 4, Table 5), non-whiting processors paid an average of $157,995. However, on average, shoreside monitoring costs are a very small proportion of total whiting and non-whiting processor gross revenue, on average (0.32% of whiting gross revenue, 0.12% of groundfish gross revenue, Table 5), compared to non-whiting catcher vessels (4.54% of groundfish gross revenue, Table 4). Additionally, shoreside whiting processors' monitoring costs are also more likely influenced by additional shoreside catch accounting

requirements required under the EM program, and thus may be less able to be changed or removed, compared to those using human at-sea monitors. However, as noted in the *Expected Costs* section, if processors pass on some or all of these costs back to harvesters, harvesters as well as processors may benefit from reduced costs. In interviews with processors and harvesters for this report, it was noted that while reductions in shoreside monitoring could be helpful reducing at-sea monitoring requirements would likely be more impactful for the industry as a whole.

If shoreside monitoring coverage was reduced to randomized spot checks, noncompliance may be further disincentivized if both harvesters and first receivers could not predict what deliveries might be monitored and increasing uncertainty with respect to the probability of detection. However, such a program may have limited cost savings, in particular, depending on the fleet and how the at-sea monitoring program is modified. If 100% of trips at sea are monitored by a human, offloads may be monitored by the same person, making both at-sea and shoreside monitoring more cost effective. Separating human at-sea and shoreside monitoring components may increase travel costs or otherwise make the program less cost effective and put upward pressure on seaday and shoreside monitoring rates, reducing possible cost savings. In interviews, this was discussed in the context of EM implementation, where it has been more difficult to retain and have catch monitors available for EM trips that only require a catch monitor, since it is difficult to have enough of this work to keep a person fully employed in remote port areas.

Biologically, impacts and tradeoffs with respect to removing shoreside monitoring requirements will depend on compliance with reporting requirements. If nonreporting or misreporting is minimal, it reduces the likelihood of overfishing or having overfished stocks, and in turn reduces the likelihood of issues in stock assessments and long-term management consequences.

Administrative tradeoffs for shoreside monitoring largely would occur if the shoreside monitoring program was changed to a variable coverage rate model, potentially independent of at-sea monitoring requirements, which could require new trip selection mechanisms for the agency to design and implement as well as increase cost recovery fees for some sectors.

In addition, removing or changing shoreside monitoring requirements for humans may also require the EM program to be redesigned. The current design of the program requires bottom trawl and non-whiting midwater trawl vessels to retain at least some discards for identification and catch accounting shoreside. Consideration would need to be given to evaluate how the EM program would need to be modified to meet a new monitoring coverage rate standard. Removing shoreside monitoring requirements for EM may also have tradeoffs for reducing costs for vessels using human monitors. In interviews with observer providers, it was noted that the shoreside monitoring services for the whiting fleet was a big source of financial stability for their business, without which they were uncertain of their ability to have enough observers available and to continue to supply monitoring services to the fleet, which could also mean that the cost of at-sea monitoring services could increase if shoreside monitoring services for all fleets, including those using EM, were diminished or removed.

## At-Sea Monitoring Options

For this report, two options to modify the at-sea monitoring program are considered: 1) reducing coverage levels to some fixed level that is less than 100%, and 2) reducing coverage levels to a variable coverage target level, which could vary based on biological or economic factors. Here we review specific economic, biological, administrative, or other consequences resulting from these options, based on discussions and information presented in the *Potential Tradeoffs Across Options* section.

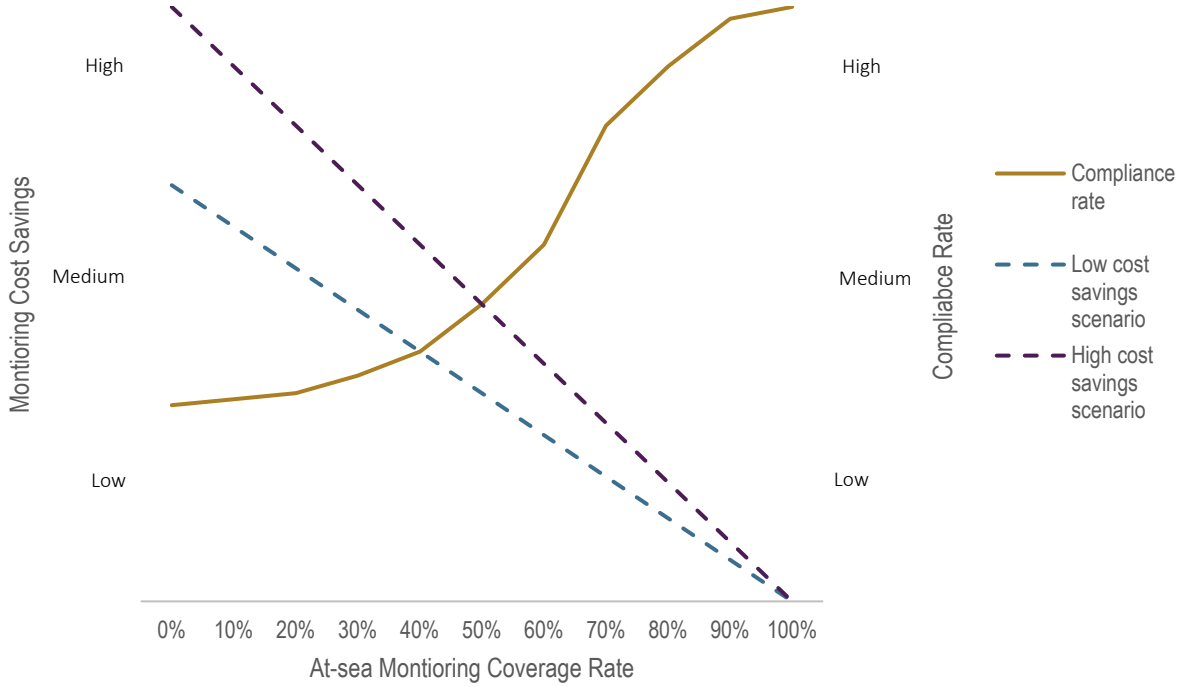
For the at-sea monitoring program, there is the potential for reductions in coverage rates to have considerable cost savings for industry, particularly if monitoring coverage rates are significantly reduced (e.g., 25%); however these reductions may also have high negative impacts to compliance and enforceability (and therefore to the quality of data for catch accounting and stock assessment). They may be less negative if smaller reductions are made (e.g., to 50% or 75%), or if incentives for noncompliance are low and attitudes towards compliance are high. Changes to a variable coverage rate are more uncertain, since coverage rates could vary from year to year. At present, economic incentives for illegally misreporting catches are relatively low, due to the low number of overfished or constraining stock quotas, but do exist especially for high-grading (Figure 10). Additionally, if an ethic of compliance generally exists across the fishery, lowering at-sea monitoring coverage rates may shift this ethic to an alternate state of non-compliance.

While the exact relationship between potential cost savings under various at-sea monitoring alternatives cannot be determined in this report, we can illustrate a hypothetical relationship, based on the factors previously discussed in the at-sea monitoring costs and compliance and enforceability sections, which may help to elucidate the magnitude of tradeoffs when it comes to potential cost savings and compliance tradeoffs. The schematic in Figure 11 shows three curves, the downward sloping curves illustrate two of the possible cost savings curves discussed previously based scenarios of seaday costs under different coverage rates and assumptions about scale efficiencies. The cost curves indicate that reductions in the coverage rate may not have a proportionate impact on costs, and that due to inefficiencies associated with supplying observers at low coverage rates, cost savings may be reduced.

The upward sloping, S-shaped curve illustrates possible compliance with reporting regulations by coverage rate. This curve indicates the possibility of a changepoint in compliance where for small changes in coverage rate it is possible to see large changes in compliance, here we present it as if it is right around 50% or 60% coverage, but this is not known. In interviews with a monitoring and compliance expert, it was indicated that 50% coverage may be a reasonable estimate, given that this provides ample amounts of information for statistical analysis about how vessels change their behavior when not observed (as observable in other characteristics in terms of what is caught, where they fish, etc.) that may aid enforcement in the identification of non-compliance. For coverage rates less than 50%, this may be increasingly more difficult, due to less information about how vessels fish when they are observed. Additionally, when vessels are observed for a minority of the time that they

are fishing, it may also work to shift general practices and ethics away from noncompliance, especially it is perceived that noncompliance is widespread and common. The hypothetical curve assumes that noncompliance may decrease to some stable level, though along with other features of the relationship, it is not known how much noncompliance would occur with limited to no monitoring. As discussed in the *Compliance and Enforceability* section, several factors including attitudes and ethics towards compliance will affect compliance rates. It may be that compliance would still be relatively high across all participants in the fishery; however, even then the ultimate impacts of noncompliance may still be high if the nature of noncompliant behaviors is extreme, or proportionately high. For example, several disaster tows for constraining stocks that occurred and were not reported, could lead to overfishing on an overfished stock.

**Figure 11. Hypothetical Monitoring Coverage, Cost, and Compliance Tradeoffs**




*Note: All curves are for illustrative purposes only and do not predict seaday rates or cost savings under various coverage rates.*
*Source: Northern Economics Analysis*

Negative biological impacts may result not only because of intentional noncompliance with fishing regulations, but also if fishing behavior significantly changes when fishing with or without an observer, which can introduce bias into data used for quota monitoring and stock assessment. Such 'observer effects' can negatively affect bycatch and discard estimation and contribute to stock assessment misspecification and stock depletion. Additionally, less observer coverage may also mean less information available about rare events, such as interactions with protected species.

As discussed in the *Administrative Impacts* section, switching to a coverage rate less than 100% may increase administrative duties and associated costs of the program, including implementation costs for a new trip selection system and ongoing costs associated with monitoring coverage rates and estimating bycatch and discards, potentially increasing cost recovery fees for some sectors. This may also reduce information and data available for management, including affect quota monitoring and discard estimation, especially if new systems and regulations need to be put in place to estimate discards and discard rates on for quota managed stocks and other species. It may also lead to reductions in flexibility granted to harvesters on when and where they fish, such as implementation of Block Area Closures. Finally, similar to the shoreside monitoring options, changes to the target coverage rate for human at-sea observers could require the EM program to be redesigned as well.

Additionally, large changes in at-sea monitoring coverage rates could reduce the ability for both the Pacific whiting and groundfish trawl fisheries to maintain their MSC certifications. Comprehensive monitoring coverage currently positively affects the MSC scoring for all major elements, major coverage rate reductions are the most likely mechanism to negatively affect certification for both fisheries, since more moderate coverage levels are likely to have neutral impacts on certification overall (see the *Other Considerations* section for more information).

### Summary of Potential Tradeoffs

Table 11 shows a summary of the potential magnitude and direction of tradeoffs across the options explored in this report. For many options, the extent of potential impacts depends on the ultimate design of the option (e.g., what coverage rate is selected), as well as what fleet and sector is considered, particularly for cost savings, since fleets vary in terms of which fleets use EM and monitoring costs as proportion of gross revenue vary across fleets and sectors. For the variable coverage rate option, several impacts are described as uncertain, because many impacts (costs, compliance, biological impacts, and information and data availability) stem from the coverage rate level in any given year, which would heavily depend on how this option was designed, including what biological, economic, or other criteria would influence monitoring coverage rates.

Overall, relative to the shoreside monitoring options, the at-sea monitoring program changes have the highest potential to reduce costs especially for sectors with relatively high cost burdens, such as small, inshore catcher vessels, but these changes may have the highest negative impacts on compliance and enforceability, stemming from reduced accountability of catch, as well as biological impacts, stemming from the introduction of potential observer effects, risk of overfishing, and potential impacts to stock assessments. While it is not precisely known how decreases in observer coverage increase these risks, they become more likely with decreased observer coverage rates, especially if attitudes towards compliance shift from a general ethic of compliance to an ethic of non-compliance. Additionally, we note that as observer coverage rates decrease, cost savings may not be 1:1, since it may become less efficient to hire, train, and deploy observers across vessels and ports.

**Table 11. Summary of Potential Monitoring Program Trade-offs by Option**

| Program Element | Option | Monitoring Costs | Compliance and Enforceability | Biological Impacts | Administrative Impacts | Information and Data Availability |
|---|---|---|---|---|---|---|
| Shoreside Monitoring | No Shoreside | Low Positive to Positive | Low Negative to Negative | Low Negative to Neutral | Low Negative | Neutral |
| | Limited Shoreside | Neutral to Low Positive | Low Negative to Neutral | Low Negative to Neutral | Negative | Neutral |
| At-Sea Monitoring | Reduced Fixed Coverage | Low Positive to High Positive | Low Negative to High Negative | Low Negative to Negative | Negative | Low Negative to High Negative |
| | Variable Coverage | Uncertain | Uncertain | Uncertain | High Negative | Uncertain |

*Note: Impacts are relative to status quo (i.e., 100% shoreside and at-sea monitoring) and for vessels and fleets that use humans for monitoring, since changes to the EM program as a result of these changes are not known. Potential impacts are based on qualitative information from a variety of sources, but primarily from expert interviews, existing literature, and best professional judgement and should be considered rough and high-level.*

*Source: Northern Economics Analysis*

Modifications to the shoreside monitoring requirements may be less likely to have negative compliance, enforceability, and biological impacts as compared to at-sea monitoring requirements, stemming from other capabilities of enforcement officials to detect noncompliance issues shoreside, as compared to at-sea, where detection may be more difficult. As the risk of noncompliance increases, the risk of negative biological impacts may increase, to the extent that changes in fishing behavior bias data obtained on observed trips or that unreported or misreported catch leads to overfishing.

All reduced at-sea and shoreside coverage rate options have the potential to have negative administrative impacts, primarily from the creation of new quota monitoring, trip-selection, and observer or catch monitor deployment systems. Removing the shoreside monitoring system altogether while holding at-sea monitoring coverage rates constant is the only option that would not have this impact.

Shoreside monitoring program modifications are less likely to result in other information and data reductions, as opposed to changes in the at-sea monitoring program, because shorebased catch monitors verify landings amounts, as opposed to at-sea monitors who estimate and record data used in management. However, negative impacts may still occur if the EM program must be redesigned. Less information from at-sea observers may impact quota monitoring systems, information about protected species interactions, and increased uncertainty in catch and discard data may reduce other forms of regulatory flexibility as a result, such as access to closed areas.

Major changes in the at-sea monitoring program may also influence the ability for the Pacific whiting and non-whiting groundfish fisheries to maintain key sustainability certifications, since comprehensive monitoring coverage supports high scores across many performance indicators for certification.

Finally, interactions between changes in at-sea monitoring coverage rates, shoreside monitoring, and EM, must be considered. This report generally discusses the impacts of modifying shoreside

monitoring or at-sea monitoring in isolation, but changes to coverage rate requirements may necessitate changes to EM components, such as review rates or when cameras are turned on. Even if changes are made to the EM program to maintain equivalency for catch accounting purposes, changes to at-sea and shoreside monitoring coverage may influence the relative cost-effectiveness of different tools, and influence how many vessels choose to use EM. For changes to the at-sea monitoring program, cost savings may be reduced if changes to shoreside monitoring requirements are not made in parallel, since the at-sea observer typically serves as the catch monitor. If the shoreside monitoring requirement stays at 100% while at-sea monitoring coverage rates are reduced, this may increase costs for shoreside monitoring, which could be passed in part to vessels.

Brief descriptions of high-level impacts by option and tradeoff are provided in Table 12.

**Table 12. Detailed Summary of Tradeoffs by Option**

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| Shoreside Monitoring (catch monitors) | No Shoreside Monitoring | Monitoring Cost Savings | Low Positive to Positive | Extent of cost savings depends on sector and fleet. Cost savings may primarily accrue to processors. Higher administrative costs may increase cost recovery fees. |
| | | Compliance and Enforceability | Low Negative to Negative | Enforcement agents may have other mechanisms and presence to detect shoreside violations, but risk for nonreporting or misreporting may increase. |
| | | Biological Impacts | Low Negative to Neutral | If noncompliance is minimal or does not induce overfishing, minimal impacts may occur. If more noncompliance occurs, especially if/when incentives are higher, biological impacts may be more negative. |
| | | Administrative Impacts | Low Negative | No new catch monitor deployments systems would be needed, but the EM program may need to be redesigned, causing more short-term impacts. |
| | | Information and Data Availability | Neutral | Minimal impacts to data streams since catch monitors (other than those used for EM) do not make data records. |
| | Reduced Fixed Shoreside Coverage Rate | Monitoring Cost Savings | Neutral to Low Positive | Cost savings may be minimal if catch monitor deployment is separate from and decoupled from at-sea monitoring services. If coupled with at-sea monitoring rate changes, savings are more likely to be positive. Cost savings may only accrue to those using EM if the EM program is redesigned. Higher administrative costs may increase cost recovery fees. |
| | | Compliance and Enforceability | Low Negative to Neutral | Compliance and enforceability may be similar to levels under 100% monitoring if selection is random and not known when a vessel is fishing. If harvesters and processors know when they will be monitored, compliance and enforceability may be negatively affected. |
| | | Biological Impacts | Low Negative to Neutral | If compliance is high, per the compliance and enforceability discussion, biological impacts may be neutral. If harvesters and processors know when they will be monitored, noncompliance and bias in data may occur. |
| | | Administrative Impacts | Negative | New catch monitor deployment and trip selection systems will need to be developed. Additionally, the EM program requirements may need to be redesigned. |
| | | Information and Data Availability | Neutral | Minimal impacts to data streams since catch monitors (other than those used for EM) do not make data records. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| At-sea Monitoring Coverage Rate (all three sectors) | Reduced Fixed At-Sea Monitoring Coverage Rate | Monitoring Cost Savings | Low Positive to High Positive | Cost savings may be higher as coverage decreases but may be less than 1:1 due to decreases in efficiency for hiring, maintaining, and deploying observers. Higher administrative costs may increase cost recovery fees. |
| | | Compliance and Enforceability | Low Negative to High Negative | Compliance and enforceability will be more adversely affected as coverage decreases, and when incentives for noncompliance are higher. Substantial changes in compliance may occur with small changes in coverage (see Synthesis and Conclusions section for more information). |
| | | Biological Impacts | Low Negative to Negative | Biological impacts may be more negative at lower levels of coverage. A higher proportion of unobserved trips increases the risk of higher uncertainty and bias affecting stock assessments and a higher risk of noncompliance increases risks of overfishing. |
| | | Administrative Impacts | Negative | Potentially new catch observer deployment, trip selection and quota monitoring systems/procedures will need to be developed, in addition the EM program requirements may need to be redesigned. Regulatory flexibility may decrease. |
| | | Information and Data Availability | Low Negative to High Negative | Reduced information from observers will decrease information for quota monitoring and information about protected species interactions. |
| | | Other Impacts | Neutral to Negative | MSC certification scores may be negatively affected by uncertainty in data and lower at-sea monitoring requirements. |
| | Variable At-Sea Coverage Rate | Monitoring Cost Savings | Uncertain | Will depend on the nature of the program and triggers for determining coverage rates. Due to more administrative costs, cost recovery fees may increase more or over a longer time period. |
| | | Compliance and Enforceability | Uncertain | Will depend on the nature of the program and triggers for determining coverage rates. |
| | | Biological Impacts | Uncertain | Will depend on the nature of the program and triggers for determining coverage rates. |
| | | Administrative Impacts | High Negative | Will incur many of the same negative impacts as described for reduced at-sea monitoring coverage but require more ongoing costs for determining coverage rates and monitoring performance on an ongoing basis. |
| | | Information and Data Availability | Uncertain | Will depend on the nature of the program. May be difficult to have variable and uncertain levels of information across years. |
| | | Other Impacts | Neutral to Negative | MSC certification scores may be negatively affected by uncertainty in data and lower at-sea monitoring requirements. |

*Note: Impacts are relative to status quo (i.e., 100% shoreside and at-sea monitoring) and potential cost savings are for vessels and fleets that use humans for monitoring. Changes to the EM program design may be an additional impact. Potential impacts are based on qualitative information from a variety of sources, but primarily from existing literature, expert interviews, and best professional judgement and should be considered rough and high-level.*

*Source: Northern Economics Analysis*

# Economic Data Collection Program

## Purpose of the EDC Program

The EDC Program was developed to meet the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requirements for Fishery Management Plans (FMPs) and Limited Access Privilege Programs (LAPPs). It also provides data to address several Federal and state regulatory requirements.

MSA Section 303(a) defines the required contents of FMPs. Section 303(a)(5) states that the FMP must "specify the pertinent data which shall be submitted to the Secretary with respect to … economic information necessary to meet the requirements of this Act". Section 303(A)(c)(1)(C) states that a LAPP must promote social and economic benefits. Section 303(A)(c)(1)(G) states that any LAPP shall:

> …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 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 frequent than once every 7 years).

EDC data are used to understand the economic effects of the groundfish catch share program including operating costs, revenues, vessel characteristics, and processing facility characteristics. The EDC program also collects data to evaluate the program's goals of providing for a viable, profitable, and efficient groundfish fishery; increased operational flexibility; minimizing adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical; promoting measurable economic and employment benefits through the harvesting, processing, distribution, and support sectors of the industry. Having the ability to understand whether these goals are being met was an important consideration in the development of the EDC program.

The requirement that data are collected to evaluate program goals also grants policy makers the authority to determine exactly what data are needed to inform their evaluation of the program. The public process for policy makers to determine the necessary data collection put in regulations is informed by stakeholder input. This review of the EDC Program is intended to provide an opportunity for the Council and stakeholders to review the costs and effectiveness of the EDC Program as well as consider tradeoffs with changing the frequency and/or structure of the survey instruments.

The EDC Program consists of mandatory annual surveys that must be completed by participants in the Trawl Catch Share Program. A link to each of the current EDC surveys is provided in Table 13.

**Table 13. Links to 2022 EDC Surveys**

| Sector | Current Survey Instrument |
|---|---|
| Mothership Operators | *https://www.fisheries.noaa.gov/s3/2023-04/Economic-Data-Collection-MothershipSurvey-2022-Form-NWFSC.pdf* |
| Catcher Vessel Operators | *https://www.fisheries.noaa.gov/s3/2023-04/Economic-Data-Collection-CatcherVesselSurvey-2022-Form-NWFSC.pdf* |
| Catcher-Processor Operators | *https://www.fisheries.noaa.gov/s3/2023-04/Economic-Data-Collection-CatcherProcessorSurvey-2022-Form-NWFSC.pdf* |
| First Receivers/ Shorebased Processors | *https://www.fisheries.noaa.gov/s3/2023-04/Economic-Data-Collection-FRSurvey-2022-Form-NWFSC.pdf* |
| Quota Share Owners (2020 forward) | *https://www.fisheries.noaa.gov/west-coast/sustainable-fisheries/west-coast-groundfish-trawl-quota-share-owner-survey* |

*Source: NOAA Fisheries website*

The EDC program collected baseline data for the years prior to implementation of the catch share program for the 2009 and 2010 fishing years, and it has annually collected data for each calendar year from the beginning of the catch share program in 2011 to the present year for all participants except the quota share owners whose survey was implemented to begin collecting data for the 2020 calendar year.

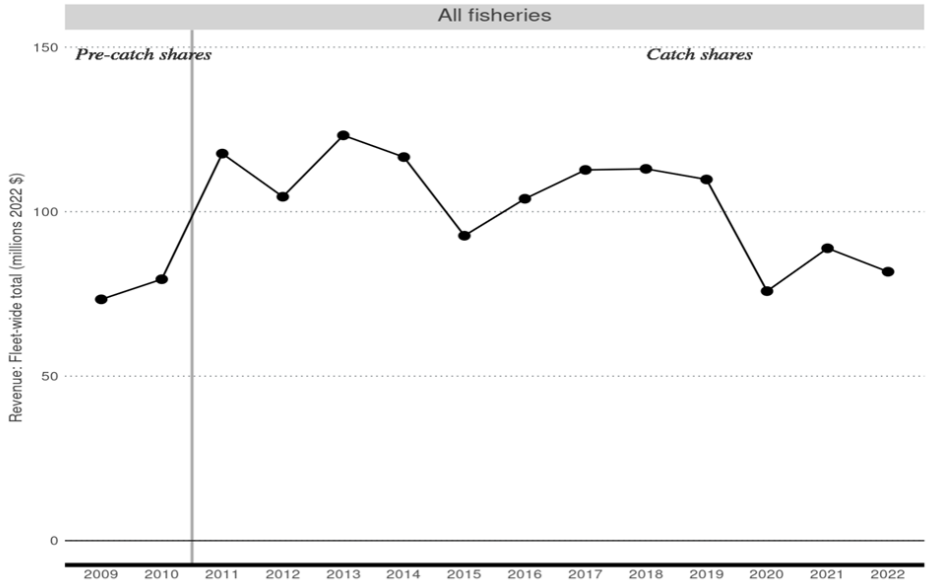
## Data Uses

EDC data uses are described in this section of the paper. Primary federal policies include laws, Executive Orders (EOs) and NOAA Fisheries strategies and policies that require economic analyses. Other data uses include studies requested by the Council or NMFS.

The importance of EDC data is that they allow for a better understanding of changes in the economics of the fisheries beyond just changes in gross ex-vessel revenue and first wholesale value. While understanding changes in gross revenue provides valuable information, it only tells part of the story. Net revenue tells a more complete story of the economic changes that take place in a fishery. For example, consider only total gross ex-vessel revenue from all fisheries[9] combined for the catcher vessel fleet completing the EDC in 2021 and 2022. Figure 4 shows an 8% decline in total gross ex-vessel revenue from $88.9 million to $81.7 million.

[9] Includes catch share fisheries, crab, shrimp, and other fisheries.

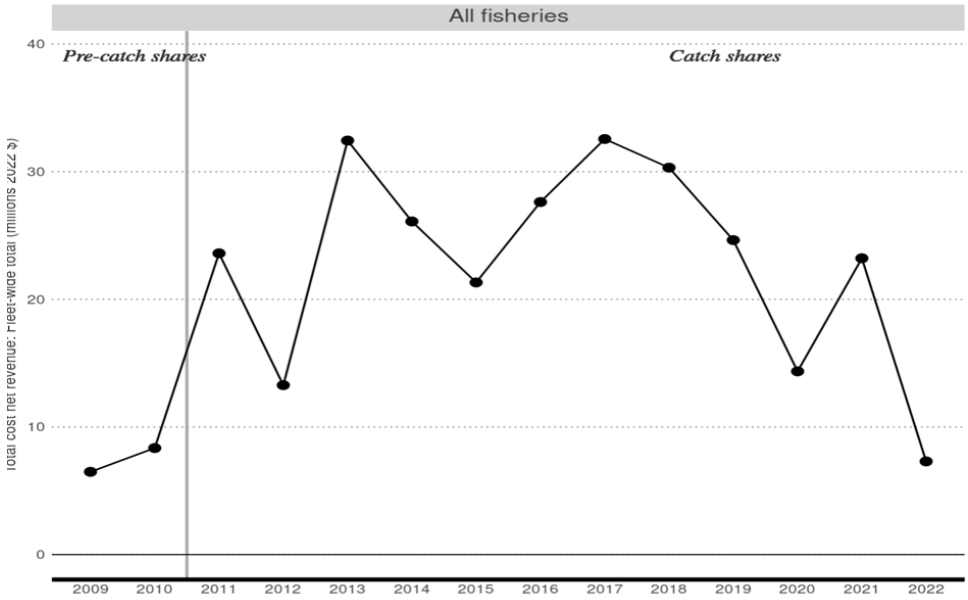
**Figure 12. Catcher vessel gross ex-vessel revenue in 2022 real dollars from all fisheries (2011 through 2022)**




*Source: EDC data from FISHEyE data tool provided by Erin Steiner*

Figure 13 shows the change in total cost net revenue declined from just over $23 million in 2021 to just over $7 million in 2022. This represents about a 70% decline in estimated take home revenue for the fleet. Considering these numbers in terms of the average per vessel, in 2021 there were 83 vessels, so on average each vessel took home about $280k. During 2022 there were 87 active catcher vessels, and the average take home was $72k. These estimates may be greater than the actual take home because not all firm costs and revenue may be captured in the EDC data. For example, information on interest expenses, principal expenses, income taxes, non-operating revenue, and gains on sales of capital assets are not collected in the EDC survey. Considering the take home revenue indicates that the average vessel faced more difficult economic conditions in 2022 that might have been thought if just gross revenue information was considered.

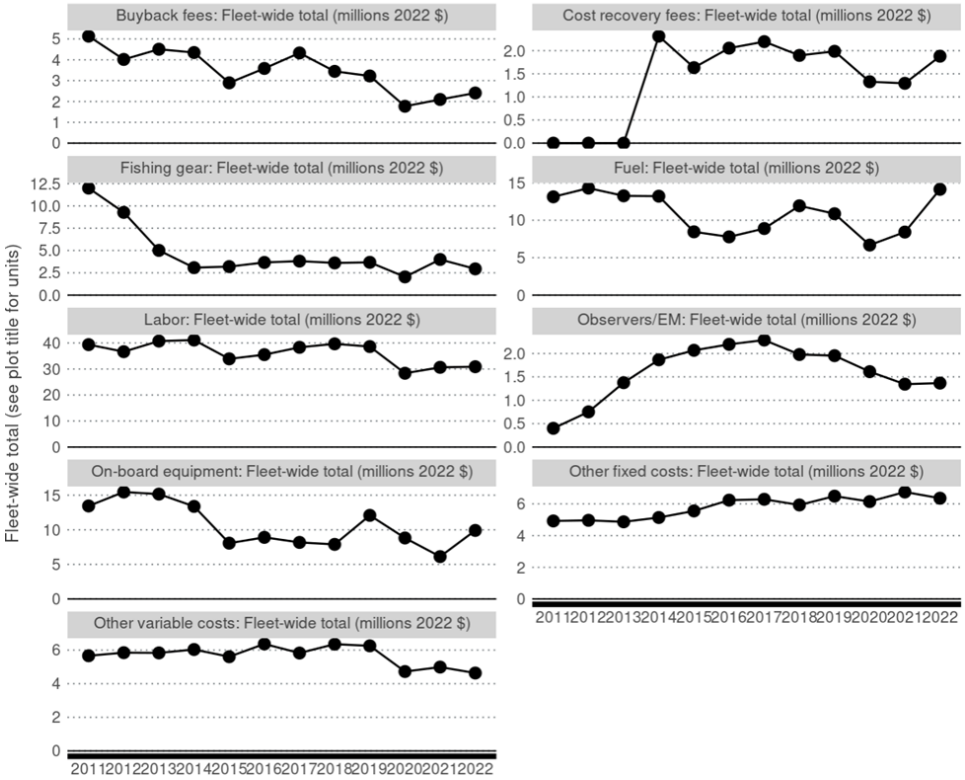
**Figure 13. Catcher vessel total cost net revenue in 2022 real dollars from all fisheries combined (2011 through 2022)**




*Source: EDC data from FISHEyE data tool provided by Erin Steiner*

Figure 14 provides more detailed costs information to help show what caused take-home revenue to decline more than gross ex-vessel revenue. Pinpointing what drove the change in take-home revenue would not have been possible without the individual cost categories collected in the EDC. By collecting the category-specific information the data indicates that a 68% increase in fuel expenditures and a 62% increase in vessel and onboard equipment expenditures were two of the primary drivers of the decrease in take-home revenue. Fuel cost changes may have been assumed to be one of the most impactful costs based on people's general understanding of fuel costs during this period, but it would have been less likely that the analysts or the public could have determined the impact that onboard equipment expenditures had on take home revenue if it were not for the EDC data that had been collected. Therefore, reporting data by cost category allows EDC staff to identify potential issues with a data element. EDC staff would be unlikely to identify an error and the cause of the error without detailed cost information.

**Figure 14. Catcher vessel cost changes by cost category (2011 through 2022)**




*Source: EDC data from FISHEyE data tool provided by Erin Steiner*

## Primary Federal Policies

Information collected by the EDC Program is used in a variety of reports and analyses to help provide an understanding of the economic impacts of the catch share program. These data are used to comply with various laws, EOs and NOAA Fisheries strategies and policies, requiring economic analyses. Many of those are listed below:

1. The Magnuson-Stevens Fishery Conservation and Management Act (MSA)
2. The National Environmental Policy Act (NEPA)
3. The Regulatory Flexibility Act (RFA)
4. EO 12866 (Regulatory Planning and Review)

Some of the EOs and other regulatory requirements are briefly described in this section. For additional information see Kitts et al (2022). Economic analyses of federal regulatory actions in U.S. fisheries are subject to EO 12866, the RFA, NEPA, and the MSA. Within the MSA are 10 National Standards, and several require economic data to be fully addressed.

EO12866, RFA, and NEPA apply to most federal regulatory actions, including but not limited to federal fisheries regulatory actions, while the MSA is specific to federal fisheries regulatory actions. EO 12866 is the most thorough in terms of economic analysis requirements, though NEPA also requires substantial economic analysis. Both analyses generally include a description of the affected industry, all affected entities, and the economic environment. The RFA analysis is focused on entities directly regulated by a proposed regulatory action. The MSA requires a description of the affected fishery(ies).

The primary objective of EO 12866 is to ensure that federal regulatory actions maximize net benefits to the nation. This means that the benefits of the program must be weighed against the program's costs and determine if the benefits are sufficient to justify those costs.

NEPA's analytical requirements are broader, but NOAA Fisheries' established practices for evaluating effects (e.g., changes in benefits and costs) on the human environment, including direct, indirect, and cumulative effects. Net economic benefits are conceptually measured as the sum of consumer surplus and producer surplus. Consumer surplus is the difference between the total amount that consumers are willing and able to pay for a good or service and the total amount that they pay. Producer surplus is the difference between the amount producers are paid for a good and the minimum amount they are willing to accept for that good.

MSA National Standard 5 requires consideration of economic efficiency (i.e., maximization of net economic benefits) in the utilization of fishery resources. National Standard 4 requires that Federal fisheries regulations avoid "excessive" concentrations of fishing privileges. The concern being that excessive concentration may place too much market power in the hands of certain individuals, creating a loss of economic efficiency overall as well as for other individuals with less market power.

An assessment of an industry's current economic impacts is required under 303(a)(13) of the MSA. Expected economic impacts of a regulatory change should also be considered under NEPA, EO 12898, as well as National Standard 8. "Economic impacts" in this case refers to changes in employment, income, sales, and value-added at the community, state, regional, and/or national level.

Some legal mandates involving economic analyses are primarily concerned with minimizing or reducing the costs and adverse effects associated with federal regulations. For example, for federal fisheries National Standard 7 requires that the costs of management be minimized, where practicable. Management costs include compliance costs for those being regulated; reporting costs are one of the aspects that should be considered.

### Other EDC Data Uses

To support economic analyses, agency resources are devoted to collecting information about revenue and operating costs from fishing businesses. A critical component of this effort is providing useful summaries of the information back to those who provide the data. This is important for maintaining good relationships with industry and to help them understand how the data are being used. The data

reporting tool FISHEyE is a good example of the work done by EDC staff to provide access to the reported data. In addition to the mandates described in this section that drive much of the work of NOAA Fisheries' economists, there are other reasons for estimating returns to fishing businesses. Fisheries economics research that is not directly linked to the evaluation of management alternatives is conducted to explore new approaches to fisheries management, to better understand economic behavior of fishermen, and to develop or improve tools used in fisheries economic analyses, among other topics.

In addition to the data uses described above, EDC data have been used in many scholarly papers published by NMFS staff and members of academic institutions. Many of these papers are listed in the *Appendix* and cover a wide range of issues. Information in these scholarly papers have been used by Council staff to inform fisheries management, provide useful statistics about the performance of the catch share program, and provide useful insights into future development and implementation of catch share programs across the country.

EDC data are also used frequently to support information requests either through EDC staff or using FISHEyE to access the data directly. These requests come from industry representatives, federal agencies, state agencies, and the general public and cover a broad range of questions.

EDC data were fundamental to the first catch share program review that was finalized in early 2018. That review relied on the EDC data collected for the baseline period (2009-2010). The baseline was compared against data collected under the program from 2011 through 2015. EDC cost, revenue, and employment data were all utilized as part of that report. The 5-year review identified quota share permit owner lease earnings as a data gap and the Council recommended a Quota Share Owner survey which was implemented in 2020 and collected revenue information for 2020.

EDC data will be equally important for the next catch share program review, scheduled to begin in the fall of 2024. The scheduled review is expected to be a critical review given current market conditions. EDC data will likely be used to help describe the effects of world market conditions both for inputs (fuel, labor) and outputs (seafood) that are not directly impacted by the catch share program and the effects of the groundfish catch share program elements.

The purpose of this study is to consider how modifying the current EDC surveys to reduce costs could result in various tradeoffs. These tradeoffs may include limiting the Council and NMFS' ability to monitor the impact of fisheries management on fisheries participants, report on the status of West Coast catch share fisheries, understand Equity and Environmental Justice Strategy Regional Implementation Plan issues, track aggregate and distributional impacts of the catch share program, and understand changes in net economic benefits generated under the program. Completely eliminating the EDC program means that it would not be possible to monitor changes in take-home pay earned by catcher vessels, processors/first receivers, motherships, or catcher-processors. Precise evaluation of the economic benefits, distributional impacts, or efficiency effects of catch share management could not be made and would rely on coarser metrics (such as provided in the example

previously) or models that would be less accurate or precise. The quota share owner survey provides information to better understand the participation of quota share owners by collecting data that describes each quota share owner's fishery participation and quota lease earnings that is not reported in any other survey or data collection effort. It would also not be possible to quantitatively evaluate whether the catch share program is achieving many of the goals identified by the PFMC without the EDC.

In addition to the MSA requirements, NMFS and Council economists may be unable to produce detailed analyses evaluating the need for modifications to the catch share program's design, compared to what is currently available. For example, evaluating the potential need to revise caps on quota share ownership or quota pound usage benefits from knowing the quantity of fish that vessels of different sizes (lengths) must harvest to minimize cost per pound of fish harvested. To determine the level of catch at which a vessel minimizes cost per pound, it is necessary to have cost data like that collected under the EDC Program.

EDC data are also necessary to evaluate the distributional consequences of catch share management, and the effects on regional economies. These and similar issues may be considered by policy makers if they determine adjustments to the catch share program are appropriate.

## Changes Since Implementation

The required submission of completed Vessel and First Receiver Costs and Earnings Forms have provided information on annual expenses, and earnings since 2009. The Quota Share Survey has provided data since 2020 as part of the quota share permit renewal process. Data collected are descriptions of each quota share owner's fishery participation and quota sale earnings information.

The FISHEyE data reporting tool was developed using metrics developed for the catch share program's 5-year review. It provides access to non-confidential EDC and PacFIN data.

## Status Quo Costs and Drivers of Costs

This section reviews reported status quo agency costs associated with administering the EDC program and industry costs to comply with the EDC program requirements. Status quo costs are based on the EDC regulations in place for that data collection year. For example, the costs of collecting and submitting the quota share owner's survey would not be included for the years prior to 2020, since the survey was not implemented until then.

### Past and Current Industry Costs

Industry costs are considered in terms of annual costs incurred to submit the EDC surveys (direct costs) and costs that they reimburse management agencies for through cost recovery fees (indirect

costs). This analysis reports the fee amounts that were collected. How those fees are calculated and the overall structure of the cost recovery program are not considered as part of this report.

## Direct Industry Costs

Direct industry costs are those costs that catch share participants incur to submit the required EDC reports. NMFS has determined that there are no capital/start-up or ongoing operation/maintenance costs associated with this information collection.

Schedule A of Office of Management and Budget (OMB) Control Number 0648-0618 provides information on the estimated cost of completing and submitting the required EDC forms[10]. These estimates are provided under the Paperwork Reduction Act (PRA) requirements and published in the Federal Register. As part of the Federal Register notice process, stakeholders are encouraged to comment on whether the estimates are accurate during the public comment period. A summary of costs is presented in Table 14. The published cost data shows the estimated annual cost of submitting that year's survey by entity and sector. The total estimated cost for all sectors combined was about $116k, with catcher vessel operators and first receivers/shorebased processors incurring the highest average cost per respondent (Table 14). The responses for 2022 (collected in 2023) consisted of 127 catcher vessels, 10 catcher-processors, 6 motherships, 47 first receivers/shorebased processors, and 152 quota owner forms. Costs were estimated using the average hourly wage rate obtained from the 2018 catcher vessel and first receiver and shorebased processor surveys. Total burden hours to prepare the information and complete the forms were based on discussions with industry and estimates of the time to organize, analyze, and report the required information. The majority of the burden estimate consists of maintaining the appropriate records to complete the form. The actual form takes less than thirty minutes, if the necessary information is readily available. These estimates are publicly available, and participants are encouraged to comment on whether they accurately reflect the data collection burden.

**Table 14. Estimated industry costs to submit EDC surveys for the 2022 fishing year**

| Information Collection | Annual Responses | Burden Hours / Response | Total Annual Burden Hours | Hourly Wage Rate of Respondent | Average Cost per Respondent | Total Annual Wage Burden Costs |
|---|---|---|---|---|---|---|
| Mothership | 6 | 8 | 48 | $37.22 | $297.76 | $1,787 |
| Catcher Vessel | 127 | 8 | 1,016 | $67.62 | $540.96 | $68,702 |
| Catcher-Processor | 10 | 8 | 80 | $37.22 | $297.76 | $2,978 |
| First Receivers/ Shorebased Processors | 47 | 20 | 940 | $37.22 | $744.40 | $34,987 |
| Quota Share Owner | 152 | 1 | 152 | $52.42 | $52.42 | $7,968 |
| **Totals** | **342** | **n/a** | **2,236** | **n/a** | **n/a** | **$116,422** |

*Source: Schedule A of OMB Control Number 0648-0618*

[10] *https://omb.report/icr/202311-0648-004/doc/137808600*

## Indirect Industry Costs

Indirect industry costs are the cost recovery fee payments. They are classified as indirect costs because they are costs incurred by management agencies that are paid by industry through the cost recovery program. These fees are determined by several factors including the recoverable costs the agencies incur, the ex-vessel value of quota landed, and the cost recovery fee limit (3% of ex-vessel value of allocated species landings).

In the IFQ sector, cost recovery fees are collected by the first receiver from catcher vessel operators. It is assumed that the catcher vessels pay the fee, but how all costs are negotiated between harvesters and processors is not known with certainty. Catcher vessels are also assumed to fund the cost recovery fees in the mothership sector. Because catcher-processors catch and process their own fish, they pay the cost recovery fee. Recoverable costs associated with the quota share holder survey are assumed to be paid by the catcher vessel harvesting the quota.

Annual published cost recovery fee reports are utilized to determine indirect industry costs. Recoverable costs associated with the EDC program for each sector are presented in Table 15 for the years 2017 through 2023. The total recoverable costs associated with the EDC program have shown a steady and substantial decline from 2017 through the most current year of data available. EDC costs associated with the IFQ sector since 2018 have typically been at least an order of magnitude more than either of the other two sectors. The difference in costs between the sectors is associated with the number of participants in each sector that are required to complete the EDC survey annually.

**Table 15. Agency recoverable EDC costs**

| | EDC Program Costs (Fiscal Year) | | | |
|---|---|---|---|---|
| Year | IFQ | Mothership | Catcher-Processor | Total |
| 2023 | $121,830 | $9,297 | $7,812 | $140,962 |
| 2022 | $129,188 | $10,573 | $9,970 | $151,753 |
| 2021 | $233,797 | $10,229 | $5,696 | $251,743 |
| 2020 | $332,758 | $19,989 | $16,414 | $371,181 |
| 2019 | $318,460 | $37,958 | $25,528 | $383,965 |
| 2018 | $399,694 | $35,809 | $14,132 | $451,653 |
| 2017 | $448,088 | $88,703 | $37,678 | $576,486 |

*Source; Annual cost recovery fee reports*

Because the IFQ sector has been over the 3% cost recovery limit more than half the years from 2017 through 2024, the recoverable costs reported in the above table does not mean that all those costs were collected from industry members in that sector. Additional discussion is provided in the subsequent agency cost section. However, because the mothership and catcher-processor sectors have always been below the 3% cost recovery fee limit, members of that sector have paid the full cost associated with the EDC program each year, albeit substantially less than the IFQ sector.

The IFQ sector costs includes costs incurred by fielding surveys from catcher vessels that shoreside, shorebased processors, and quota share owners. The mothership sector includes fielding surveys from catcher vessels that deliver to motherships and motherships. In both sectors, the cost recovery is paid by catcher vessels. Quota share owners do not pay any cost recovery directly, though cost recovery might factor into contract negotiations with vessels and/or quota share owners that are also active IFQ vessel owners pay cost recovery.

Assuming the cost associated with submitting the EDC forms in 2022 was the same in 2023 the maximum cost incurred by stakeholders is shown in Table 24. IFQ sector costs accounted for more than 91% of the total cost with the mothership and catcher-processor sectors each accounting for over 4% of the total cost. For the IFQ sector this should be considered the maximum cost, since they were over the 3% cost recovery fee limit in 2023 and they may not pay all of the indirect costs associated with the EDC program.

**Table 16. Direct and Indirect EDC Industry Costs (2023)**

| Sector | Direct Cost | Indirect Cost | Total Cost | Percent of Total |
|---|---|---|---|---|
| IFQ | $111,657 | $121,830 | $233,487 | 91.4% |
| Mothership | $1,787 | $9,297 | $11,084 | 4.3% |
| Catcher-Processor | $2,978 | $7,812 | $10,790 | 4.2% |
| **Total** | **$116,422** | **$138,939** | **$255,361** | **100%** |

*Notes: IFQ sector includes catcher vessels, First Receivers/ Shorebased Processors, and quota share owners.*
*Total may not equal 100% due to rounding*

## Current and Past Agency Costs

This section considers agency costs associated with the EDC program in the broader context of recoverable costs, since during years the cost recovery fee exceeds 3%, the agency must cover any additional expenses. The information in this section also shows that during some years the difference between the amount of agency expenditures and the cost recovery fee payment is greater than the cost of the EDC program. This means that in those years, all else being equal, eliminating the EDC program would not have changed the amount the IFQ sector was charged in cost recovery fees.

Table 17 shows the calculated EDC direct program cost for each year. This is the calculated cost of the EDC program for that sector. The total recoverable cost for the sector, from the previous year (y-1), is the total amount needed to be collected to cover all the previous year's recoverable costs. The fishery value is estimated using the standard ex-vessel price from the most recent year available (y-2). This estimated value is the denominator used to calculate the fee percentage. The estimated fee to be collected is subtracted from the recoverable cost to estimate the management agencies costs that would not be recovered. If the cost not recovered is greater than the cost of the EDC program, in that year, the EDC program costs could have been eliminated and it would not have changed the cost to industry. It is also the amount that agencies needed to fund out of their existing budget. This

information shows that during 2017, 2018, 2022, 2023, and 2024 the estimated amount of cost recovery fees that were not recovered were greater than the EDC program costs for the IFQ sector. During those years, even if the EDC program were eliminated, there would need to be additional reductions in recoverable costs before cost recovery fee payments would be reduced. The cost recovery fee was less than 3% in the three-year period from 2019 through 2021. Those years any cost savings associated with the EDC program would have indirectly but proportionately reduced the IFQ sector's costs.

**Table 17. Summary of IFQ cost recovery and EDC costs**

| Year | EDC Direct Program Costs (Fiscal Year) | Sector Cost (y-1) | Fishery Value (y-2) | Fee % Calculated | Fee % Collected | Est $ to be collected at fee % calculated | Estimated (y-1) recoverable costs that will not be collected |
|---|---|---|---|---|---|---|---|
| 2024 | - | $1,927,301 | $54,406,343 | 3.5% | 3.0% | $1,632,190 | $295,111 |
| 2023 | $121,830 | $1,701,903 | $48,344,359 | 3.5% | 3.0% | $1,450,331 | $251,573 |
| 2022 | $129,188 | $1,689,034 | $40,008,494 | 4.2% | 3.0% | $1,200,255 | $488,779 |
| 2021 | $233,797 | $1,482,105 | $60,388,316 | 2.5% | 2.5% | $1,482,105 | $0 |
| 2020 | $332,758 | $1,576,277 | $54,795,365 | 2.9% | 2.9% | $1,576,277 | $0 |
| 2019 | $318,460 | $1,753,654 | $60,624,195 | 2.9% | 2.9% | $1,753,654 | $0 |
| 2018 | $399,694 | $2,179,402 | $46,206,889 | 4.7% | 3.0% | $1,386,207 | $793,195 |
| 2017 | $448,088 | $2,021,491 | $41,605,012 | 4.9% | 3.0% | $1,248,150 | $773,340 |

*Source: Annual NMFS cost recovery reports*

Table 18 and Table 19 provide similar information for the mothership and catcher-processor sectors, respectively. The EDC and total recoverable costs are much less for these sectors than the IFQ sector, so all recoverable costs are expected to be recovered annually. This means that any savings associated with reducing the EDC costs would be indirectly realized by these sectors. However, because the cost of the EDC program to these sectors is already relatively low, only modest cost savings would be realized. Note that adjustments in the estimated cost recovery fee calculation and carry-over fees in their accounts result in negative numbers being reported for sector costs and fees to be collected some years.

**Table 18. Summary of mothership cost recovery and EDC costs**

| Year | EDC Direct Program Costs (Fiscal Year) | Sector Cost (y-1) | Fishery Value (y-2) | Fee % Calculated | Fee % Collected | Est $ to be collected at fee % calculated | Estimated (y-1) recoverable costs that will not be collected |
|---|---|---|---|---|---|---|---|
| 2024 | - | $280,187 | $15,425,858 | 1.8% | 1.8% | $280,187 | $0 |
| 2023 | $9,297 | $128,759 | $7,674,928 | 1.7% | 1.7% | $128,759 | $0 |
| 2022 | $10,573 | $127,650 | $7,367,455 | 1.7% | 1.7% | $127,650 | $0 |
| 2021 | $10,229 | $137,543 | $10,625,816 | 1.3% | 1.3% | $137,543 | $0 |
| 2020 | $19,989 | $33,233 | $11,562,543 | 0.3% | 0.3% | $33,233 | $0 |
| 2019 | $37,958 | -$73,928 | $11,350,916 | -0.7% | -0.7% | -$73,928 | $0 |
| 2018 | $35,809 | -$132,607 | $12,214,291 | -1.1% | -1.1% | -$132,607 | $0 |
| 2017 | $88,703 | -$261,060 | $4,373,922 | -6.0% | -6.0% | -$261,060 | $0 |

*Source: Annual NMFS cost recovery reports*

**Table 19. Summary of catcher-processor cost recovery and EDC costs**

| Year | EDC Direct Program Costs (Fiscal Year) | Sector Cost (y-1) | Fishery Value (y-2) | Fee % Calculated | Fee % Collected | Est $ to be collected at fee % calculated | Estimated (y-1) recoverable costs that will not be collected |
|---|---|---|---|---|---|---|---|
| 2024 | - | $29,364 | $33,367,531 | 0.1% | 0.1% | $29,364 | $0 |
| 2023 | $7,812 | $33,840 | $22,901,112 | 0.1% | 0.1% | $33,840 | $0 |
| 2022 | $9,970 | $35,958 | $22,052,787 | 0.2% | 0.2% | $35,958 | $0 |
| 2021 | $5,696 | $44,256 | $23,703,578 | 0.2% | 0.2% | $44,256 | $0 |
| 2020 | $16,414 | $16,050 | $20,307,972 | 0.1% | 0.1% | $16,050 | $0 |
| 2019 | $25,528 | -$69,385 | $24,656,732 | -0.3% | -0.3% | -$69,385 | $0 |
| 2018 | $14,132 | -$132,607 | $21,314,878 | -0.6% | -0.6% | -$132,607 | $0 |
| 2017 | $37,678 | -$188,439 | $11,120,803 | -1.7% | -1.7% | -$188,439 | $0 |

*Source: Annual NMFS cost recovery reports*

## Options to Reduce Costs Relative to Status Quo

Three general approaches for reducing EDC costs relative to the status quo are considered in this report. The first is to continue the current census survey structure but not collect information from participants every year or only census selected sectors during a year. A second approach would modify collections to sample a portion of the population from each sector annually or to sample a portion of the population of certain sectors on a rotating basis while continuing a census of sectors but not every year. A third option is to only survey active participants in the fishery and not all permit holders.

When considering the various options, it is worth noting that there is a substantial difference in costs associated with using current survey instruments to survey specific sectors versus developing new issue-specific surveys that may be applied to some or all sectors. Issue-specific surveys are more time consuming to develop and test and would probably be more focused. How these surveys would be

utilized and how they would supplement current surveys are difficult to project. The Council and NMFS would likely determine the need for issue specific surveys based on management problems that must be addressed. Given the time and cost to develop those surveys that would likely be utilized in the more contentious and high-profile policy issues. These types of issues are often unique and are difficult to predict when they will arise. For these reasons, the cost differences are noted, but quantitative estimates of the cost differences are not undertaken in this paper.

### Census of sectors periodically

Options considered for all sectors to submit the current survey but less frequently, including moving to a biennial survey. Another approach would be to complete the current survey for every calendar year but only being required to submit the information for both years every other year.

Changing the reporting frequency of the EDCs, assuming each sector is treated individually, from annually to once every two years is expected to reduce respondent burden. For this option, it is further assumed that the reporting would be limited to the year before the reporting deadline rather than the cumulative information for all years since the last report.

### Switch to a biennial survey (or other time interval)

Because only the most recent year of data is collected, respondent burden of collecting and maintaining multiple years of data is minimized. EDC data may require annual or continuous recordkeeping and staff time; however, the industry costs of reporting the data would be like the current annual estimates but not incurred as frequently. Reducing the frequency of EDC reporting would reduce the industry reporting cost burden. Changing the frequency of reporting to every two years would reduce the total reporting cost by 50%, assuming no other changes in numbers of respondents or burden hour cost rate applied to the collection.

Estimating agency costs associated with the changing the submission frequency of the EDCs is more difficult to assess than industry reporting costs. The agency costs include NMFS staff time managing the forms (e.g., PRA requirements), data review and verification, analysis and reporting, administering the EDCs, as well as maintaining databases and web-based electronic forms. Some of these costs would presumably decrease with reduced frequency of collections thereby reducing some cost recovery fees charged to industry. However, the EDC data collections, verification processes, database infrastructure, and web-based electronic forms would still need to be maintained to monitor and manage the information collections. Staff and/or contractors would have to be retained but may be available for other agency tasking in years when EDC data is not submitted.

Another factor affecting how agency implementation costs may change with changing frequency is whether all EDCs are changed to the same frequency versus certain individual EDCs having differing frequency of collection. In a staggered approach, implementation costs would also be spread out but the need to maintain EDC processing capabilities would remain. Additionally, if the data collections are staggered, it will not be possible to report comprehensive statistics for any given year. For

example, if motherships and catcher-processors are surveyed in one year and shorebased processors are surveyed in a different year, it would not be possible to report total Pacific whiting production. Similarly, if Pacific whiting processors are surveyed in one year and other groundfish processors are surveyed in a separate year, we would not be able to report total IFQ production value.

The North Pacific Fishery Management Council has recently considered similar changes to their economic data program, the Economic Data Reporting (EDR) program. Most recently, they considered the issue of EDR frequency during a review of that program and in outreach meetings leading up to that review. Some of those findings are detailed in the November 2020 EDR workshop report presented to the Council in April of 2021 as well as the regulatory analysis presented to the NPFMC (2022)[11]. Some of the responses may apply to the EDC program and are presented here.

When the EDR program was initially implemented the first years of reporting were more burdensome than subsequent years. This was due to participants having a clearer understanding of the information that would be needed to complete the forms and could develop protocols to have that information readily available when it was time to complete the annual survey. EDC staff reported similar conclusions when the EDC program was implemented.

Data quality improves as respondents gain familiarity with the reporting process over time. EDC staff have noted a similar trend in that participants need to ask fewer questions to complete the survey and the surveys are completed more accurately. This reduces the cost to both industry and EDC staff. The NPFMC SSC noted that reduced frequency of collection will reduce the amount of best scientific information available (in terms of increased uncertainty) on social and economic conditions. Specifically, this loss of that data would limit analyses associated with National Standards 2 and 8.

Industry participants felt reducing the frequency of EDR collections would reduce reporting burdens, however the NPFMC SSC pointed out that the cost of collection will increase due to "the need for training and weaker data processes for participants." They also indicated that it was more important to monitor some information that may change more frequently due to harvesting or economic conditions than other elements that do not tend to change much over time.

Participants indicated that completing EDRs less frequently should only be considered if it did not contribute to data quality issues. While less frequent submissions may not contribute to data quality issues during years that the surveys are conducted, some valuable information could be lost by not collecting data during years when there are either endogenous or exogenous impacts that cause shifts in the fishery. Stakeholders recognized that less frequent EDR reporting could impact the utility of EDR data for monitoring and interpreting trends over time.

[11] https://meetings.npfmc.org/CommentReview/DownloadFile?p=bcbe6d59-01b6-4852-adc0-41b1f54e6bf5.pdf&fileName=C1%20EDR%20Analysis.pdf

The NPFMC SSC noted that year-to-year changes might not be captured, particularly if there is an event that impacts the economics of a fleet during a year that data is not collected such as annual events like COVID or marine heatwaves.

**Potential Benefits.** Industry members are expected to benefit from completing survey data less frequently (e.g., every other year). The benefits would primarily be a decreased time burden to submit the data and some expected, but unquantified, total cost savings. Information provided in the status quo section shows the annual cost for each sector to submit the data and NOAA Fisheries recoverable costs for staff to enforce the program and enter, store, and use the data. Those estimates should be considered the maximum savings during a year that could be realized if data submissions were not required from all sectors during a year. However, it is unlikely that the maximum potential cost savings would be realized. Agency costs for maintaining and using the data are expected to result in some costs during that year. These factors are discussed in more detail in the negative impacts section.

**Potential adverse impacts.** There may be negative impacts associated with reducing the frequency of the census including data losses and costs associated with quality assurance (QA) and quality control (QC). NOAA Fisheries staff would be unable to report performance metrics for all years because of data not being available. During years when there were factors that positively or negatively impacted the economic performance of participants, NOAA Fisheries staff and others producing academic studies may be unable to address questions about the cause and impact of specific exogenous or endogenous shocks impacting the fishery and its participants. Some of the major events that have impacted the West Coast groundfish fisheries in recent years include the following:

2011 - Fukushima nuclear plant disaster in Japan impacts sablefish prices

2012 - Sablefish ex-vessel price declines and widow rockfish stocks are rebuilt

2014 - Russia trade sanctions and MSC Certification for non-whiting groundfish

2015 – Canary rockfish and Petrale sole stocks rebuilt, hake CPUE declines, and water temperature changes (general climate change issues)

2017 – Pacific ocean perch, bocaccio rockfish and darkblotched rockfish stocks are rebuilt

2018 - Trawl EFPs were utilized

2019 - Recruitment of large year class into sablefish fishery and essential fish habitat issues

2020 - Global pandemic (COVID 19)

2021 - Shipping and supply chain issues

2022 – Very strong U.S. dollar's impact on import and export markets, increased fuel prices, increased labor costs

2025 – Doubling of sablefish Total Allowable Catch (TAC)

Based on EDC staff's experience working with individuals completing the surveys, there may be a loss of knowledge from year to year regarding how to complete the survey. The loss could be due to more time passing between when the surveys are completed by the same person or employee turnover resulting in a person completing the survey that has no experience with the forms. NOAA Fisheries staff have recently begun making the past completed surveys available to the firm online. Easy access to those surveys could help bridge some but not all the knowledge loss.

Any loss of knowledge of completing the forms could increase the time it takes a person to assemble the necessary data, complete and check the survey form, and submit the survey. The most recent assumed average time to complete these steps is shown in Table 22 for each sector. Increasing the amount of time necessary to complete the forms cannot be estimated with the information currently available, but the current estimates are an average for the sectors, so it does account for some turnover of bookkeepers.

Loss of knowledge to complete the surveys could increase QA/QC time per form submitted, but there still could be an overall reduction in total cost associated with QA/QC because fewer forms need to be checked. The difference in cost would be dependent on the actual change in the number of forms submitted and the realized average additional time to check each form.

Changing the requirement to have completed the EDC for every other year, or some longer period, could lead to confusion regarding delinquent EDC applications and any resulting holds on issuing various permits. Regulations at 50 CFR 660.114(b) require the EDC forms to be submitted and completed before persons can participate in the fisheries. Consequences for failure to submit a completed EDC survey apply to permit holders, vessel owners, and vessel lessee or charterers. For the permit holder, the limited entry trawl permit application is not considered complete until submission and acceptance of the EDC form is finalized. Vessel owners will not be allowed to participate in the groundfish fishery due to agencies not approving changes in vessel registration, vessel account actions, or if they own a QS permit neither the quota pounds nor individual bycatch quota pounds will be issued until the required EDC form is submitted and determined to be complete. Finally, a vessel lessee or charterer will not be allowed to participate in the groundfish fishery until the required EDC form for their operation of that vessel is submitted.

Sales of firms may mean that the new owner would not have the information to complete the forms for years they were not active and if the person exiting the fishery was not active in any fishery there would be limited ability to compel them to complete the survey. This could reduce the EDC information available, especially if the survey collection was less than every other year.

### Switch to a biennial survey but collect two years of data at once

**Benefits.** Potential benefits of collecting two calendar years of data during the same calendar year include increased data quality relative to not submitting data for all years and to the extent there may be cost efficiencies associated with submitting two years of data at once, a decreased number of hours for industry to submit the data. These conclusions assume that two identical survey forms would be completed, one for each calendar year.

Utilizing this method may allow participants to consider the information provided in a broader context in terms of how the business has changed over the period. The same person submitting the data for two (or more years) would likely make similar assumptions for both years, aiding the continuity of the data collection.

Submitting two years of data may also reduce the burden hours required to provide the data. Firms that have a computerized record keeping system could query data for both years and complete the required sections of the survey. Completing these queries a year apart, by potentially different people, could take more time and potentially yield slightly different results depending on how the queries were structured. For people that keep paper records, it could also result in some time savings, but would be highly dependent on their recordkeeping system and how accessible previous years records are to the bookkeeper.

**Adverse Impacts.** Data collected for the off-year would not be available until a year later than it is currently. For example, if data were collected for 2023-2024 in 2025, the 2023 data would not be available until the beginning of 2026 (a three-year lag). Depending on the issues in front of policy makers, it could reduce the information provided.

As stated for other options that reduce the frequency of the data collections, participants could forget from year-to-year how to complete the form. If there is frequent bookkeeper turnover, there is a potential loss of knowledge by not fielding the survey every year. This could add to the time required for the participant to complete the form and require additional EDC staff time to answer questions.

EDC staff would not be able to catch errors annually, so QA/QC could be more burdensome if two years of data needed to be corrected instead of one.

### *Census of Certain Sectors*

Censusing certain sectors would have the greatest impact on the IFQ participants because of the number of members in the catcher vessel and first receiver/processing sectors. The mothership and catcher-processor sectors have few participants and that could create issues with developing a sampling procedure that would be representative of the sector (small sample size) and given the small number of participants the cost savings to the sector would be small.

Positive and negative impacts on the sectors would be like those described for a census every other year for the sectors when they were not surveyed. The overall impacts would depend on how the

sectors were selected annually. For example, if the IFQ sector was sampled one year and the catcher-processor and mothership sectors were sampled next year and that cycle. Tradeoffs will need to weigh reporting on sub-sectors versus burden equity for participants. For example, if there are only three Pacific whiting processors, to report for that sector, those participants would need to be surveyed every year, but it might be perceived as unfair because non-whiting processors would be required to submit the form less regularly.

#### *Census periodically with reduced collections during off years*

Routine collection of surveys allows participants to know what data they must collect and assemble if data are collected in the same format every year. If data are collected less regularly it could result in loss of institutional memory regarding how to complete the surveys which could result in more discussion between the data providers and agency staff. Collecting the data to correspond with completing tax forms may result in cost savings since bookkeepers are using similar data to complete tax returns and the EDC surveys. Any increased time needed to support the collections could be passed on through the cost recovery program. Because the frequency and scope of the surveys would be altered this option would also require OMB approval of an updated PRA package.

### Survey a subsample of participants

#### *Random sample of participants*

**Potential Benefits.** Fewer survey forms would need to be processed and QA/QC costs would likely decrease. Stakeholder concerns regarding providing detailed information about their business operations would also be reduced during years a participant is not selected to complete a survey.

**Potential Adverse Impacts.** Moving from a census of the population to a random sample methodology would likely result in the high variability of estimates noted under the census approach translating to uncertainty of the estimates and unavoidable sampling error. This increased uncertainty could potentially result in sub-optimal analytical results.

Administration of the groundfish fishery and its impact on participants is complicated. Industry needs to maintain and renew vessel accounts, quota accounts and permits, LEPs, establish contracts with observer contractors, and identify buying stations with First Receiver Site Licenses (FRSLs) or obtain their own FRSL. It is possible that keeping the mandatory requirement, but also not requiring it every year, could increase confusion for participants. EDC staff noted that they already receive calls from people that no longer have an LEP on their vessel, questioning why they were not mailed an EDC form. The amount of confusion would depend on how and when stakeholders would be notified if they are subject to the EDC each year. In order to ensure that enough active catch shares participants are surveyed each cycle, participants would be selected after the fishing year is complete. As a result, participants would not be notified of the requirement to submit an EDC form until after their season was over and therefore would need to maintain their records regardless of whether they were required to submit a form.

Data are submitted on a company-specific fiscal year basis. EDC staff can adjust a firm's responses to calendar year with the annual census collection. Moving to a sample where a firm may not be selected over the two consecutive years that make up their fiscal year, will likely make some data less usable and reduce the flexibility in reporting.

Selecting a subset of the population (the sampling strata) would need to be carefully conducted to ensure that all sub-sectors are represented. This process would need to ensure that the data collected and used in the EDC Program are sufficient to develop and maintain models that represent the unsampled population and cover the various business models. Decisions would need to be made about which definitions of subsectors (vessel size, gear, targeting strategy, home port, delivery location, etc.) should be prioritized in developing the sampling scheme.

Participants that are not selected for a year could lose knowledge of how to complete the forms or have a different bookkeeper than previously completed the forms. Costs may increase depending on how they need to prepare to complete the survey. All these factors could increase the time required to complete the form for industry members selected and could increase QA/QC issues for industry and EDC staff, on a per-form basis. Overall costs for the sector could be less than the statis quo.

A sampling methodology that collects data from enough participants that have similar participation patterns, business structures, and cost profiles to provide reasonable estimate the unsampled population would be necessary. The IFQ fishery has a broad range of participation types (mix of fisheries, areas fished, gear used, and vessel sizes) which may require complex stratification of the sampled population. It is also likely that there will be an increase in the uncertainty of NOAA Fisheries estimates for some or all of the strata developed. The mothership, catcher-processor, and first receiver/shorebased processors have relatively few participants. Creating a sampling methodology that is representative of the entire sector may be difficult given the number of participants. Examples of the "diversity" and number of participants are discussed in the following sections. Additionally, if there is a relatively small number of participants within one category, those participants might be required to submit data more frequently than others. For example, if a port only has four vessels, three out of four vessels would be required to submit their data in order to continue reporting data summaries, whereas vessels in busier ports would be required to submit less frequently. Conversely, if equity across participants survey frequency is prioritized, data might not be available for certain segments, resulting in inequitable treatment of that segment in analysis and management.

### *Catcher Vessels*

One major determinant of the cost profile is what fisheries the vessels participated in during the year. In the catcher vessel sector, there are approximately 100 participants, but nearly 30 participation strategies (combinations of fisheries). Statistically, it would mean that NOAA Fisheries staff would need to create a complex stratified sample to ensure that multiple observations from each participation strategy were selected. Regardless of the stratification strategy developed, estimates of

the unsampled operations would be expected to have large confidence intervals associated with the estimates.

### *First Receivers and Shorebased Processors*

Entities purchasing groundfish from shoreside catcher-vessels are diverse in terms of the species they purchase, the products they produce, their location, and the size of their operation. For these reasons the sector would likely need to be stratified so that large whiting processors in Oregon and not combined with small California buyers, for example.

Assuming a random selection of entities is utilized to determine an unbiased sample from this pool of participants. It could result in substantial information losses and potentially limit the information that could be reported under confidentiality rules.

Improperly defining the random sample protocol in a year could result in missing information for some sectors and missing important products being produced. This may be the most likely to occur in the whiting sector. It is also possible that a substantial portion of the deliveries to an individual state would be missed if certain processors were not selected in the random sample.

Processor EDC forms include questions regarding how inventory reported internally for fiscal years is addressed when reporting it annually in the EDC survey. Not collecting the data every year would make providing and interpreting those types of data less consistent.

### *Motherships and Catcher-Processors*

There are less than ten entities in each of these sectors, but their product forms and therefore their cost profiles vary significantly across operations. Depending on the year there are typically six or seven companies that participate across the two sectors, so confidentiality issues could also be a concern. The small sample size and heterogeneity of the sectors mean that it is unlikely that EDC staff could calculate representative estimates for the unobserved vessels. Not having reliable estimates would also likely mean that EDC staff would be unable to report on the performance of the sector.

Product forms produced by these sectors often vary from year to year. EDC data is the only source of the product mix being produced by each firm. Without a census of the participants, data from years when a firm changes their product mix and any costs associated with modifying their production facilities and equipment to produce new products could be missed. It would not be possible for models to predict shifts in product forms.

### *Survey active catch share harvesters instead of all LE Permit holders*

Another potential option to reduce the number participants that are required to submit a completed EDC form each year would be to change the regulations to only survey vessels that harvested catch share groundfish rather than vessels with a trawl permit. There are some vessels that have not been used to fish in the IFQ program for several years, but the vessel operators are required to complete

an EDC survey for their sector, because their permit is assigned to the vessel and the permit triggers the required submission.

**Potential Benefits.** Changing the regulations to only survey active harvesters in the program would decrease the reporting burden on individuals that are not actively fishing under the program. Like the options that would sample participants, the reduction in direct costs to participants would be commensurate with the reduction in the number of surveys submitted on an annual basis.

While the exact number varies by year it is estimated that on average 35 trawl catcher vessel LEPs are not used to catch any groundfish during a year from 2011 through 2022[12]. The number of trawl catcher vessel LEPs not used to catch groundfish ranged from 31 to 42 over that same period. Assuming the cost reduction is proportional to the number of surveys that must be completed, it would be anticipated that there would be a reduction in direct average annual costs to stakeholders not required to submit the survey of about $19k. The direct cost savings would only accrue to LEP holders that did not fish. Vessel operators that harvested groundfish would not realize any reductions in direct costs. Reductions in indirect costs would be realized by active catch share participants because they pay the costs associated with collecting data from the LEP holders that did not fish.

There would be an anticipated decrease in the administration burden to EDC staff, Permits Office staff, and the OLE staff to identify and contact individuals that have not submitted their required forms. This process can be complicated if people change addresses or phone numbers and add to the cost of ensuring program compliance.

Compliance issues associated with holding vessels liable for someone else assigning a permit to their vessel has been noted as a problem in past years. Current regulations hold the vessel owner accountable for submitting the EDC survey in these instances.

Information from the vessels removed from the survey could still be collected through other surveys. For example, these vessels or a sample of these vessels could be surveyed as part of the voluntary cost and earnings data collection. Because that collection is voluntary less than 100% participation may be realized, so some loss of data could occur, but it may be justified by the potential cost savings. Costs associated with the voluntary survey would not be costs associated with the catch share program and would not be subject to cost recovery. Therefore, increasing costs associated with those surveys could increase agency costs.

**Potential Adverse Impacts.** Eliminating survey collection from vessels not active in the catch share program will reduce the information available about individuals who did not participate in the program during a year. Some of the negative impacts would be mitigated by the quota owner survey because even if a vessel did not fish in the catch share program, they may have earned quota lease

[12] Personal communication with Erin Steiner July 8, 2024, and Jessi Doerpinghaus August 12, 2024.

revenue. Prior to implementing that survey information regarding quota leasing would have been lost.

### *Survey Active Catch Share First Receivers Instead of All FRSL holders*

Modify regulations to only require buyers that purchased IFQ groundfish to submit the First Receivers/Shorebased Processors EDC survey rather than all buyers with an FRSL. FRSL are issued for two years. If someone obtains a FRSL, they are required to submit surveys for a minimum of two years, regardless of whether they bought a pound of IFQ fish during either year.

**Potential Benefits.** Modifying this regulation would decrease the reporting burden for individuals that did not buy IFQ fish during the year they held a FRSL. It is estimated that on average 24% of the FRSL were not used on an annual basis from 2019 through 2023[13]. The number of FRSL not used during that period ranged from 7 to 13. Based on these estimates, the direct cost of submitting the FRSL survey annually, a maximum direct savings of about 24% would be expected. These savings are considered a maximum because of the issues associated with issuing a FRSL for two years as described in this section. The people holding these permits would directly benefit from this regulatory change. Persons that hold and use a FRSL would not realize any direct benefit from this regulatory change.

Decreasing the number of surveys that are submitted annually would reduce the administrative burden to EDC staff, NOAA Fisheries Permits Office, and the OLE to ensure that all persons required to submit the survey comply with the regulations. Projections of the reduction amount will depend on several factors and given the uncertainty of those estimates they are not provided.

**Potential Adverse Impacts.** Not surveying FRSL holders that were inactive in the IFQ fishery could reduce the information available for non-IFQ species. As the number of firms active in the fishery declines, the impact on available information for other fisheries could increase over time.

As with the options to sample a portion of the population, this option could introduce reporting issues with first receivers that do their accounting based on a fiscal year that is different from the calendar year. This could result in the survey only collecting a partial year's information. Depending on the internal accounting structure of the firm, reporting a partial year's information could create more variability of the aggregated information. It could also create confusion in terms of what data should be reported on the survey. This inconsistency would only occur if a shorebased processor or first receiver did not consistently make at least one IFQ purchase per year.

Reducing the consistency of when a firm is required to complete the survey could also create confusion in terms of what years the survey is required. It could also result in a loss of knowledge of how to complete the survey for bookkeepers that have not had to complete the survey for several years or if there was a new bookkeeper that needed to complete the survey the first time.

[13] Personal communication Erin Steiner July 8, 2024.

### Summary of Cost Expectations Associated with Changes Considered

In general, it is expected that reducing the number of surveys that industry must complete during a year will decrease their direct costs of completing and submitting the form. However, direct costs would not be eliminated in a year they are not surveyed, under a random sample structure, since bookkeepers would still need to maintain data to complete the surveys if their company was selected to complete the survey.

The indirect industry costs and agency costs are more difficult to estimate for two primary reasons, first there are many fixed costs associated with the program (e.g. updating code and generating reports requires the same amount of time regardless of how many submissions there are) and because new methods and models will need to be developed to fill in and account for missing responses. A variety of factors that influence costs are discussed in the following sections. The direct industry costs are likely reduced and the indirect and agency costs are likely reduced by some amount that cannot be projected with accuracy. The actual reduction amount would be dependent on several factors including agency costs to maintain the EDC system under reduced surveys, regulatory cost changes associated with the PRA and survey modifications, and development of models using sampled data that would be representative of segment of the fleet that is not surveyed. Additionally, the costs associated with action-specific analyses could become more expensive because sample data is more complicated to work with than census data. For example, calculating the total fuel expenditures for one year only requires simple arithmetic for census data but requires a model to populate missing responses for sample data.

It is also worth noting that while implementing a scaled-back[14] survey in terms of years it is required or the number of participants surveyed is expected to reduce costs over the long-term (after about three years). During the near-term (during analysis and implementation of the regulations) the indirect cost to industry and the agency would be expected to increase. The amount of cost increases would depend on agency costs to implement the regulations and how much of those costs would be passed on to industry through cost recovery fees. When the calculated IFQ sector cost recovery fee amounts are greater than or equal to 3% the indirect industry costs would not increase. Agency costs would increase by any costs associated with developing and implementing the regulatory changes.

## Other Issues

### Require electronic submissions

Submission of paper surveys has always been allowed, and starting with the 2014 collection, participants were given the option to submit their information electronically. Over the last decade

[14] Specific alternatives regarding how the program would be scaled-back are not generated by the analysts in this paper. If the Council were to move forward with EDC cost reductions, it would develop specific options that could be addressed in more detail in the proposed amendment analysis.

the data entry tool has improved, and participants have become more comfortable using online tools in general.

This option has not been considered in more detail in this paper in terms of the fee amount or how it would be collected. Depending on other actions policy makers may wish to pursue to reduce EDC costs, it may reduce the need for this type of regulatory change.

**Potential Benefits.** Eliminating the option for participants to use paper forms to submit their data would save EDC staff time managing the paperwork and keying in data and potentially reducing data entry errors. With electronic entry, information would already be keyed into the computer and quality control checks could be built into the program that would prevent the participant from entering data in a field that is outside certain parameters. These automated checks could further reduce burdensome calls to participants after submission. Electronic forms could also self-populate fields that are unlikely to change from year-to-year (e.g., vessel characteristics). Electronic submission of all surveys would eliminate the requirement that NOAA Fisheries maintain a data entry application to key in the data submitted on paper forms.

Electronic submission of the surveys would also eliminate issues that typically arise when surveys are lost or delayed in the mail. NOAA Fisheries and OLE staff must follow-up on surveys that are not submitted in a timely manner and electronically submitting the form could eliminate some of those problems.

**Potential Adverse Impacts.** Some participants may not have the hardware, internet connections, computer training, or other resources required to submit their data electronically. While these types of issues are becoming less common, the extent that some participants do not have access to the necessary resources to comply with this requirement would require the EDC staff to work with individuals that require additional support.

## Summary of Tradeoffs Across Options

### Administrative Impacts

**Regulatory Changes.** Regulatory changes would be required to alter the frequency of the data collection, move from a census to a sampling protocol, or only surveying active participants in the sectors. Changing the regulation would require the standard, detailed analysis of impacts of the proposed change. Information provided in this paper could be used as a starting point for that analysis but would need to be supplemented with additional information on the specific alternatives considered as well as the other required elements of a regulatory amendment not included in this paper (e.g., Impacts on small entities). The regulatory process is typically time consuming and could take multiple years to complete. For NMFS to implement a new data collection it takes about 1.5 to 2 years to develop a proposal to request funding, obligate the funds, and hire staff to oversee the project. An additional 0.5 years (about 6 months) is typically required to develop and test the survey

instruments. PRA development and submission would add another 0.75 years (about 9 months) or longer. In total, it is about a three-year process from concept to implementation of any of the modifications being considered in this paper. The costs associated with the regulatory process could be added to the cost recovery amount. This would be a direct increase in the program's cost to the management agencies involved and potentially a temporary indirect increase in costs for participants during years the cost recovery fee is less than 3%.

NMFS must work with stakeholders to make sure they comply with any current or new program requirements. If the EDC submissions are late or require modifications all the correspondence (emails, calls, etc.) between agency staff and the stakeholder must be documented and supplied to OLE when necessary. The collection and submission of every email and other correspondence can increase the costs of the program.

EDC staff, Permits Office staff, and the OLE staff would realize a decreased the administration burden to identify and contact individuals that have not been active but have not submitted their required forms. Contacting people that have changed addresses or phone numbers can be time-consuming, adding to program compliance costs and agency staff workload.

Compliance issues associated with holding vessels liable for someone else assigning a permit to their vessel has been noted as a problem in past years. Current regulations hold the vessel owner accountable for submitting the EDC survey in these instances.

to identify and contact individuals that have not submitted their required forms. This process can be complicated if people change addresses or phone numbers and add to the cost of ensuring program compliance.

Compliance issues associated with holding vessels liable for someone else assigning a permit to their vessel has been noted as a problem in past years. Current regulations hold the vessel owner accountable for submitting the EDC survey in these instances.

**OMB Approval.** The PRA requires OMB approval for data collections that meet the following criteria. In general, if the same mandatory or voluntary information is collected over a 12-month period from ten or more people or entities, PRA clearance is required. Requesting information from fewer than ten people or groups, which represent the majority or all of an industry or sector, may also require PRA clearance.

Based on these rules, all proposed changes considered for surveys under the EDC program will require OMB approval. OMB approval is a five-step process:

1. NOAA Fisheries must develop the information request, supporting statements, and provide for an internal approval process. Statement B is the technical summary document required as part of the approval process. Completion of that document can be complex, time consuming, and difficult.

2. NOAA Fisheries submits to the Federal Register a 60-day notice for comments.
3. NOAA Fisheries must consider the public comment on the notice, and makes changes, if applicable.
4. NOAA Fisheries must then publish a 30-day notice to the Federal Register for public comment and concurrently submit the final package to OMB for review.
5. OMB reviews and engages NOAA Fisheries on any questions/comment, then issues a decision.

Given the timing of these five steps, the process takes about 9-month under favorable conditions. Current OMB workload and backlog of projects requiring PRA approval could result in the approval of a package submitted to OMB taking well over one-year.

**Developing New Survey Instruments.** If new survey instruments are developed to fill in data gaps that result from adjusting the EDC program, NOAA Fisheries staff would need to create and test those surveys. The time and cost to develop these surveys is not known exactly but it was assumed earlier to take about 2 years. The time required will depend on how extensive the modifications are to the existing surveys.

**Incorporating Data into Existing Structure.** That FISHEyE data tool would continue to be utilized under any of the survey modifications considered in this paper, but additional descriptions of the data and it potential uses would likely need to be updated to account for estimates applied to sectors that are not surveyed in a year or only a portion of the sector's participants was sampled.

Changing the data collection to samples of the population or less frequent census of the sectors will result in EDC staff developing models that use the available data to represent firms or years that are not surveyed. Development of those models will require staff and/or contractor's time and will result in greater uncertainty around the estimates. Also, the NWFSC Economics and Social Science Research program has been actively working to combine other survey projects with the EDC program to achieve cost savings by distributing shared costs associated with survey development and fielding. Standardizing these data collection programs becomes more important if, for example, only vessels that harvest IFQ or FRSL holders that take delivery of IFQ are surveyed. Projects that survey participants in the non-IFQ fisheries to fill in data gaps may be closely linked to the EDC program to take advantage of existing staff and infrastructure to achieve lower costs of conducting the survey.

### Information and Data Availability

EDC staff have noted that no two years of data are the same. Several factors may influence the economics of a fishery from year to year including wars, tariffs, inflation, labor shortages, facility fires, changes in TACs, pandemics, etc. If data are not collected each year, off-years would need to be modeled based on previous years' data. Modeling costs would likely result in large error bars associated with these estimates. If only some segments of the various sectors were surveyed, the data may require additional aggregation to meet confidentiality requirements. This could result in the loss

of port-level information as data are aggregated to include enough entities to report. Information that is important on a smaller geographic scale would be lost. In summary, the use of other models or metrics that are not as accurate or precise as the current models that utilize annual census data from active participants would adversely affect analysts' ability to describe the fisheries.

### Social and Economic Impacts

Several social and economic impacts have been identified earlier in this paper. Persons required to complete the EDC surveys would likely prefer not to complete and submit the forms each year because of the cost associated with completing the survey, the time it takes to assemble the necessary paperwork, and providing confidential information about their business that they are unsure how it might be used. During years they are not required to complete the survey, they would realize direct cost savings; during years they are required to complete the EDC survey, the direct costs may slightly increase if any loss of knowledge by the bookkeeper requires more time to complete the forms. However, the total cost to the sector is expected to decrease.

Indirect costs to participants would vary depending on their sector and whether the cost recovery fee percentage is at or close to its limit during a year. Indirect cost savings for the mothership and catcher-processor sectors would be more likely to occur on an annual basis, since those two sectors have always been below the 3% cost recovery fee limit. The IFQ sector would likely realize some indirect cost saving, but those would only occur in years when the EDC costs would not increase recoverable costs above 3% of the ex-vessel value of IFQ species landed.

Agency costs are likely to decrease during the years when fewer surveys are submitted and processed. The exact cost savings cannot be projected because of the many steps that go into the EDC collection. Reducing NOAA Fisheries costs would be beneficial for its budget during years when not all costs can be recovered because of the 3% limit. If any changes are made to the program, it is expected to increase costs to NOAA Fisheries to modify surveys, meet OMB requirements, and implement all the necessary regulatory changes during the years it takes to implement the regulations.

Agency and academic staff that utilize the data may realize an increase in the uncertainty associated with certain estimates derived from the EDC data. Increased error bars around some estimates would result under both the sampling options that only survey a portion of the fleet and census options that do not collect data from a sector every year (assuming off years are modeled). The increased uncertainty could impact policy makers' understanding of a proposed regulatory action. It could also impact the ability of the public to understand the breadth of benefits that individuals, firms, and communities derive from the seafood industry and how it benefits the national economy.

# Synthesis and Conclusions

Moving from a census to either a sample or less frequent census would reduce costs in the longer-term but may increase costs in the near term. Near-term costs are expected to increase because firms would still be required to complete the surveys until the regulations are changed, but additional, recoverable costs would be incurred to implement the changes. Long-term costs would decline depending on the options implemented. A summary of directional cost changes and a rough estimate of the magnitude of the change is presented in Table 20. Estimates are dependent on how often the periodic census occurs and how the random sample is stratified. The less often the census occurs the greater the potential for cost savings, but also the greater potential for data loss. Similar outcomes are expected under the random sample structure. Smaller sample sizes would have a greater potential for cost savings but could result in potentially greater data losses. Data losses may be most acute for costs that are most sensitive to fluctuations in catch and economic factors that are exogenous to the fisheries. For example, fuel prices, processing wage rates, insurance, loss of markets close to the vessel's homeport, etc.

## Table 20. Summary of EDC Tradeoffs by Option Considered

| Sector Surveyed | Status Quo Census | Periodic Census | Random Sample | Census Active Participants |
|---|---|---|---|---|
| **IFQ** | | | | |
| **Catcher Vessels** | | | | |
| Direct Participant Cost | ↔ | ↓↓ | ↓ | ↓↓↓ |
| Indirect Participant Cost | ↔ | ↓ | ↓ | ↓↓ |
| Agency Cost | ↔ | ↓ | ↓ | ↓↓ |
| Data Loss | ↔ | ↑↑ | ↑↑↑ | ↑ |
| **Shoreside Processors/First Receivers** | | | | |
| Direct Participant Cost | ↔ | ↓↓ | ↓ | ↓↓↓ |
| Indirect Participant Cost | ↔ | ↓ | ↔ | ↓↓↓ |
| Agency Cost | ↔ | ↓ | ↔ | ↓↓ |
| Data Loss | ↔ | ↑↑ | ↑↑↑ | ↑ |
| Mothership | | | | |
| **Catcher Vessels** | | | | |
| Direct Participant Cost | ↔ | ↓↓ | ↓ | ↓ |
| Indirect Participant Cost | ↔ | ↓ | ↓ | ↓ |
| Agency Cost | ↔ | ↓ | ↓ | ↓ |
| Data Loss | ↔ | ↑↑ | ↑↑↑ | ↑ |
| **Motherships** | | | | |
| Direct Participant Cost | ↔ | ↓↓ | NA | ↓ |
| Indirect Participant Cost | ↔ | ↓ | NA | ↓ |
| Agency Cost | ↔ | ↓ | NA | ↓ |
| Data Loss | ↔ | ↑↑ | NA | ↔ |
| **Catcher-Processor** | | | | |
| Direct Participant Cost | ↔ | ↓↓ | NA | ↓↓↓ |
| Indirect Participant Cost | ↔ | ↓ | NA | ↓↓ |
| Agency Cost | ↔ | ↓ | NA | ↓ |
| Data Loss | ↔ | ↑↑ | NA | ↔ |
| **Quota Holder** | | | | |
| Direct Participant Cost | ↔ | ↓ | NA | ↓ |
| Indirect Participant Cost | ↔ | ↓ | NA | ↓ |
| Agency Cost | ↔ | ↓ | NA | ↓ |
| Data Loss | ↔ | ↑↑↑ | ↑↑↑ | ↑ |
| **All Sectors** | | | | |
| Total Cost All Sectors | ↔ | ↓↓ | ↓ | ↓↓↓ |
| Data Loss All Sectors | ↔ | ↑↑ | ↑↑↑ | ↑ |

*Notes: Cost changes are long-term changes. Costs would likely increase in all cases except the status quo until the proposed program changes were implemented, which is estimated to take about three years from the time work begins on the regulatory analysis. The darker the blue the greater the cost savings; the darker the brown the more data loss.*

Changing who is subject to completing the EDC survey annually may change the need for enforcement, but the direction of the change is uncertain. If people are required to submit the survey but did not because they forgot it was required that year it could increase costs of having them comply; enforcement costs could also decrease because fewer people are required to complete the survey. Additional enforcement issues could result from people not understanding or forgetting that they were to complete the survey that year and losing the habit of tracking the relevant information. Enforcement staff would then be required to contact the individuals that were delinquent in submitting the survey to notify them of the required action. If the person still did not complete the survey, it could impact their QS application approval for the upcoming fishing year or other penalties.

Knowledge loss by persons completing the forms has also been described as a concern that could impact data quality and increase the time agency staff must dedicate to answering questions regarding the survey and contacting participants that submitted inaccurate information. Bookkeepers completing the survey annually become familiar with the questions asked and the data necessary to complete it. They often link completing the survey with other federal and state economic data submissions (e.g., filing business taxes). Not completing the survey each year or staff turnover during the years the survey is not required could result in the person completing the survey needing additional time or support to complete the survey fully and accurately.

Table 21 provides a high-level overview of options considered. Potential cost savings by sector and a description of the impacts is provided.

**Table 21. Detailed Summary of EDC Program Options and Tradeoffs**

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| **Reduced Census (e.g., every other year)** | **IFQ** | Direct Cost Savings (industry) | Low Positive to Positive | The extent of cost savings depends on how often sectors are surveyed and the bookkeeping savings in non-survey years. During non-survey years there would be no cost for either the catcher vessels or first receivers to submit the data, but they may still incur bookkeeping costs... |
| | | Indirect Cost Savings (industry) | Neutral to Low Positive | Lower administrative costs may decrease cost recovery fees during years when they are not at the maximum amount. Cost decreases would be reduced during the years when regulatory changes are developed and implemented, including PRA requirements. |
| | | Agency Cost Savings | Neutral to Low Positive | Agency cost savings would occur, but not be eliminated, during the years the survey is not conducted. Cost savings would not be expected to change during survey years. Cost recovery fee limits impact the cost borne by agencies. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| | | Data Impacts | Low Negative to Negative | Data would be unavailable for years when it is not collected and would have the greatest impact when substantial changes to the fishery occurred. Could increase QA and QC costs to ensure data are reported correctly. More inconsistent data when person submitting the form must make assumptions and those assumptions change based on the person submitting the data. |
| | | Other Impacts | Low Negative to Negative | Knowledge loss by the person submitting the data could increase the time required to complete the forms. Increased assumptions by analysts that must explain changes in the fishery. Requires regulatory and PRA changes. |
| | **Mothership (including the catcher vessels) and Catcher-Processor** | Direct Cost (industry) | Low Positive to Positive | Cost savings may be minimal because of the relatively low direct costs incurred by these sectors. The actual savings will depend on the difference in bookkeeping costs during non-survey years. |
| | | Indirect Cost (industry) | Neutral to Low Positive | Lower administrative costs would decrease cost recovery fees. Cost reductions would be greatest after necessary regulatory changes are developed and implemented, including PRA requirements. |
| | | Agency Cost | Neutral to Low Positive | Agency cost savings would be realized, but not be eliminated, during the years the survey is not conducted. Cost savings would not be expected to change during survey years. Cost recovery fee limits have not impacted the cost borne by agencies. |
| | | Data Loss | Low Negative to Negative | Data would be unavailable for years when it is not collected and would have the greatest impact when substantial changes to the fishery occurred. Could increase QA and QC costs to ensure data are reported correctly. |
| | | Other Impacts | Low Negative to Negative | Knowledge loss by the person submitting the data could increase the time required to complete the forms. Increased assumptions by analysts that must explain changes in the fishery could be required. Requires regulatory and PRA changes. |
| **Sample of Stratified Sectors** | **IFQ** | Direct Cost Savings (industry) | Low Positive to Positive | Sector will still incur record keeping costs because they will not know if they will be sampled until after the season is over. There could be minor direct cost savings because fewer people would be completing the survey. |
| | | Indirect Cost Savings (industry) | Neutral to Low Positive | Higher administrative costs may increase cost recovery fees during years they are not at the maximum amount. These costs would be greatest during the years when regulatory changes are developed and implemented, including PRA requirements. |
| | | Agency Cost Savings | Neutral to Low Positive | Agency costs associated with data collection and review would decrease because fewer forms are submitted. Costs would increase to develop models to describe unsampled portion of the population. Overall cost savings would be small. |

| Program Element | Option | Tradeoff Type | Summary of Impact | Description |
|---|---|---|---|---|
| | | Data Impacts | Low Negative to Negative | Development of models to estimate values for unsampled portion of the population would increase costs and potentially have large estimation errors. Could reduce confidence in the information provided. Knowledge loss could increase QA/QC issues. |
| | | Other Impacts | Low Negative to Negative | Heterogeneity within the fleet would require development of sampling strata. To collect representative data some firms/individuals would need to be surveyed every year, which may trigger fairness concerns. Requires regulatory and PRA changes. |
| | **Mothership and Catcher-Processor** | Because of the limited number of participants in the fishery, implementing a random sample survey methodology would not be a viable option given confidentiality constraints. | | |
| **Census Active Participants** | **LE Permit Holders** | Direct Cost Savings (industry) | Low Positive to Positive | There will not be any recordkeeping or reporting costs for non-participants during the year. Active participants will realize similar costs to the status quo. Overall, there will be cost savings to industry |
| | | Indirect Cost Savings (industry) | Neutral to Positive | Indirect costs will decline during the years that the cost recovery fee is less than 3%. During years that the full 3% is charged, the cost reductions would not be realized. |
| | | Agency Cost Savings | Low Positive to Positive | Agency cost savings would result from fewer surveys to process and less need to find and contact people that are not active in the catch share program that have not completed the survey. |
| | | Data Impacts | Neutral to Low Negative | No impact on the catch share fishery data but could have a minor negative impact on non-catch share fishery data. Other surveys could supplement that data as needed. |
| | | Other Impacts | Neutral to Low Negative | Would require regulatory and PRA changes |
| | **FRSL holders** | Direct Cost Savings (industry) | Low Positive to Positive | Will reduce costs for FRSL holders that are not active in the fishery that year. Costs for FRSL holders that are active in the catch share program would realize costs like the status quo. |
| | | Indirect Cost Savings (industry) | Neutral to Positive | Indirect costs will decline during the years that the cost recovery fee is less than 3%. During years the full 3% is charged, the cost reductions would not be realized |
| | | Agency Cost Savings | Low Positive to Positive | Agency cost savings would result from fewer surveys to process and less need to find and contact persons not active in the catch share program that have not completed the survey. |
| | | Data Impacts | Neutral to Low Negative | No impact on the catch share fishery data but could have a minor negative impact on non-catch share fishery data. Other surveys could supplement that data as needed. |
| | | Other Impacts | Neutral to Low Negative | Would require regulatory and PRA changes |

# Other Information Collection Programs

Phase 1 of this project described the program requirements for the VMS and annual cooperative reports. These program requirements were discussed in terms of potential cost savings. A summary of the program costs and reasons why no changes to these collections are recommended, based solely on the potential cost savings, are provided in this section. The time burden and coordination between the vessel and the home office to ensure the information was reported to ensure compliance with the regulations was the primary concern. Annual cooperative reports provided some information that was not available elsewhere and industry members indicated that supplying the information to the Council on an annual basis was not a substantial cost burden.

## VMS Reporting

An approved VMS transceiver unit must be installed and operating 24 hours per day when use is required. To ensure the VMS system provides the required information the vessel operator must establish a service agreement with a type-approved communication service provider and send an activation report at least 72 hours prior to leaving port on the first trip that requires VMS and maintain a valid declaration report with NMFS OLE.

Declaration reports must be submitted before a vessel leaves port on the first trip in which the vessel is required to have VMS. A new declaration report must be submitted before leaving port on a trip in which a different gear type will be used. Limited entry trawl vessels fishing in the Shorebased IFQ Program must provide NMFS OLE with a new declaration report each time a different groundfish trawl gear (bottom or midwater only) is fished. The declaration may be made from sea and must be made to NMFS before a different type (bottom or midwater only) of groundfish gear is fished. Limited entry midwater trawl vessels targeting Pacific whiting may change their declarations while at sea between the Pacific whiting shorebased IFQ sector and the mothership sector. The declaration must be made to NMFS before a different sector is fished.

The purpose of VMS is to provide management and enforcement agencies with the ability to track the time, location, and speed of vessels. That information can be used to validate fishing locations and whether a vessel is fishing, moored, or steaming. That information is useful for managing areas that are closed to fishing or using certain types of gear.

The actual reductions in cost are likely small with any of changes that would be made to the VMS program since it would not completely be eliminated, and vessel operators would still be required to maintain the system and a have service agreement with a type-approved communication service provider. None of the changes would reduce agency costs and to the extent they may increase enforcement costs they could be passed on to industry through cost recovery fees.

## Annual Cooperative Reports

The mothership cooperative report requirements are listed at 50 CFR 660.113(c)(3) and the catcher-processor requirements at 50 CFR 660.113(d)(3). Cooperative reports must include the cooperative's allocation, actual retained and discarded catch for certain allocated species on a vessel-by-vessel basis, methods used by the cooperative to monitor performance, a description of any actions taken by the cooperative against member vessels, and for the companies participating in the cooperative that year, the harvest agreement, and catch monitoring and reporting requirements.

Annual reports from the mothership and catcher-processor cooperatives help the Council determine if the program is functioning well or if there are areas of concern the Council may consider addressing. The Council has already eliminated the required filing of preliminary cooperative reports in November. Cooperative managers have developed a template for providing the required information. Removing some of the requirements could slightly reduce costs, but this has not been identified as a concern of the cooperatives. In general, the information can be provided annually at a limited cost to industry and provides a concise summary of the cooperatives' annual activity. For these reasons changing the cooperative's reporting requirements is not considered further in this report.

# Conclusions

In this section we review high-level conclusions in each major report section followed by a synthesis of potential combined effects of these options. The evaluation of these options is intentionally high-level and qualitative, with the goal in mind to identify coarse and emergent factors with respect to potential cost-savings and trade-offs. This report is intended to assist the Council in identifying the potential for subsequent action with respect to any of the topics explored, which if and when that occurs, a full analysis of these options, including quantitative modeling of alternatives, where appropriate, will occur.

## Monitoring Program

The comprehensive at-sea and shoreside monitoring requirements instituted under the original program were to support the goal of achieving individual accountability of catch and bycatch. Since the program was put in place, there have been large reductions in discards and reductions in the number of overfished or rebuilding stocks (Figure 1, Figure 2). However, in the spring of 2024 seaday rates averaged around $615 dollars per day for at-sea monitoring,[15] and shoreside monitoring services ranging from a similar fee to $90 per hour, costs for harvesters and processors may be burdensome and there is a desire to reduce costs in a way that does not jeopardize gains made since the program was implemented. In the current program, the non-whiting trawl fleet pays the highest total cost for monitoring services at an average of $1,074,596 between 2020 and 2022, followed by shorebased whiting processors at $880,673 (Table 4, Table 5). These costs are influenced by the use of EM across different fleets, with the shoreside whiting fleet using EM the most for monitoring (Figure 6).

Across the shorebased and at-sea program options examined, removing shoreside monitoring requirements may be the least likely to result in negative compliance, biological, administrative, or information and data impacts; however, these options may also have lower relative cost savings for industry (Table 11). Removing shoreside monitoring requirements would benefit shorebased processors most, where costs as a proportion of gross revenue are relatively low (0.13% to 0.35%, Table 5), as compared to non-whiting trawl harvesters pay the highest proportion of their gross revenue for monitoring (4.54%, Table 4). However, removing shoreside monitoring requirements for vessels using EM for their monitoring may also not be straightforward, given the different role of shorebased monitoring for catch accounting under the current EM program. Additional work would be needed to understand if and how to modify the program to meet a new monitoring standard, which contributes to possible administrative impacts associated with this option for quota monitoring and catch accounting, as well as potentially increasing indirect industry costs associated

[15] At the time we were finalizing this report, we learned that at least one provider had increased their seaday rate to $700/day, effective August 16, 2024 (Sommer 2024)

with cost recovery fees. Additionally, while removing shorebased monitoring requirements may reduce compliance risks, compared to at-sea monitoring changes, due to redundancy in enforcement and the relative difficulty of non-compliance with shorebased reporting requirements, compliance risks are not zero. Removing shorebased monitoring requirements increases the risk of overfishing and negative biological impacts, particularly when incentives for noncompliance exist. Further, across the shorebased and at-sea monitoring options considered, lower levels of monitoring additionally run the risk of shifting attitudes in the fishery towards general noncompliance.

Within the at-sea monitoring program options considered, a decreased fixed coverage rate is most likely to reduce costs for harvesters that use humans for monitoring, particularly in the non-whiting trawl fleet, but could result in cost savings for vessels who use EM, depending on if and how EM program requirements are adjusted as a result. Cost savings from reductions in coverage are unlikely to be 1:1, meaning a reduction in coverage to 50% coverage may mean cost savings are less than 50% (Figure 11), due to effects on how efficiently observers can be hired, retained, and deployed under lower coverage rates. While this could still mean higher cost savings in comparison to the other options considered in this report, possible administrative, compliance and enforceability, and biological impacts may be negative, depending on how much coverage rates are decreased. In general, coverage rates less than 50% are expected to have the highest negative compliance, enforceability, and biological impacts, stemming from the reduced ability to detect noncompliance at sea, potential biases in catch and effort data, and long-term impacts on stock assessments. The current status of most quota managed stocks minimizes risks of noncompliance in most cases, but incentives for noncompliance may exist for at least two stocks (Figure 10, Table 10). Furthermore, reductions in at-sea monitoring coverage rates may increase administrative costs associated with respect to creating systems to randomly select and deploy observers on trips and systems for quota monitoring. Such administrative costs may increase cost recovery fees for fleets that are not capped. Additionally, the regulatory system may need to reduce flexibility in terms of where and when harvesters can fish to reduce uncertainty and minimize negative biological impacts, and the EM program may need to be further redesigned with a new catch accounting standard in mind. It may also be more difficult to train and have enough observers available if coverage rates change from year to year, or under low coverage rates, have enough observers or catch monitors available in remote port areas.

Finally, there may be other indirect consequences associated with changing monitoring coverage rates, including lower scores for many Marine Stewardship Council performance indicators, but also some benefits, including improved safety for both harvesters and crew, as a result of reducing the amount of time that observers need to be on fishing vessels and by reducing incentives to reduce monitoring costs and starting trips after midnight.

## Economic Data Collection Program

The EDC Program was developed to collect data that provides the necessary information to meet MSA and other regulatory requirements associated with understanding the impacts of the groundfish catch share program. EDC program data are used to understand the economic effects on operating costs, revenues, vessel characteristics, and processing facility characteristics. The EDC program also collects data to evaluate the program's goal of providing for a viable, profitable, and efficient groundfish fishery; increased operational flexibility; minimizing adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical; promoting measurable economic and employment benefits through the harvesting, processing, distribution, and support sectors of the industry; providing quality products for consumers; and, increasing safety in the fishery. Having the ability to understand whether these goals are being met was an important consideration by that Council in the development of the EDC program. The requirement that data are collected to evaluate program goals also grants policy makers the authority to determine the data needed to inform their evaluation of the program.

This paper considers whether there are potential options to collect the information policy makers determine is necessary but at a lower cost to catch share program participants. In addition to the status quo three different collection mythologies were considered, conducting a census less frequently, sampling sector populations, and conducting a census of just active participants.

Each sector's annual direct costs of submitting 2022 EDC data is presented in Table 13 and it shows that the total cost for all sectors was about $116k. The average cost per submission was the largest for first receivers/shorebased processors ($744). Catcher vessels cost per submission was next at $541, followed by motherships and catcher-processors ($298) and quota share holders ($52). In terms of overall direct cost, the catcher vessel sector paid $68,702, the first receivers/shorebased processors paid $34,987, quota share holders $7,968, catcher-processors $2,978, and motherships $1,787.

Indirect costs, the payment to reimburse agency costs (cost recovery) are presented in Table 14 by sector for the years 2017 through 2023. Those data indicate that there has been a steady and substantial decline in recoverable EDC costs over that period for all sectors. During 2022 the IFQ sector's EDC program costs were $129k. For all sectors combined, overall costs have declined over 75% during that period.

Total costs associated with the EDC program, direct plus indirect, were $268k in 2022 for all sectors. Whether that total cost is paid by participants in the catch share program depends on whether cost recovery fees are limited by the 3% cap that year. During those calendar years the mothership and catcher-processor sector were always below the 3% cap, so any indirect cost savings under the changes considered would be realized through cost recover fee reductions, all else being equal. The IFQ sector would realize indirect cost savings in some years, based on past cost recovery fee limits

and the sector's indirect costs. Table 17 shows that eliminating the EDC recoverable costs would not have changed the indirect cost to the IFQ sector in five of the eight years.

A summary of the directional changes in costs and data loss by sector and option are presented in Table 20. Conducting a census less often will result in data loss the years the surveys are not conducted. Because the fisheries are never for two consecutive years, not conducting the survey during a year with substantial changes (COVID year for example) would limit analyst's ability to detail all the economic impacts. Based on EDC staff's experience there could be a greater knowledge loss regarding how to complete the survey if it is not collected every year. The loss could be due to more time passing between when the surveys are completed by the same person or employee turnover. Knowledge loss could increase the time it takes to complete the survey and increase QA/QC checking time required by NMFS staff to review and correct each survey submitted. A reduction in overall cost with QA/QC because fewer forms need to be reviewed.

Regulations would need to be changed, which would increase costs in the short-term. Current regulations require the EDC forms to be submitted and completed before persons can participate in fisheries. Consequences for failure to submit a completed EDC survey apply to permit holders, vessel owners, and vessel lessee or charterers and could result in not being issued quota or not having required vessel permits approved.

Changes to the survey would require OMB approval of an updated PRA application. This process would increase agency staff time and costs in the short term.

Moving from a census to a sampling of participants in a sector would potentially only be possible for the IFQ sector. There are too few participants in the mothership and catcher-processor sector to collect a representative sample of the population without triggering confidentiality issues. Sampling the IFQ sector would also pose substantial challenges because of the heterogeneity in the harvesting and processing sectors. Some individuals would need to be sampled every year or critical data would not be collected for some products or harvest vessel categories. Industry participants may view being selected every year for the survey as unfair.

Moving to a sampling procedure would decrease costs in the long-run by some unknown amount and increase agency costs in the short-term (about three years) as regulations are changed, surveys are updated and tested, models are developed to describe the unsampled portion of the population, and paperwork for OMB approval is developed and submitted.

Overall, moving to a sampling model would be expected to have substantial negative impacts on data availability, with small but unquantified cost savings for the IFQ sector in the long-run. This option is unlikely to be viable for the mothership and catcher-processor sectors because of the small number of participants. Moving to a sampling procedure would have similar impacts on knowledge loss by the persons submitting the data and QA and QC for the agency as a less frequent census.

Conducting a census of just active participants could result in cost savings and limited loss of data quality for the non-IFQ fisheries. For LEP holders, it would decrease the reporting burden on individuals not actively fishing. The exact number of inactive LEP holders varies by year but EDC staff estimated that on average 35 trawl catcher vessel LEPs are not used to catch groundfish. The direct cost savings would only accrue to LEP holders that did not fish groundfish that year. The administration burden for EDC staff, Permits Office staff, and the OLE staff to identify and contact individuals that have not submitted their required forms would decrease. Compliance issues associated with holding vessels liable for someone else assigning a permit to their vessel could be reduced. Information from the vessels removed from the survey could still be collected through other surveys.

Modify regulations to only require buyers that purchased IFQ groundfish to submit the First Receivers/Shorebased Processors EDC survey rather than all buyers with a FRSL. It is estimated that on average 10 to 24% of the current FRSL are not used annually to take groundfish deliveries under the catch share program. The people holding these inactive permits would directly benefit from this regulatory change. Persons that hold and use a FRSL would not realize any direct benefit from this regulatory change.

Decreasing the number of surveys that are submitted annually would reduce the administrative burden. Not surveying FRSL holders that were inactive in the IFQ fishery could reduce the information available for non-IFQ species. As the number of firms active in the fishery declines, the impact on available information for other fisheries could increase over time. This option could introduce reporting issues with first receivers that do their accounting based on a fiscal year that is different from the calendar year. This could result in the survey only collecting a partial year's information. Reducing the consistency of when a firm is required to complete the survey could also create confusion in terms of what years the survey is required. It could also result in a loss of knowledge of how to complete the survey for bookkeepers that have not had to complete the survey for several years or if there was a new bookkeeper that needed to complete the survey the first time.

## Other Information Collection Programs

Two other information collection programs are briefly considered in this paper to determine whether cost savings might be realized. In both cases, the information collected is considered important and imposes minor costs. VMS gives management and enforcement agencies the ability to track the time, location, and speed of vessels. That information can be used to validate fishing locations and whether a vessel is fishing, moored, or steaming. That information is useful for managing areas that are closed to fishing or using certain types of gear. Scaling back the VMS requirements would be expected to have a small reduction in costs since the VMS program would not be eliminated. Vessel operators would still be required to maintain the system and have a service agreement. None of the changes would reduce agency costs and to the extent they may increase enforcement costs they could be passed on to industry through cost recovery fees. Reducing the

number of VMS submissions and the change in activities that trigger a required submission would reduce the reporting burden for harvesters that must coordinate the transfer of information with their home office.

Mothership and catcher-processor cooperative reports are annually submitted to the Council and provide specific information that the Council has determined to be important to better understand the fisheries. The Council has already removed the requirement for a preliminary report. Representatives for the two sectors have not expressed concern over providing the reports that have an established template.

## Considerations Across Alternatives

- Total industry costs for the EDC program in 2022 were $268,000 for all sectors
- Average industry costs between 2020 and 2022 for the monitoring program were $2,185,881 for at-sea monitoring and $1,038,668 for the shoreside monitoring, for a total of $3,224,549.
- Due to the differences in total industry costs associated with the EDC program and the monitoring program, changes to the monitoring program have a greater potential to reduce costs than changes to the EDC program.
- Major tradeoffs identified vary between these options, with the top trade-offs identified for monitoring program changes including negative impacts to compliance and enforceability of reporting requirements, and biological impacts resulting from potentially greater uncertainty and bias in discard and landings data. Negative administrative impacts may stem from new observer deployment and quota monitoring systems, redesign of the EM program, and loss of regulatory flexibility for harvesters. Top tradeoffs for changes to the EDC program includes the loss of data that helped analysts understand factors that contribute to cost changes, regulatory costs associated with changing data submission requirements, inability to model data not collected some years or for some strata, increased QA and QC costs to ensure accurate data, increased enforcement if people are not certain which years they must complete the surveys, and increased concern regarding the representativeness of the data utilized in analyses.

# References

Ardini, Greg, Chad Demarest, and Katherine McArdle. 2020. "Costs of At-Sea Monitoring under Government and Private Contracts in the Groundfish Fishery of the Northeastern United States." Fishery Bulletin 118 (3): 284–96. https://doi.org/10.7755/FB.118.3.7.

Atcheson, Megan. 2024. "Personal Communication with MSC Senior Fisheries Standards Manager," July 23, 2024.

Batsleer, J., K. G. Hamon, H. M. J. van Overzee, A. D. Rijnsdorp, and J. J. Poos. 2015. "High-Grading and over-Quota Discarding in Mixed Fisheries." Reviews in Fish Biology and Fisheries 25 (4): 715–36. https://doi.org/10.1007/s11160-015-9403-0.

Brannan, Darrell R. 2023. "An Initial Review Draft of a Comparative Cost Study for the West Coast Groundfish Trawl Catch Share Program." Pacific Fishery Management Council. https://www.pcouncil.org/documents/2023/04/review-material-comparative-cost-study-for-the-west-coast-groundfish-trawl-catch-share-program.pdf/.

Bretreger, David, In-Young Yeo, George Kuczera, and Greg Hancock. 2021. "Remote Sensing's Role in Improving Transboundary Water Regulation and Compliance: The Murray-Darling Basin, Australia." Journal of Hydrology X 13 (December):100112. https://doi.org/10.1016/j.hydroa.2021.100112.

Demarest, Chad, Anna Henry, Greg Ardini, and Samantha Werner. 2019. "Cost Efficiency Analysis for Catch Monitoring." *https://d23h0vhsm26o6d.cloudfront.net/2a.-Cost-efficiency-analysis_presentation.pdf*.

Doerpinghaus, J. 2024. "Personal Communication with Northern Economics," August 12, 2024.Hatcher, Aaron, Shabbar Jaffry, Olivier Thebaud, and Elizabeth Bennett. 2000. "Normative and Social Influences Affecting Compliance with Fishery Regulations." Land Economics 76 (3): 448. https://doi.org/10.2307/3147040.

Holland, Dan. 2024. "Personal Communication with NOAA Staff," April 12, 2024.

Kavanaugh, Justin. 2024. "Personal Communication with NOAA Staff," 2024.

Martins, Amy. 2022. "Fishery Monitoring and Research Division Update." New England Fishery Management Council Meeting, September 29. https://d23h0vhsm26o6d.cloudfront.net/1_2022-FMRD-Update-to-NEFMC_092822.pptx.pdf.

MRAG. 2024. "West Coast Limited Entry Groundfish Trawl Announcement Comment Draft Report." MRAG-MSC-F36-v1.3. MRAG Americas, Inc.

MSC (Marine Stewardship Council). 2023a. "Celebrating Sustainable Seafood: The Marine Stewardship Council Annual Report 2022-23." Marine Stewardship Council. https://www.msc.org/docs/default-source/default-document-library/about-the-msc/msc-annual-report-2022-2023.pdf.

MSC. 2023b. "MSC Fisheries Standard Toolbox." https://www.msc.org/docs/default-source/default-document-library/for-business/program-documents/fisheries-program-documents/msc-fisheries-standard-toolbox.pdf.

MSC. 2024a. "At-Sea Monitoring and Surveillance." Marine Stewardship Council. MSC International - English. 2024. https://www.msc.org/what-we-are-doing/our-approach/at-sea-monitoring-and-surveillance.

MSC. 2024b. "Evidence Requirements Framework Project." Marine Stewardship Council. MSC International - English. 2024. https://www.msc.org/standards-and-certification/developing-our-standards/the-fisheries-standard-review/projects/effective-fisheries-management-systems.

MSC. 2024c. "Fisheries - MSC Fisheries." Marine Stewardship Council. Track a Fishery. 2024. https://fisheries.msc.org/en/fisheries/.

MSC. 2024d. "Revised Approach to Implementing the MSC Fisheries Standard Version 3." Marine Stewardship Council. MSC International - English. 2024. https://www.msc.org/standards-and-certification/fisheries-standard/revised-version-3-approach-implementation.

MSC. 2024e. "The MSC Conditions Log - MSC Fisheries." Marine Stewardship Council. 2024. https://fisheries.msc.org/en/the-msc-conditions-log/.

MSC. 2024f. "What Does the MSC Label Mean." Marine Stewardship Council. MSC International - English. 2024. https://www.msc.org/what-we-are-doing/our-approach/what-does-the-blue-msc-label-mean.

National Fisherman. 2024. "Supreme Court Rules for Fishermen in Landmark 'Chevron Deference' Case." June 28, 2024. https://www.nationalfisherman.com/national-international/supreme-court-rules-for-fishermen-in-landmark-chevron-deference-case.

NEMFC (Northeast Fishery Management Council). 2022. "Amendment 23 to the Northeast Multispecies Fishery Management Plan: Volume II- Appendices." https://d23h0vhsm26o6d.cloudfront.net/210427_Amendment-23_Volume-II-Appendices.pdf.

NMFS (National Marine Fisheries Service). 2020. "Trawl Rationalization Program Cost Recovery Annual Report Fee Calculation for 2020 and Fishing Year 2019 Payments." National Marine Fisheries Service.

NMFS. 2021a. "NMFS Report: EM Cost Estimates Prepared by NMFS West Coast Regional Office PFMC Meeting, March 2-11, 2021." Supplemental NMFS Report 8. Agenda Item G.5.a. National Marine Fisheries Service. https://www.pcouncil.org/documents/2021/03/g-5-a-supplemental-nmfs-report-8-em-cost-estimates.pdf/.

NMFS. 2021b. "Trawl Rationalization Program Cost Recovery Annual Report: Fee Calculation for 2021 and Fishing Year 2020 Payments." National Marine Fisheries Service. West Coast. https://www.fisheries.noaa.gov/resource/document/trawl-rationalization-program-cost-recovery-annual-report-fee-calculation-2021.

NMFS. 2022a. "Regulatory Impact Review and Initial Regulatory Flexibility Analysis for a Proposed Regulatory Amendment to Implement an Electronic Monitoring Program for Groundfish Bottom Trawl and Non-Whiting Midwater Trawl Vessels in the Pacific Coast Groundfish Fishery." National Marine Fisheries Service, West Coast.

NMFS. 2022b. "Trawl Rationalization Program Cost Recovery Annual Report: Fee Calculation for 2022 and Fishing Year 2021 Payments." National Marine Fisheries Service. West Coast. https://www.fisheries.noaa.gov/resource/document/trawl-rationalization-program-cost-recovery-annual-report-fee-calculation-2022.

NMFS. 2023a. "Draft Analytical Document for a Regulatory Amendment Under the Pacific Coast Groundfish Fishery Management Plan - West Coast Electronic Monitoring Program." Supplemental Attachment 2 (Electronic Only) Agenda Item F.5. https://www.pcouncil.org/documents/2023/02/f-5-supplemental-attachment-2-electronic-only-draft-analytical-document-for-a-regulatory-amendment-under-the-pacific-coast-groundfish-fishery-management-plan-west-coast-electronic-monitorin.pdf/.

NMFS. 2023b. "Trawl Rationalization Program Cost Recovery Annual Report: Fee Calculation for 2023 and Fishing Year 2022 Payments." National Marine Fisheries Service. https://www.pcouncil.org/documents/2023/03/g-2-a-nmfs-report-1-pacific-coast-groundfish-trawl-rationalization-program-2023-cost-recovery-annual-report-fee-calculation-for-2023-and-fishing-year-2022-payments.pdf/.

NMFS. 2024. "Trawl Rationalization Program Cost Recovery Annual Report: Fee Calculation for 2024 and Fishing Year 2023 Payments." National Marine Fisheries Service. West Coast. https://www.fisheries.noaa.gov/resource/document/trawl-rationalization-program-cost-recovery-annual-report-fee-calculation-2024.

NMFS and NOAA (National Oceanic and Atmospheric Administration). 2019. Regulatory Amendment to the Pacific Coast Groundfish Fishery Management Plan to Implement an Electronic Monitoring Program for the Pacific Whiting Fishery. Vol. 50 CFR 660. https://www.govinfo.gov/content/pkg/FR-2019-06-28/pdf/2019-13324.pdf.

NOAA. 2023. "NOAA Fisheries Announces Overfished Determination for Quillback Rockfish off California." NOAA. West Coast. December 2023. https://www.fisheries.noaa.gov/bulletin/noaa-fisheries-announces-overfished-determination-quillback-rockfish-california.

NOAA Fisheries. 2012. "West Coast Groundfish Trawl Catch Share Program." https://media.fisheries.noaa.gov/dam-migration/fs-observers.pdf.

NOAA Fisheries. 2023. "2024 West Coast Region Electronic Monitoring Program: Updates and Reminders | NOAA Fisheries." NOAA. West Coast. November 30, 2023. https://www.fisheries.noaa.gov/bulletin/2024-west-coast-region-electronic-monitoring-program-updates-and-reminders.

NOAA Fisheries. 2024a. "FISHEyE." U.S. Department of Commerce, National Oceanographic and Atmospheric Administration. Fisheries Economic Explorer. 2024. https://connect.fisheries.noaa.gov/WestCoastCatchShares/.

NOAA Fisheries. 2024b. "West Coast Groundfish Trawl Catch Share Program | NOAA Fisheries." NOAA. West Coast. March 22, 2024. https://www.fisheries.noaa.gov/west-coast/sustainable-fisheries/west-coast-groundfish-trawl-catch-share-program.

NOAA OLE (Office of Law Enforcement). 2024. "2023 Trawl Rationalization (TRat) Compliance Summary." Supplemental Informational Report 2. NOAA Fisheries. https://www.pcouncil.org/documents/2024/03/supplemental-informational-report-2-2023-trawl-rationalization-trat-compliance-summary.pdf/.

PFMC (Pacific Fishery Management Council). 2022. "Status of the Pacific Coast Groundfish Fishery: Stock Assessment and Fishery Evaluation." The Pacific Management Council. https://www.pcouncil.org/documents/2022/09/status-of-the-pacific-coast-groundfish-fishery-stock-assessment-and-fishery-evaluation-july-2022.pdf/.

PFMC. 2024. "Electronic Monitoring." Pacific Fishery Management Council. 2024. https://www.pcouncil.org/managed_fishery/electronic-monitoring/.

PFMC and NMFS. 2010a. "Analysis of Components, Elements, and Options for the Individual Fishing Quota Alternative Trawl Individual Quota Components: Appendix A to the Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery Final Environmental Impact Statement." The Pacific Management Council and the National Marine Fisheries Service. https://www.pcouncil.org/documents/2010/06/sdf.pdf/.

PFMC and NMFS. 2010b. "Council Final Preferred Groundfish Trawl Rationalization Alternative: Appendix D to the Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery Final Environmental Impact Statement." The Pacific Management Council and the National

Marine Fisheries Service. https://www.pcouncil.org/documents/2010/06/groundfish-fmp-amendment-20-feis-appendix-d.pdf/.

PFMC and NMFS. 2010c. "Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery : Final Environmental Impact Statement Including Regulatory Impact Review and Initial Regulatory Flexibility Analysis." The Pacific Management Council and the National Marine Fisheries Service. https://repository.library.noaa.gov/view/noaa/3857.

PFMC and NMFS. 2017. "West Coast Groundfish Trawl Catch Share Program: Five-Year Review." Costa Mesa, CA: The Pacific Management Council and the National Marine Fisheries Service. https://www.pcouncil.org/documents/2017/01/trawl-catch-share-review-main-document.pdf/.

Phillips, Todd. 2024. "Personal Communication with PFMC Staff," July 18, 2024.

Porter, Read D. 2010. "Fisheries Observers as Enforcement Assets: Lessons from the North Pacific." Marine Policy 34 (3): 583–89. https://doi.org/10.1016/j.marpol.2009.11.005.

PSMFC (Pacific States Marine Fisheries Commission). 2012. "West Coast Groundfish Observer Program (WCGOP) | Pacific States Marine Fisheries Commission." Pacific States Marine Fisheries Council. 2012. https://www.psmfc.org/program/west-coast-groundfish-observer-program-wcgop.

Singh, Rajesh, and Quinn Weninger. 2015. "Harvest Efficiency and Fishery Discards under Harvest Uncertainty and Trading Restrictions." Journal of Environmental Economics and Management 70 (March):72–91. https://doi.org/10.1016/j.jeem.2014.11.001.

Somers, Kayleigh A., Jason Earl Jannot, Kate Richerson, Vanessa J. Tuttle, and Jon McVeigh. 2018. "Fisheries Observation Science Coverage Rates, 2002-17." [object Object]. https://repository.library.noaa.gov/view/noaa/18733.

Somers, Kayleigh A., Kate E. Richardson, Vanessa J. Tuttle, and Jon T. McVeigh. 2023. "Estimated Discard and Catch of Groundfish Species in the 2022 U.S. West Coast Fisheries." *https://doi.org/10.25923/1M2M-1008*.

Sommer, M. 2024. "Personal Communication with Northern Economics," August 12, 2024.Stewart, Carli. 2024. "Maine Fishermen Take Plea Deal for Herring Fraud." National Fisherman. March 2024. https://www.nationalfisherman.com/northeast/maine-fishermen-take-plea-deal-for-herring-fraud.

Wallace, John R. 2023. "Catch Only Rebuilding Projection: Status of Yelloweye Rockfish (Sebastes Ruberrimus) Along the U.S. West Coast in 2023." Northwest Fisheries Science Center. https://www.pcouncil.org/documents/2024/02/catch-only-rebuilding-projection-status-of-yelloweye-rockfish-sebastes-ruberrimus-along-the-u-s-west-coast-in-2023.pdf/.

Wang, Yuntao, and Jane DiCosimo. 2019. "National Observer Program 2016 Fishery Observer Attitudes and Experiences Survey." NOAA Technical Memorandum NMFS-F/SPO-186. https://spo.nmfs.noaa.gov/sites/default/files/TMSPO186.pdf.

Warlick, Amanda, Erin Steiner, and Marie Guldin. 2018. "History of the West Coast Groundfish Trawl Fishery: Tracking Socioeconomic Characteristics across Different Management Policies in a Multispecies Fishery." Marine Policy 93 (July):9–21. https://doi.org/10.1016/j.marpol.2018.03.014.

White, Cliff. 2016. "IRS Undercover Operation Leads to Tax Fraud Charges against Carlos Rafael of Carlos Seafoods." Seafood Source. February 2016. https://www.seafoodsource.com/news/supply-trade/irs-undercover-operation-leads-to-tax-fraud-charges-against-carlos-rafael-of-carlos-seafoods.

# Appendix 1: Supplemental Data and Materials

## Industry Monitoring Costs

### Catcher-Processor Monitoring Costs

**Table 22. Catcher-Processor Mean Observer Cost per Vessel ($2022)**

| Year | Median per vessel | Standard Deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | 17,300 | 4,003 | 15,133 | 50,822 |
| 2010 | 34,100 | 13,788 | 24,508 | 46,437 |
| 2011 | 33,700 | 15,956 | 19,359 | 50,161 |
| 2012 | 24,600 | 10,526 | 13,837 | 27,700 |
| 2013 | 21,660 | 4,415 | 17,196 | 26,129 |
| 2014 | 33,002 | 8,899 | 24,600 | 39,552 |
| 2015 | 41,210 | 12,142 | 27,653 | 44,933 |
| 2016 | 42,700 | 21,005 | 33,311 | 67,143 |
| 2017 | 54,400 | 25,501 | 47,433 | 89,620 |
| 2018 | 56,351 | 17,271 | 38,733 | 64,200 |
| 2019 | 54,500 | 9,395 | 49,430 | 64,689 |
| 2020 | 72,354 | 12,219 | 51,483 | 78,869 |
| 2021 | 58,698 | 11,185 | 37,646 | 65,550 |
| 2022 | 51,200 | 10,991 | 33,600 | 57,438 |
| **Average 2009-2010** | **25,700** | **8,896** | **19,821** | **48,630** |
| **Average 2011-2022** | **45,365** | **13,292** | **32,857** | **56,332** |

*Note: Catcher-processor monitoring costs were found by querying the FISHEyE Catcher-processor cost database using the terms: "cost category: Observers" and "Statistic: median per vessel"*

*Source: FISHEyE, accessed 7/1/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 23. Catcher-Processor Mean Observer Cost per Vessel/Day ($2022)

| Year | Median per vessel | Standard Deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | 733 | 149 | 672 | 985 |
| 2010 | 604 | 141 | 520 | 718 |
| 2011 | 636 | 375 | 472 | 1,008 |
| 2012 | 697 | 35 | 601 | 717 |
| 2013 | 461 | 214 | 340 | 716 |
| 2014 | 508 | 156 | 443 | 641 |
| 2015 | 644 | 143 | 481 | 760 |
| 2016 | 646 | 115 | 524 | 788 |
| 2017 | 879 | 273 | 685 | 1,100 |
| 2018 | 764 | 106 | 669 | 810 |
| 2019 | 768 | 129 | 688 | 897 |
| 2020 | 1,138 | 442 | 827 | 1,327 |
| 2021 | 896 | 353 | 666 | 1,146 |
| 2022 | 849 | 153 | 639 | 883 |
| **Average 2009-2010** | **669** | **145** | **596** | **852** |
| **Average 2011-2022** | **741** | **208** | **586** | **899** |

*Note: Catcher-processor monitoring costs were found by querying the FISHEyE Catcher-processor cost database using the terms: "cost category: Observers" and "Statistic: median per vessel/day"*

*Source: FISHEyE, accessed 7/1/2024,* https://connect.fisheries.noaa.gov/WestCoastCatchShares/

## Mothership Monitoring Costs

### Table 24. Mothership Median Observers Cost per Vessel ($2022)

| Year | Median per vessel | Standard Deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| | $2022 | | | |
| 2009 | 14,583 | 5,460 | 12,483 | 21,208 |
| 2010 | 15,810 | 4,611 | 12,783 | 20,258 |
| 2011 | 28,551 | 26,938 | 16,900 | 57,164 |
| 2012 | 29,458 | 21,139 | 22,338 | 46,097 |
| 2013 | 24,460 | 16,157 | 17,654 | 43,320 |
| 2014 | 33,132 | 12,798 | 25,233 | 52,057 |
| 2015 | 38,400 | 7,443 | 18,785 | 42,583 |
| 2016 | 32,285 | 32,891 | 18,517 | 71,508 |
| 2017 | 59,790 | 35,638 | 34,031 | 86,772 |
| 2018 | 53,100 | 26,835 | 29,920 | 72,947 |
| 2019 | 34,650 | 17,194 | 24,583 | 48,340 |
| 2020 | 23,008 | 21,658 | 16,381 | 45,600 |
| 2021 | 34,209 | 11,699 | 11,440 | 39,833 |
| 2022 | 32,259 | 23,860 | 17,720 | 54,175 |
| **Average 2009-2010** | **15,197** | **5,036** | **12,633** | **20,733** |
| **Average 2011-2022** | **35,275** | **21,188** | **21,125** | **55,033** |

*Note: Mothership monitoring costs were found by querying the FISHEyE mothership cost database using the terms: "cost category: Observers" and "Statistic: median per vessel"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 25. Mothership Median Observers Cost per Vessel/Day ($2022)

| Year | Median per vessel/day | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | 810 | 293 | 603 | 1,006 |
| 2010 | 620 | 178 | 356 | 723 |
| 2011 | 539 | 177 | 370 | 673 |
| 2012 | 601 | 140 | 533 | 982 |
| 2013 | 426 | 227 | 279 | 776 |
| 2014 | 733 | 221 | 506 | 786 |
| 2015 | 668 | 334 | 325 | 856 |
| 2016 | 663 | 241 | 424 | 796 |
| 2017 | 1,018 | 225 | 830 | 1,182 |
| 2018 | 823 | 323 | 642 | 1,042 |
| 2019 | 662 | 68 | 627 | 748 |
| 2020 | 886 | 92 | 779 | 974 |
| 2021 | 836 | 88 | 699 | 977 |
| 2022 | 719 | 98 | 659 | 810 |
| **Average 2009-2010** | **715** | **236** | **480** | **865** |
| **Average 2011-2022** | **715** | **186** | **556** | **884** |

*Note: Mothership monitoring costs were found by querying the FISHEyE mothership cost database using the terms: "cost category: Observers" and "Statistic: median per vessel/day"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Catcher-Vessel Monitoring Costs

### Table 26. Non-Whiting Trawl Median Observer/EM Costs per Vessel ($2022)

| Year | Median per vessel | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | NA | NA | NA | NA |
| 2010 | NA | NA | NA | NA |
| 2011 | 2,551 | 2,053 | 1,166 | 4,021 |
| 2012 | 4,676 | 4,104 | 2,502 | 8,284 |
| 2013 | 9,009 | 6,035 | 5,402 | 16,504 |
| 2014 | 12,312 | 10,065 | 6,653 | 22,196 |
| 2015 | 17,255 | 12,845 | 10,222 | 30,243 |
| 2016 | 16,242 | 14,081 | 7,901 | 36,655 |
| 2017 | 17,180 | 15,405 | 7,891 | 39,948 |
| 2018 | 15,214 | 13,923 | 6,574 | 33,921 |
| 2019 | 16,563 | 15,909 | 6,513 | 30,761 |
| 2020 | 16,875 | 13,976 | 7,861 | 34,804 |
| 2021 | 11,270 | 15,171 | 5,419 | 32,928 |
| 2022 | 10,000 | 8,897 | 5,292 | 27,496 |
| **Average 2009-2010** | **NA** | **NA** | **NA** | **NA** |
| **Average 2011-2022** | **12,429** | **11,039** | **6,116** | **26,480** |

*Note: Catcher vessel non-whiting trawl monitoring costs were found by querying the FISHEyE catcher vessel cost database using the terms: "cost category: Observers/EM", "Statistic: median per vessel", "Fisheries: All catch share fisheries combined" and "Vessel type: Non-whiting vessels"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 27. Non-Whiting Trawl Median Observer/EM Costs per Vessel/Day ($2022)

| Year | Median per vessel/day | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | NA | NA | NA | NA |
| 2010 | NA | NA | NA | NA |
| 2011 | 27 | 25 | 14 | 52 |
| 2012 | 53 | 47 | 30 | 99 |
| 2013 | 104 | 82 | 59 | 186 |
| 2014 | 143 | 118 | 71 | 259 |
| 2015 | 178 | 177 | 91 | 362 |
| 2016 | 183 | 175 | 88 | 455 |
| 2017 | 233 | 230 | 84 | 477 |
| 2018 | 198 | 196 | 70 | 389 |
| 2019 | 182 | 187 | 84 | 366 |
| 2020 | 205 | 197 | 103 | 482 |
| 2021 | 197 | 233 | 64 | 418 |
| 2022 | 177 | 183 | 77 | 404 |
| **Average 2009-2010** | **NA** | **NA** | **NA** | **NA** |
| **Average 2011-2022** | **157** | **154** | **70** | **329** |

*Note: Catcher vessel non-whiting trawl monitoring costs were found by querying the FISHEyE catcher vessel cost database using the terms: "cost category: Observers/EM", "Statistic: median per vessel/day", "Fisheries: All catch share fisheries combined" and "Vessel type: Non-whiting vessels"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 28. Whiting Trawl Median Observer/EM Costs per Vessel ($2022)

| Year | Median per vessel | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | 0 | 0 | 0 | 3,347 |
| 2010 | 0 | 0 | 0 | 7,276 |
| 2011 | 3,799 | 2,494 | 1,388 | 5,117 |
| 2012 | 6,623 | 6,213 | 3,652 | 14,291 |
| 2013 | 16,254 | 10,381 | 8,685 | 22,172 |
| 2014 | 23,368 | 13,022 | 14,572 | 32,300 |
| 2015 | 10,651 | 6,382 | 8,313 | 35,579 |
| 2016 | 8,723 | 5,052 | 6,738 | 28,254 |
| 2017 | 9,092 | 3,676 | 7,263 | 24,566 |
| 2018 | 7,494 | 1,538 | 6,792 | 11,271 |
| 2019 | 7,685 | 2,296 | 6,343 | 13,243 |
| 2020 | 6,783 | 6,025 | 6,452 | 13,126 |
| 2021 | 7,171 | 3,253 | 5,289 | 10,506 |
| 2022 | 7,450 | 7,505 | 6,153 | 14,958 |
| **Average 2009-2010** | **0** | **0** | **0** | **5,312** |
| **Average 2011-2022** | **9,591** | **5,653** | **6,803** | **18,782** |

*Note: Catcher vessel whiting trawl monitoring costs were found by querying the FISHEyE catcher vessel cost database using the terms: "cost category: Observers/EM", "Statistic: median per vessel", "Fisheries: All catch share fisheries combined" and "Vessel type: Whiting vessels"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 29. Whiting Trawl Median Observer/EM Costs per Vessel/day ($2022)

| Year | Median per vessel/day | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | 0 | 0 | 0 | 45 |
| 2010 | 0 | 0 | 0 | 80 |
| 2011 | 45 | 24 | 27 | 58 |
| 2012 | 110 | 74 | 50 | 143 |
| 2013 | 192 | 62 | 148 | 209 |
| 2014 | 260 | 87 | 180 | 315 |
| 2015 | 188 | 256 | 100 | 409 |
| 2016 | 85 | 70 | 52 | 221 |
| 2017 | 112 | 100 | 68 | 203 |
| 2018 | 84 | 52 | 55 | 136 |
| 2019 | 92 | 83 | 51 | 229 |
| 2020 | 75 | 63 | 48 | 186 |
| 2021 | 59 | 61 | 34 | 120 |
| 2022 | 79 | 72 | 44 | 156 |
| **Average 2009-2010** | **0** | **0** | **0** | **63** |
| **Average 2011-2022** | **115** | **84** | **71** | **199** |

*Note: Catcher Vessel whiting trawl monitoring costs were found by querying the FISHEyE catcher vessel cost database using the terms: "cost category: Observers/EM", "Statistic: median per vessel/day", "Fisheries: All catch share fisheries combined" and "Vessel type: Whiting vessels"*

*Source: FISHEyE, accessed 6/21/2024,* https://connect.fisheries.noaa.gov/WestCoastCatchShares/

## Shoreside Monitoring Costs

### Table 30. All Processor Shoreside Processor Median Monitoring Costs per Processor ($2022)

| Year | Median per processor | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | 7,055 | 10,258 | 2,212 | 13,009 |
| 2010 | 20,052 | 22,297 | 4,264 | 39,505 |
| 2011 | 2,558 | 20,917 | 1,833 | 12,524 |
| 2012 | 8,407 | 11,937 | 1,766 | 18,299 |
| 2013 | 15,675 | 20,217 | 5,852 | 36,381 |
| 2014 | 20,371 | 23,916 | 7,415 | 43,060 |
| 2015 | 28,192 | 45,657 | 7,637 | 69,513 |
| 2016 | 31,883 | 56,632 | 6,011 | 85,202 |
| 2017 | 34,005 | 78,255 | 9,357 | 128,674 |
| 2018 | 50,583 | 80,686 | 12,687 | 169,829 |
| 2019 | 77,177 | 80,639 | 20,331 | 181,803 |
| 2020 | 71,002 | 73,082 | 29,433 | 150,084 |
| 2021 | 50,502 | 71,825 | 13,326 | 139,926 |
| 2022 | 29,400 | 69,421 | 3,810 | 118,392 |
| **Average 2009-2010** | **13,554** | **16,278** | **3,238** | **26,257** |
| **Average 2011-2022** | **34,980** | **52,765** | **9,955** | **96,141** |

*Note: All processor costs were found by querying the FISHEyE shorebased processors cost database using the terms: "cost category: Shoreside monitoring", "Statistic: median per processor", "production activities: All Production" and "processor type: All processors"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 31. Whiting Shoreside Processor Median Monitoring Costs per Processor ($2022)

| Year | Median per processor | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | NA | NA | NA | NA |
| 2010 | NA | NA | NA | NA |
| 2011 | 11,912 | 26,149 | 2,137 | 15,509 |
| 2012 | 13,930 | 14,291 | 2,575 | 27,432 |
| 2013 | 30,063 | 24,296 | 8,245 | 45,242 |
| 2014 | 32,501 | 28,260 | 9,433 | 52,924 |
| 2015 | 68,377 | 50,457 | 32,194 | 111,985 |
| 2016 | 81,452 | 61,584 | 39,144 | 133,347 |
| 2017 | 123,828 | 80,511 | 52,168 | 178,411 |
| 2018 | 132,537 | 83,651 | 42,229 | 182,844 |
| 2019 | 181,610 | 69,783 | 82,044 | 188,583 |
| 2020 | 125,036 | 62,050 | 71,181 | 199,361 |
| 2021 | 136,659 | 66,532 | 62,103 | 186,278 |
| 2022 | 124,705 | 62,709 | 69,802 | 169,846 |
| **Average 2009-2010** | **NA** | **NA** | **NA** | **NA** |
| **Average 2011-2022** | **88,551** | **52,523** | **39,438** | **124,314** |

*Note: Whiting processor costs were found by querying the FISHEyE shorebased processors cost database using the terms: "cost category: Shoreside monitoring", "Statistic: median per processor", "production activities: All Production" and "processor type: Whiting processors"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

## Table 32. Non-whiting Shoreside Processor Median Monitoring Costs per Processor ($2022)

| Year | Median per processor | Standard deviation | Quartile: 25th | Quartile: 75th |
|---|---|---|---|---|
| 2009 | NA | NA | NA | NA |
| 2010 | NA | NA | NA | NA |
| 2011 | 1,298 | 1,508 | 241 | 2,928 |
| 2012 | 7,633 | 6,258 | 609 | 10,585 |
| 2013 | 8,129 | 11,961 | 3,869 | 20,451 |
| 2014 | 14,962 | 14,794 | 5,110 | 21,229 |
| 2015 | 8,458 | 20,995 | 5,126 | 28,962 |
| 2016 | 16,407 | 21,900 | 2,499 | 28,072 |
| 2017 | 10,101 | 27,738 | 2,849 | 31,712 |
| 2018 | 15,777 | 29,550 | 5,375 | 39,714 |
| 2019 | 17,075 | 33,387 | 5,127 | 49,317 |
| 2020 | 29,408 | 30,045 | 4,643 | 45,436 |
| 2021 | 14,210 | 30,647 | 1,859 | 33,238 |
| 2022 | 4,185 | 27,979 | 3,021 | 21,697 |
| **Average 2009-2010** | **NA** | **NA** | **NA** | **NA** |
| **Average 2011-2022** | **12,304** | **21,397** | **3,361** | **27,778** |

*Note: Non-whiting processor costs were found by querying the FISHEyE shorebased processors cost database using the terms: "cost category: Shoreside monitoring", "Statistic: median per processor", "production activities: All Production" and "processor type: Non-whiting processors"*

*Source: FISHEyE, accessed 6/21/2024, https://connect.fisheries.noaa.gov/WestCoastCatchShares/*

# Agency Costs

## Total Agency Incremental Costs

### Table 33. Agency Incurred Incremental Monitoring Costs

| Fishing Year | Category | Permits & Monitoring (WCR) ($) | % of Total Category Cost | PSMFC (WCR) ($) | % of Total Category Cost | Fisheries Observation Science (NWFSC) ($) | % of Total Category Cost | Total Category Cost ($) |
|---|---|---|---|---|---|---|---|---|
| 2023 | IFQ | 38,975.58 | 2.00% | 854,779.35 | 44.40% | 591,620.72 | 30.70% | 1,927,301.37 |
| | CP | 472.4 | 1.60% | 0 | 0.00% | 0 | 0.00% | 29,364.40 |
| | MS | 8,720.56 | 3.10% | 53,713.00 | 19.20% | 148,276.30 | 52.90% | 280,187.19 |
| 2022 | IFQ | 45,267.22 | 2.70% | 688,104.00 | 40.40% | 550698.73 | 32.40% | 1,701,903.39 |
| | CP | 1,141.72 | 3.40% | 0 | 0.00% | 193.78 | 0.60% | 33,840.12 |
| | MS | 13,936.08 | 10.80% | 11,175.00 | 8.70% | 47753.06 | 37.10% | 128,758.92 |
| 2021 | IFQ | 44,039.62 | 2.60% | 618,595.00 | 36.60% | 480,039.30 | 28.40% | 1,689,034.21 |
| | CP | 3,730.17 | 10.40% | 0 | 0.00% | 160.2 | 0.40% | 35,958.08 |
| | MS | 15,641.93 | 12.30% | 14,986.00 | 11.70% | 36,778.96 | 28.80% | 127,649.64 |
| 2020 | IFQ | 64,837.51 | 4.30% | 269,994.00 | 17.70% | 511,945.05 | 33.60% | 1,525,104.48 |
| | CP | 847.9 | 1.30% | NA | 0.00% | 152.4 | 0.20% | 63,380.69 |
| | MS | 24,115.27 | 16.60% | NA | 0.00% | 43,017.27 | 29.60% | 145,378.12 |
| 2019 | IFQ | 31,089 | 1.70% | 631,890 | 35.00% | 154,584 | 8.60% | 1,807,568.00 |
| | CP | 1,903 | 2.20% | NA | 0.00% | 828 | 1.00% | 85,435.73 |
| | MS | 24,104 | 22.50% | NA | 0.00% | 4,767 | 4.40% | 107,161.38 |
| 2018 | IFQ | 35,571.89 | 2.0% | 201,882.00 | 11.5% | 159,407 | 9.1% | 1,753,653.57 |
| | CP | 1,795.59 | 2.5% | NA | 0.0% | 593 | 0.8% | 71,400.39 |
| | MS | 4,160.02 | 8.8% | NA | 0.0% | 2,248 | 4.8% | 47,178.23 |
| 2017 | IFQ | 142,254.78 | 7.1% | 199,361.00 | 9.9% | 187,229 | 9.3% | 2,015,787.69 |
| | CP | 1,127.17 | 1.5% | NA | 0.0% | 1,744 | 2.3% | 76,817.17 |
| | MS | 1,769.62 | 1.4% | NA | 0.0% | NA | 0.0% | 128,452.93 |

*Note: IFQ stands for "individual fishing quota", CP stands for "catcher-processor", and MS stands for "mothership". The cost recovery reports for 2014-2016 do not provide specific sector cost breakdowns and were not included*

*Source: NOAA Trawl Rationalization Program Cost Recovery Annual Reports (2024-2015)*

## Agency Costs by Sector

### Table 34. IFQ Agency Incurred Incremental Monitoring Costs

| Fishing Year | Permits & Monitoring (WCR) | % Total IFQ Spending | PSMFC (WCR) | % Total IFQ Spending | Fisheries Observation Science (NWFSC) | % Total IFQ Spending |
|---|---|---|---|---|---|---|
| 2023 | 38,975.58 | 2.0% | 854,779.35 | 44.4% | 591,620.72 | 30.7% |
| 2022 | 45,267.22 | 2.7% | 688,104.00 | 40.4% | 550698.73 | 32.4% |
| 2021 | 44,039.62 | 2.6% | 618,595.00 | 36.6% | 480,039.30 | 28.4% |
| 2020 | 64,837.51 | 4.3% | 269,994.00 | 17.7% | 511,945.05 | 33.6% |
| 2019 | 31,089 | 1.7% | 278,655.00 | 15.4% | 154,584 | 8.6% |
| 2018 | 35,571.89 | 2.0% | 201,882.00 | 11.5% | 159,407 | 9.1% |
| 2017 | 142,254.78 | 7.1% | 199,361.00 | 9.9% | 187,229 | 9.3% |

*Note: The cost recovery reports for 2014-2016 do not provide specific sector cost breakdowns and were not included*

*Source: NOAA Trawl Rationalization Program Cost Recovery Annual Reports (2024-2018)*

### Table 35. Catcher-Processor Agency Incurred Incremental Monitoring Costs

| Fishing Year | Permits & Monitoring (WCR) | % Total Catcher-Processor Spending | PSMFC (WCR) | % Total Catcher-Processor Spending | Fisheries Observation Science (NWFSC) | % Total Catcher-processor Spending |
|---|---|---|---|---|---|---|
| 2023 | 472.4 | 1.61% | 0.00 | 0.00 | 0 | 0.0% |
| 2022 | 1,141.72 | 3.37% | 0 | 0.0% | 193.78 | 0.6% |
| 2021 | 3,730.17 | 10.37% | 0 | 0.0% | 160.2 | 0.4% |
| 2020 | 847.9 | 1.34% | NA | 0.0% | 152.4 | 0.2% |
| 2019 | 1,903 | 2.23% | NA | 0.0% | 828 | 1.0% |
| 2018 | 1,795.59 | 2.51% | NA | 0.0% | 593 | 0.8% |
| 2017 | 1,127.17 | 1.47% | NA | 0.0% | 1,744 | 2.3% |

*Note: The cost recovery reports for 2014-2016 do not provide specific sector cost breakdowns and were not included*

*Source: NOAA Trawl Rationalization Program Cost Recovery Annual Reports (2024-2018)*

## Table 36. Mothership Agency Incurred Incremental Monitoring Costs

| Fishing Year | Permits & Monitoring (WCR) | % Total Mothership Spending | PSMFC (WCR) | % Total Mothership Spending | Fisheries Observation Science (NWFSC) | % Total Mothership Spending |
|---|---|---|---|---|---|---|
| 2023 | 8,720.56 | 3.11% | 53,713.00 | 19.2% | 148,276.30 | 52.9% |
| 2022 | 13,936.08 | 10.82% | 11,175.00 | 8.7% | 47753.06 | 37.1% |
| 2021 | 15,641.93 | 12.25% | 14,986.00 | 11.7% | 36,778.96 | 28.8% |
| 2020 | 24,115.27 | 16.59% | NA | 0.0% | 43,017.27 | 29.6% |
| 2019 | 9,457 | 8.83% | NA | 0.0% | 4,767 | 4.4% |
| 2018 | 4,160.02 | 8.82% | NA | 0.0% | 2,248 | 4.8% |
| 2017 | 1,769.62 | 1.38% | NA | 0.0% | NA | 0.0% |

*Note: The cost recovery reports for 2014-2016 do not provide specific sector cost breakdowns and were not included*

*Source: NOAA Trawl Rationalization Program Cost Recovery Annual Reports (2024-2018)*

# West Coast Groundfish Stock Status

### Table 37. Status of Overfished and Rebuilding Species 2002-2016

| Species | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| California Quillback Rockfish | | | | | | | | | | * | | | | | | | | | | * | | | **Of** |
| Lingcod | **Of** | **Of** | *R** | * | | | | * | | | | | | | | | | | | * | | | |
| Whiting | **Of*** | **Of** | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Widow Rockfish | **Of** | **Of*** | **OF** | *R** | *R* | *R** | *R* | *R** | *R* | * | | | | * | | | | * | | | | | |
| Bocaccio | **Of** | **Of*** | **Of** | **Of*** | **Of** | **Of*** | **Of** | *R** | *R* | *R** | *R* | *R** | *R* | *R** | *R* | * | | | | | | | |
| Darkblotched | **Of** | **Of*** | **Of** | **Of*** | **Of** | **Of*** | **Of** | *R** | *R* | *R** | *R* | *R** | *R* | *R** | *R* | * | | | | | | | |
| Petrale Sole | | | | * | | | | **Of*** | **Of** | *R** | *R* | *R** | *R* | * | | | | * | | | | * | |
| Cowcod | **Of** | **Of** | **Of** | **Of*** | **Of** | **Of*** | **Of** | **Of** | **Of*** | **Of** | *R* | *R** | *R* | *R** | *R* | | | | | | | | |
| Canary Rockfish | **Of*** | **Of** | **Of** | **Of*** | **Of** | *R** | *R* | **Of*** | **Of** | **Of*** | **Of** | **Of** | **Of** | * | | | | | | | | * | |
| POP | **Of** | **Of*** | *R* | **Of*** | **Of** | *R** | *R* | *R** | *R* | **Of*** | **Of** | **Of** | **Of** | **Of** | **Of** | * | | | | | | | |
| Yelloweye Rockfish | **Of*** | **Of** | **Of** | **Of*** | **Of*** | **Of*** | **Of*** | **Of** | **Of*** | **Of** | **Of*** | **Of** | **Of** | **Of*** | **Of** | *R** | *R* | *R* | *R* | *R* | *R* | *R* | *R* |
| # overfished | 9 | 9 | 6 | 6 | 6 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| # rebuilding | 0 | 0 | 2 | 1 | 1 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Total** | **9** | **9** | **8** | **7** | **7** | **7** | **7** | **8** | **8** | **7** | **7** | **7** | **7** | **5** | **5** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **2** |

*Note: "Of" represents stocks that are considered overfished and "R" represents stocks that are no longer considered overfished, but not yet rebuilt (i.e. rebuilding). The Council does not differentiate the rebuilding phase from the overfished phase, so any stock defined as "rebuilding" by NMFS would be considered "overfished" by the Council. Designations with * represent years where stock assessments were completed for that stock.*

*Source: PFMC and NMFS 2017*

## Studies Using EDC Data

Brannan, D. 2023. A Comparative Cost Study for the West Coast Groundfish Trawl Catch Share Program. September 2023. Prepared for the Pacific Fishery Management Council. September 2023.

Brinson, A.A. and E. M. Thunberg. 2013. The Economic Performance of U.S. Catch Share Programs. U.S. Dept. of Commer., NOAA Technical Memorandum NMFS-NWFSC.

Connelly, K., E. Steiner, and A. Vizek. 2022. Quota Share Owner Survey: Initial Results and Analysis. NOAA Tech Memo NMFS-NWFSC 172.

Errend, M., L. Pfeiffer, E. Steiner, M. Guldin, and A. Warlick. 2019. Economic Outcomes for Harvesters under the West Coast Groundfish Trawl Catch Share Program: Have Goals and Objectives Been Met? Coastal Management 46(6): 564–86.

Guldin, M., and C. Anderson. 2018. Catch Shares and Shoreside Processors: A Costs and Earnings Exploration into the Downstream Sector. Marine Resource Economics 33(3): 289–307.

Harsch, M., L. Pfeiffer, E. Steiner, and M. Guldin. 2018. Economic Performance Metrics: An Overview of Metrics and the Use of Web Applications to Disseminate Outcomes in the U.S. West Coast Groundfish Trawl Catch Share Program. NOAA technical memorandum NMFS-NWFS 143.

Guldin, M., A. Warlick, M. Errend, L. Pfeiffer, and E. Steiner. 2019. Shorebased Processor Outcomes Under Catch Shares. Coastal Management: 1–16.

Holland, D., E. Steiner, and A. Warlick. 2017. Can Vessel Buybacks Pay off: An Evaluation of an Industry Funded Fishing Vessel Buyback. Marine Policy 82: 8–15.

Holland, D., and K. Norman. 2015. The Anatomy of a Multispecies Individual Fishing Quota (IFQ) Market. US Dept. of Commer., NOAA Technical Memorandum NMFS-NWFSC.

Holland, D. 2016. Development of the Pacific Groundfish Trawl IFQ Market. Marine Resource Economics 31(4): 453–64.

Holland, D., and C. Martin. 2019. Bycatch Quotas, Risk Pools, and Cooperation in the Pacific Whiting Fishery. Frontiers in Marine Science 6: 600.

Kitts, A., Van Anrooy, R., Van Eijs, S., Pino Shibata, J., Pallalever Pérez, R., Augusto Gonçalves, A., Ardini, G., Liese, C., Pan, M., Steiner, E. 2020. Techno-economic performance review of selected fishing fleets in North and South America. FAO Fisheries and Aquaculture Technical Paper No. 653/2. Rome, FAO.

Kitts, A., J. Walden, D. Squires, M. Travis, E. Steiner, L. Pfeiffer, C. Liese, and M. Pan. 2022. NOAA Fisheries Best Practices for Measuring Returns to Fishing Businesses NOAA Tech. Memo. NMFS-F/SPO-231, 54 p

Krigbaum, M. and C. Anderson. 2021. Increasing value through gear flexibility: a case study of US west coast sablefish. Canadian Journal of Fisheries and Aquatic Sciences. 78(8): 1130-1145.

Krigbaum, M., M. Steiner, A. Vizek, J. Leonard. 2019. Economic Data Collection Program First Receiver and Shorebased Processor Report (2009-2016). NMFS Northwest Fisheries Science Center. May 2019. *https://media.fisheries.noaa.gov/dam-migration/edc_catcher_vessel_report_may_2019.pdf*

Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

Leonard, J., and E. Steiner. 2017. Initial Economic Impacts of the U.S. Pacific Coast Groundfish Fishery Individual Fishing Quota Program. North American Journal of Fisheries Management 37(4): 862–81.

Lian, C. 2010. West Coast Limited Entry Groundfish Trawl Cost Earnings Survey Protocols and Results for 2004. NOAA Technical Memorandum NMFS-NWFSC.

Lian, C., R. Singh, and Q. Weninger. 2010. Fleet Restructuring, Rent Generation, and the Design of Individual Fishing Quota Programs: Empirical Evidence from the Pacific Coast Groundfish Fishery. Marine Resource Economics 24(4): 329–359.

Pfeiffer, L. (2018). Outcomes of the West Coast Groundfish Trawl Catch Share Program: The First Five Years. Coastal Management. 46. 1-7. 10.1080/08920753.2018.1522488.

PFMC and NMFS. 2017. West Coast Groundfish Trawl Catch Share Program: Five-year review. Approved by the Pacific Fishery Management Council November 16th 2017, Costa Mesa, CA.

Russell, S., M. Van Oostenburg and A. Vizek. 2019. Adapting to Catch Shares: Perspectives of West Coast Groundfish Trawl Participants. Coastal Management 46(6): 603-620.

Russell, S., A. Arias-Arthur, K. Sparks, and A. Varney. 2016. West Coast Communities and Catch Shares: The Early Years of Social Change. Coastal Management 44(5): 441-451.

Steiner, E. 2019. Economic Data Collection Program Catcher Vessel Report (2009-2016). NMFS. Northwest Fisheries Science Center. May 2019. *https://media.fisheries.noaa.gov/dam-migration/edc_catcher_vessel_report_may_2019.pdf*

Steiner, E., S. Russell, A. Vizek, and A. Warlick. 2019. Crew in the West Coast Groundfish Catch Share Program: Changes in Compensation and Job Satisfaction. Coastal Management 46(6): 656–676. *https://doi.org/10.1080/08920753.2018.1522495*.

Steiner, E., A. Vizek, M. Guldin, M. Krigbaum, and L. Pfeiffer. 2021. Evaluating the Economic Performance of the U.S. West Coast Groundfish Trawl Catch Share Program. NOAA Tech Memo NMFS-NWFSC 169.

Thunberg, E., J. Agar, S. Crosson, B. Garber-Yonts, A. Harley, A. Kitts, T. Lee, C. Lian, C. Liese, M. Pan, L. Perruso, G. Silva, D. Squires, E. Steiner, and S. Stohs. 2015. A Snapshot of NOAA Fisheries Data Collection of Commercial Fishery Costs. U.S. Dept of Commer., NOAA Technical Memorandum NMFS-NWFSC.

Thunberg, E., A. Kitts, G. Ardini, A. Chen, B. Garber-Yonts, J. Hilger, C. Hutt, C. Liese, S. Lovell, M. McGregor, M. Pan, D. Records, G. Silva, E. Steiner, S. Stohs, M. Travis, S. Werner, and S. Warpinski. 2023. A Snapshot Update of NOAA Fisheries Data Collection of Commercial and For-Hire Fishery Costs and Earnings. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-F/SPO-245, 71 p.

Vizek, A., M. Van Oostenburg, and S. Russell. 2020. The transition to catch shares management in the West Coast groundfish trawl fishery: changing job attitudes and adjusting fishing participation plans. Society and Natural Resources 33(10): 1175-1193.

Warlick, A., E. Steiner, and M. Guldin. 2018. History of the West Coast Groundfish Trawl Fishery: Tracking Socioeconomic Characteristics across Different Management Policies in a Multispecies Fishery. Marine Policy 93: 9–21.

## Proposed Work

Report to the Council in February 2023. Developing a Report on West Coast Fisheries Considerations in Offshore Wind Development. Lisa Pfeiffer, Ph.D. Research Economist NMFS Northwest Fisheries Science Center Jennifer Lilah Isé West Coast Offshore Wind Energy Coordinator NMFS West Coast Region.

Pacific Fishery Management Council: Review of the West Coast Groundfish Trawl Catch Share Program.